LINDAU NOBEL LAUREATE MEETINGS

7th Lindau Meeting on Economic Sciences

71st Lindau Nobel Laureate Meeting Chemistry

Annual Report 2022

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LINDAU
NOBEL LAUREATE
MEETINGS

Contents

Commitment to Collaboration, Dialogue, Respect and Diversity

For the Lindau Nobel Laureate Meetings, 2022 in general meant a return to on-site meetings in Lindau. After two years mainly online, of which we made the most, Young Scientists and Nobel Laureates enjoyed the true Lindau spirit again. Young Economists invited in 2020 finally also had the chance to meet their idols and peers. Looking back at last year, we extend our gratitude to Wolfgang Lubitz for his achievements as Scientific Chair for Chemistry. After almost 20 years of commitment for the Lindau Meetings, he is succeeded by Professors Valeria Nicolosi and Pernilla Wittung-Stafshede, both equally dedicated to their new role (see p. 12f).

With the pandemic on the downswing in early 2022, the world was reminded that there are other crises to deal with, namely the Russian war against Ukraine. As we write this, unfortunately, the Call for Peace, initiated by the Max Planck Society and supported by the Lindau Meetings, remains as topical as ever (see p. 112f). The scientific community had to work out how to best respond to this war, especially with regard to the numerous collaborations among researchers and scientific institutions. A widespread approach was to suspend cooperation with Russian and Belarussian state institutions while maintaining ties with individual scientists believing in the Lindau Spirit.

We discussed this question and ultimately decided on the same approach. By welcoming participants from all countries, without restrictions, we deliberately reinforced our tradition of being a place for dialogue among people, of reconciliation and collaborative progress, since 1951. We strongly believe that we need a cooperative world to tackle the common crises engulfing mankind; thus, we believe that it is still meaningful to bring together people from more than 100 countries as we did during both meetings last year. And this will also hold true for the 72nd Lindau Nobel Laureate Meeting 2023 dedicated to Physiology and Medicine.

Against the political backdrop of nations fighting each other and based on suggestions from Young Scientists in previous years, the Council decided to establish a written 'Code of Conduct' for the meetings. The Code is formulated in the spirit of the Lindau Guidelines, including international collaboration, sharing of knowledge, transparency and truthfulness, as well as ethical values such as integrity and respect for life, the law and the public good. Its goal is to provide an environment for scientific exchange that considers mutual respect and peacefulness as natural behavior and is thus free of harassment and aggression. By specifically reminding all participants of the Code at future meetings, the Council aims to make adherence to these rules even more binding. As introduced for the 7th Lindau Meeting on Economic Sciences in August 2022, there will be designated ombudspersons for future meetings whom participants may address in the event of an alleged violation of the 'Code of Conduct'.

These governance rules are closely linked with the responsibility and social obligation of the Lindau Meetings to embody diversity in various ways. Considering that COVID-19 regulations and travel restrictions were still prevailing in 2022, the diversity among Young Scientists and Young Economists participating in the respective meetings was heartening. This continued the positive trend of recent years towards a more diverse meeting, which we hope will persist in the future. We are grateful for the feedback we have received, telling us that many participants saw the meeting as one of the most diverse conferences they ever attended. However, there is definitely still potential for improvement that we will exhaust in preparation for the upcoming meetings.

So, the Lindau Nobel Laureate Meetings start the new year with many internal tasks and a general environment that continues to be challenging. The latter includes a foreseeable increase in meeting costs in line with the general price trend together with a substantial decline in return on investment of our endowment. The Council and the Foundation will therefore work even harder to secure donations and endowment contributions in order to safeguard the future of the Lindau Nobel Laureate Meetings. And after the successful adaptation to the pandemic as well as in memory of our more than 70-year experience of often difficult times, there are good reasons to look forward with confidence to the upcoming summer – and beyond – when we will again provide the stage for Nobel Laureates and Young Scientists alike for their unique exchange in Lindau.

Countess Bettina Bernadotte af Wisborg
President
Council for the Lindau Nobel Laureate Meetings

Jürgen Kluge
Chairman of the Board of Directors
Foundation Lindau Nobel Laureate Meetings

71st Lindau Nobel Laureate Meeting Chemistry

Opening Day

The opening day was the prelude to a week full of personal encounters and inspiring exchanges. Joy at the fact that a meeting on site was possible again was felt everywhere, not least in the emotional speech by Countess Bettina to welcome all participants in Lindau and on the online platform.

Enthusiastic audience during the opening

Countess Bettina Bernadotte

Opening Concert in the City Theatre

The attending Laureates with Countess Bettina Bernadotte and Jürgen Kluge

Opening Ceremony

Opening Address
Countess Bettina Bernadotte, President of the Council

Greetings from Stockholm
Laura Sprechmann, CEO Nobel Prize Outreach AB, Sweden

Welcome Speech
Bettina Stark-Watzinger, German Federal Minister of Education and Research

Sketches of Science
Volker Steger, photographer and initiator of the project Adam Smith, texts on Laureates and their research

Programme Preview
Scientific Chairpersons of the 71st Lindau Nobel Laureate Meeting: Wolfgang Lubitz, Valeria Nicolosi, Pernilla Wittung-Stafshede

Greetings from Munich
Markus Blume, Bavarian State Minister of Science and the Arts

Master of Ceremonies
Adam Smith, Chief Scientific Officer, Nobel Prize Outreach AB

Reception

hosted by the Bavarian State Government

Opening Concert

hosted by the Republic of Austria
Ensemble of the Vienna Philharmonic

Welcome Address
Martin Polaschek, Austrian Federal Ministry of Education, Science and Research

Dinner and Online Meet-up

for Young Scientists

Foundation Dinner

hosted by the Foundation Lindau Nobel Laureate Meetings

Welcome Address
Jürgen Kluge, Chairman of the Board of Directors, Foundation Lindau Nobel Laureate Meetings

Greetings from Berlin

Ambassadors and Peacemakers

Bettina Stark-Watzinger, Federal Minister of Education and Research, Germany, delivered her first welcome speech in Lindau.

"Youth meets experience, the present meets the future. And I'm happy that politics meets science. Some of you have come as Laureates, others have come as Young Scientists who may soon achieve their own outstanding accomplishments; in any case, you are striving for excellence. If you have an idea, share it. If you have questions, ask.

This meeting is about thinking without boundaries, about seizing a precious opportunity to overcome the barriers that stand in our way: differences between generations, differences between academic career levels and cultures. Lindau lives up to its credo – Lindau connects.

Rarely has this kind of exchange been as important as it is this year. Right now, in the year of what we call a turning point. We are experiencing three major disruptions which describe not only the destructive power of such phases but also the emerging space for something new, for innovation.

The corona pandemic, the imperialist war of aggression on an independent country, and the ecological disruption. We are called to action!

All these disruptions show us that we need more cooperation, not less. We must rely on the knowledge of the many rather than on the limitations of the few. In like-minded countries, or with like-minded people that share the same values we must be able to understand, develop and produce new solutions or key technologies ourselves.

The freedom to carry out curiosity-driven research is the basis of social, economic and scientific progress. We should take that seriously. Transparency in data and positioning are crucial. Plurality, an interdisciplinary approach and communication are not only desirable, they are essential.

In 2022, we have become aware of how relevant the motive for the creation of the Lindau Meeting really is: to bring together researchers from all different parts of the world, acting as ambassadors for their nations and as peacemakers. Participants from 90 countries have come this year to create networks that span generations and national borders. We can only overcome global challenges if we work together. Our shared values help us to balance out different interests and people can build the bridges that war has destroyed.

2022 is not an easy year, but it is a year in which there could be no stronger mandate for your work."

Greetings from Stockholm and Munich

Calling Upon the Young and the Young at Heart

Laura Sprechmann, CEO Nobel Prize Outreach AB, Sweden

Markus Blume, Bavarian State Minister of Science and the Arts with Countess Bettina Bernadotte

"It's such a pleasure to be in Lindau after these two years to connect again and to get these face-to-face discussions that we have been longing for.

This year the focus is on chemistry. Alfred Nobel was a chemist. He invented dynamite, but he had to deal with the damage to his reputation, because, while his invention could be used to build and develop, it could also be used to destroy. He was even called the merchant of death. By conceiving of the Nobel Prizes, he wanted the world to understand that science is about life. He wanted this prize to achieve something, to be lasting and to be awarded to those who have conveyed the greatest benefit to humankind.

We at Nobel Prize Outreach want to stimulate and engage, especially young people like you, to dedicate themselves to science, to defend the values that the prize stands for, and to work for peace and indeed for a better world.

I hope you make the most out of this meeting inspired by these fantastic opening reflections by the different Lindau Alumni. I encourage you to explore new ideas and connections, hopefully lasting connections. Enjoy the week and thank you all."

"We are at a turning point in history. We realise there is a paradigm shift in so many fields. There are so many huge transformations going on. We are witnessing dramatic change that needs a response and I'm quite sure you guys here in this room will come up with the right answers.

Let's make sure that disruption happens, but let's also ensure that we shape it. Let's shape it together because otherwise it could also cause people to become apprehensive about what's going on there. The heart of this meeting is scientific communication. Let us work together to increase the power of scientific findings, to ensure that it is bigger than the reach of fake news and the power of algorithms.

In Bavaria, we try to create an ecosystem for all the different fields of science. We're quite proud that with recent initiatives we have the opportunity to strengthen it even more. The High-Tech Agenda Bavaria is a 3.5 billion euro programme, very much focused on new fields in science – on quantum tech, on artificial intelligence, on biomedicine and all the other areas where things are really moving, where we think we can provide answers to the big questions."

Outlook from the Scientific Chairs in Chemistry

Timely Topics and Daring Discussions

On the opening day, the scientific chairs Wolfgang Lubitz, Valeria Nicolosi and Pernilla Wittung-Stafshede introduced the meeting programme and gave their recommendations on how to make the most of the week.

A sign of the times: Wolfgang Lubitz, vice-president of the Council, and new Council members Valeria Nicolosi and Pernilla Wittung-Stafshede met for the first time in person in Lindau at the start of the programme they organised together as scientific co-chairpersons. Valeria Nicolosi, who is also a Lindau Alumna, and Pernilla Wittung-Stafshede, a member of the Royal Swedish Academy of Sciences and the Nobel Committee for Chemistry, were elected as Council members in late 2021.

Together, they discussed their personal highlights of the meeting week with Adam Smith. All three stressed their intent to ensure the focus was on the Young Scientists and to give them even more opportunities and space in the programme than in earlier years, for example by consolidating the Next Gen Science sessions from the online programme of the last two years (see p. 44). Professor Wittung-Stafshede looked forward to seeing how the Agora Talk sessions could start good discussions between Nobel Laureates and Young Scientists. Professor Lubitz emphasised the interdisciplinary relevance of many sessions during a meeting nominally dedicated to chemistry: "That's what we need for the future, more interdisciplinarity in all the different fields."

The 71st Lindau Meeting took place in the context of significant challenges, from climate change, the fossil fuel crisis to the ongoing war in Ukraine, and the three scientific chairs considered these circumstances when drafting the programme. Professors Nicolosi and Wittung-Stafshede highlighted the closing panel on Diversity in Science (see p. 41), and the need for discussions in this area would become clear throughout the week. Wolfgang Lubitz pointed to the panel on Sunday for discussions on how chemistry can help solve some of the global crises, and to the Science Breakfast for a conversation on how scientific cooperation can continue: "We have a lot of time during the week to find or discuss solutions for how we can get through this valley of tears."

Valeria Nicolosi drew from her experience participating in 2004 and encouraged the current participants to make the most of the amazing opportunity to talk with Nobel Laureates and connect with their peers from all over the world: "Please use the fact that you are in this very, very special place, surrounded by these incredible minds and be inspired by them." Lubitz asked the audience to try and see "everything that you think is interesting for you, but also go to a few other things to learn about other aspects." Pernilla Wittung-Stafshede advised our Young Scientists to "be brave, dare to speak to each other, dare to speak to Nobel Laureates."

Scientific co-chairs Lubitz, Nicolosi, Wittung-Stafshede in conversation with moderator Adam Smith

Valeria Nicolosi, Professor of Nanomaterials and Advanced Microscopy, Trinity College Dublin, Ireland

Pernilla Wittung-Stafshede, Professor, Division of Chemical Biology, Head of Genie, Gender Initiative for Excellence, Chalmers University of Technology, Gothenburg, Sweden

It was wonderful to be back in Lindau. In spite of the COVID precautions, the events proceeded well and the spirit of Lindau was certainly present.

Peter Agre

Participants in #LINO22

Nobel Laureates

Thirty Nobel Laureates took part in the
71st Lindau Nobel Laureate Meeting (Chemistry).

Peter Agre
Nobel Prize: Chemistry
Year: 2003
Prize Motivation:
"for the discovery of water channels"

Elizabeth H. Blackburn
Nobel Prize: Physiology or Medicine
Year: 2009
Prize Motivation:
"for the discovery of how chromosomes are protected by telomeres and the enzyme telomerase"

Martin Chalfie
Nobel Prize: Chemistry
Year: 2008
Prize Motivation:
"for the discovery and development of the green fluorescent protein, GFP"

Steven Chu
Nobel Prize: Physics
Year: 1997
Prize Motivation:
"for development of methods to cool and trap atoms with laser light"

Aaron Ciechanover
Nobel Prize: Chemistry
Year: 2004
Prize Motivation:
"for the discovery of ubiquitin-mediated protein degradation"

Ben L. Feringa
Nobel Prize: Chemistry
Year: 2016
Prize Motivation:
"for the design and synthesis of molecular machines"

Joachim Frank
Nobel Prize: Chemistry
Year: 2017
Prize Motivation:
"for developing cryo-electron microscopy for the high-resolution structure determination of biomolecules in solution"

Stefan W. Hell
Nobel Prize: Chemistry
Year: 2014
Prize Motivation:
"for the development of super-resolved fluorescence microscopy"

Avram Hershko
Nobel Prize: Chemistry
Year: 2004
Prize Motivation:
"for the discovery of ubiquitin-mediated protein degradation"

Robert Huber
Nobel Prize: Chemistry
Year: 1988
Prize Motivation:
"for the determination of the three-dimensional structure of a photosynthetic reaction centre"

Louis J. Ignarro
Nobel Prize: Physiology or Medicine
Year: 1998
Prize Motivation:
"for their discoveries concerning nitric oxide as a signalling molecule in the cardiovascular system"

William G. Kaelin, Jr.
Nobel Prize: Physiology or Medicine
Year: 2019
Prize Motivation:
"for their discoveries of how cells sense and adapt to oxygen availability"

Jean-Marie Lehn
Nobel Prize: Chemistry
Year: 1987
Prize Motivation:
"for their development and use of molecules with structure-specific interactions of high selectivity"

Michael Levitt
Nobel Prize: Chemistry
Year: 2013
Prize Motivation:
"for the development of multiscale models for complex chemical systems"

Benjamin List
Nobel Prize: Chemistry
Year: 2021
Prize Motivation:
"for the development of asymmetric organocatalysis"

Sir David W.C. MacMillan
Nobel Prize: Chemistry
Year: 2021
Prize Motivation:
"for the development of asymmetric organocatalysis"

Rudolph A. Marcus
Nobel Prize: Chemistry
Year: 1992
Prize Motivation:
"for his contributions to the theory of electron transfer reactions in chemical systems"

Hartmut Michel
Nobel Prize: Chemistry
Year: 1988
Prize Motivation:
"for the determination of the three-dimensional structure of a photosynthetic reaction centre"

William E. Moerner
Nobel Prize: Chemistry
Year: 2014
Prize Motivation:
"for the development of super-resolved fluorescence microscopy"

Erwin Neher
Nobel Prize: Physiology or Medicine
Year: 1991
Prize Motivation:
"for their discoveries concerning the function of single ion channels in cells"

Sir Konstantin S. Novoselov
Nobel Prize: Physics
Year: 2010
Prize Motivation:
"for groundbreaking experiments regarding the two-dimensional material graphene"

Venki Ramakrishnan
Nobel Prize: Chemistry
Year: 2009
Prize Motivation:
"for studies of the structure and function of the ribosome"

Randy W. Schekman
Nobel Prize: Physiology or Medicine
Year: 2013
Prize Motivation:
"for their discoveries of machinery regulating vesicle traffic, a major transport system in our cells"

Brian P. Schmidt
Nobel Prize: Physics
Year: 2011
Prize Motivation:
"for the discovery of the accelerating expansion of the Universe through observations of distant supernovae"

Richard R. Schrock
Nobel Prize: Chemistry
Year: 2005
Prize Motivation:
"for the development of the metathesis method in organic synthesis"

Dan Shechtman
Nobel Prize: Chemistry
Year: 2011
Prize Motivation:
"for the discovery of quasicrystals"

Donna Strickland
Nobel Prize: Physics
Year: 2018
Prize Motivation:
"for their method of generating high-intensity, ultra-short optical pulses"

Arieh Warshel
Nobel Prize: Chemistry
Year: 2013
Prize Motivation:
"for the development of multiscale models for complex chemical systems"

Kurt Wüthrich
Nobel Prize: Chemistry
Year: 2002
Prize Motivation:
"for his development of nuclear magnetic resonance spectroscopy for determining the three-dimensional structure of biological macromolecules in solution"

Ada E. Yonath
Nobel Prize: Chemistry
Year: 2009
Prize Motivation:
"for studies of the structure and function of the ribosome"

Efim I. Zelmanov
Award: Fields Medal 1994 (Mathematics)
Prize Motivation:
"for the solution of the restricted Burnside-Problem"

Find more information on the Nobel Laureates in the Lindau Mediatheque.

31 Laureates Altogether – 24 On Site in Lindau and 7 Participating Online

Disciplines

21 Chemistry

5 Physiology/Medicine

1 Mathematics

4 Physics

Records

First Participation
William G. Kaelin, Jr.
Benjamin List
Sir David W.C. MacMillan

Most Participations: 25
Robert Huber
Hartmut Michel

Earliest Award: 1987
Jean-Marie Lehn – Chemistry

Most Recent Nobel Prize: 2021
Benjamin List – Chemistry
Sir David W.C. MacMillan – Chemistry

Age

Youngest
Sir Konstantin S. Novoselov
48

Oldest
Rudolph A. Marcus (online)
99

Robert Huber (on site)
85

Nationalities

United States 9
Germany 6
Israel 4
Australia 2
Canada 2
Russia 1
United Kingdom 3
France 1
Hungary 1
Netherlands 1
Switzerland 1

Personal Impressions From #LINO22

With Passion and Dedication

Benjamin List, Nobel Laureate in Chemistry 2021, was greatly moved by his first participation in a Lindau Nobel Laureate Meeting. Here, he shares his thoughts and impressions from his time at Lake Constance.

I will never forget my first visit to the Lindau Nobel Laureate Meetings in 2022. I had just come from a conference in San Diego, which I had already agreed to attend several years previously – back when I had no inkling of either the Nobel Prize or the Lindau Meeting. At first, the little town, so picturesquely situated on Lake Constance, somewhat passed me by, and I went straight to the hotel.

At this point, I was still a bit nervous. After all, I was the "new guy" in the Nobel club. However, this nervousness subsequently vanished into thin air. I had already met a few of my colleagues, and on the very first evening the other Laureates welcomed me warmly into their midst. A barbecue evening and – just like that – I was part of the group.

Despite that relaxedness, the days in Lindau were also quite intense. I only met the hundreds of young scientists for the first time on the following morning, and I have to say that I have never experienced anything quite like it. Being a Nobel Laureate is a bit different than it used to be; you are really the center of attention. But in Lindau I was virtually besieged – in a positive sense of course! I had to sign an unbelievable number of autographs and pose for photos, and I also partook in very intense discussions.

This may sound exhausting, but it was in fact delightful: These were not just autograph hunters and selfie collectors, but smart, intelligent, fascinating scientists from all over the world. The sharing of ideas with these young people was incredibly inspiring and immensely fruitful and was for me the absolute highlight of the entire meeting. Many of the young chemists told me about their own work and we went into a lot of detail about certain projects. I also suggested to a few of them that they should try one of the catalysts from my research group.

The attendees of the meeting are so incredibly enthusiastic, but also determined. For example, we talked a lot about career strategy. My credo in this regard is simple: don't follow a strategy but simply do what you do with passion and with dedication! Everything else will then come naturally. A certain degree of "safe thinking" prevails among many Young Scientists. My own experience was completely different; I threw everything I had into my own projects. Looking back, I have to say that this was associated with a certain degree of risk. To be honest, I don't know what would have happened if I hadn't had great results to show after a few years. What would I have done then?

Nevertheless, to this day, it doesn't bother me all that much when I hold an opinion that runs counter to the majority. And I am also firmly convinced that if you want to discover something fundamentally new, you have to accept that you will feel quite alone at certain moments. You can't have that "cozy campfire" feeling and be revolutionary at the same time. You have to choose. But the pull of the campfire is quite understandable for me. We are herd animals, like so many other mammals. However, that gets in the way of revolutionary ideas.

As soon as I had finished my talk, a crowd of young people formed around me.

At the same time, I don't want to pass judgement on the youth of today; it was certainly no different in the past than it is now. It has always been only at the tip of the spear where the absolutely revolutionary stuff happens. And who knows – maybe a future spearhead will have been in Lindau together with me in 2022.

But Lindau, I can now say, is so much more than that. For me, the meeting embodies a truly unique combination of beauty and intelligence. Beauty, because the island with the Alpine panorama on the horizon is simply enchanting, and also the people who come to the conference radiate a very special joy and inner beauty. This, combined with the intelligence and enthusiasm already mentioned, results in a very special atmosphere, exemplified in the boat trip to Mainau Island. Live music was played on the ship, and everyone immediately started dancing enthusiastically. That's unusual at these kinds of events; chemists actually tend to stand around awkwardly in the corner. Not so in Lindau – and for me that is also an expression of this magical atmosphere. While we live in challenging times of wars and climate change, participating in the Lindau Meeting made me feel optimistic. It was a fantastic experience, and Countess Bettina Bernadotte and her team deserve credit for the meeting being such a success. She puts her heart and soul into it. You could also say: she does what she does with passion and dedication.

Not a single free seat – Open Exchange with Benjamin List

Impressions

Young Scientists at #LINO22

Global Community in Numbers

Whether they were able to join us on site in Lindau or online, our 597 young scientists were at the heart of the discussions and exchanges at the 71st Lindau Nobel Laureate Meeting. Here are a few more interesting figures:

Representing 387 Institutions and 90 Countries

Gender Balance

Female 45%

Male 55%

Participants Beyond Chemistry

26 Biology

18 Physics

4 Medicine

Lindau Experience

83% On Site

17% Online

Abdelaziz Gouda's #LINO22 Story

An Unforgettable Eureka Moment

Abdelaziz Gouda is a postdoctoral research fellow in the solar fuels group at the University of Toronto, Canada. He presented his work during Next Gen Science at the 71st Lindau Nobel Laureate Meeting.

Abdelaziz Gouda during his Next Gen Science presentation on Monday in Stadttheater Lindau

Growing up in Egypt, education is the main determinant for the quality of one's life, skills, personality and shaping the future. In 1999, when I was nine years old, I first heard about the Nobel Prize when Ahmed Zewail was awarded for his discovery of femtosecond chemistry. Always in my mind is the following quote from Professor Zewail's speech at the Nobel Banquet: "The honour comes with great responsibilities and new challenges for the future. I do hope to be able to continue the mission, recalling the thoughtful words of the great scholar Taha Hussein which can be paraphrased as: 'The end will begin when seekers of knowledge become satisfied with their own achievements.'" Since then, I always dreamt of being able to meet Nobel Laureates to discuss and learn from them. This dream was realised during the 71st Lindau Nobel Laureate Meeting 2022.

More than 600 Young Scientists from around the world were chosen for the 2022 chemistry meeting held on the fascinating island of Lindau, Germany. I was honoured to not only be one of those chosen to attend but also one of 14 who got the chance to present their research in front of the Nobel Laureates and Young Scientists.

The 71st Lindau Nobel Laureate Meeting was an excellent in-person, multi-disciplinary opportunity for Young Scientists to get together, discuss, engage and explore new ideas for future scientific and social collaboration.

It was an intense week of inspiration, networking and learning. Special thanks to the Council for the amazing organisation and to the distinguished Nobel Laureates for spending their precious time with us to discuss their discoveries, perspectives and our professional development. Meeting the passionate fellow Young Scientists with curious minds from all over the world kindled a strong interest in future collaborations.

Against this diverse background, I really enjoyed discussing different topics from chemistry, materials science and biology to gender equality with Young Scientists and Nobel Laureates. We all came to Lindau with one shared aim: to learn, connect and get inspired for future research, collaboration and innovation for the benefit of humankind.

One of my best moments was meeting Nobel Laureate Ben Feringa during the Bavarian dinner. Professor Feringa shared the 2016 Nobel Prize in Chemistry for his work on molecular machines. He is one of the best teachers ever, his passion for research and the ability to make molecules dance is unbelievable. Professor Feringa ended his talk with a precious piece of advice: If you want to make a breakthrough in your field, be passionate and love what are you doing to make the impossible possible.

I was inspired by Nobel Laureate Benjamin List's vision to align his research goals in addressing global energy issues. Professor List shared the 2021 Nobel Prize in Chemistry for the development of asymmetric organocatalysis. His vision to convert CO_2 (Greenhouse Gas) into useful chemical fuels using solar light is a huge inspiration for me and my aim to form a research group to work on green energy materials for sustainable electrochemical energy storage applications and sustainable catalysis. I was lucky enough to meet Professor List and have a long discussion with him. An unforgettable Eureka moment came when I told him that we were thinking about an idea and asked him if he had tried this reaction before. "We have not tried it yet. But it is not impossible."

Besides the scientific content of the meeting, the organisers did not forget to give us insights into the Bavarian culture through the traditional dances, food (especially the Bavarian bread!) and music. These wonderful activities left us with great memories about Bavarian culture. Finally, after these unforgettable memories and experiences, I would like to leave my colleagues – now Lindau Alumni – with this piece of advice: Get out of your comfort zone and do not be afraid to reach out and make new connections in different areas than yours in the quest for innovative ideas.

Ben Feringa during his lecture

Diana Zhang's #LINO22 Story

The Olympics for Young Scientists

Diana Zhang is a PhD candidate and Fulbright Future and Scientia Scholar at the University of New South Wales, Sydney, Australia. In this article, she looks back on her experience at the 71st Lindau Nobel Laureate Meeting.

Nobel Laureate Peter Agre (left) and Diana Zhang (4th from left) about to start a Science Walk

I had the immense privilege of representing Australia at the 71st Lindau Nobel Laureate Meeting. The meeting generated a lot of excitement and anticipation, but what was it really like? I'd describe it as the Olympics for young scientists (minus the competition aspect), sprinkled with the energy of a TEDx conference and the awe of a Lifetime Achievement Award celebration. In other words, it was a gathering filled with ideas, multilateral relationship building, and reverence for esteemed scientists.

I recall when all the Young Scientists were yearning for coffee after it became clear we had 14+ hour days ahead of us! Of course, nothing would have stopped us, the opportunity to listen to these Nobel Laureates and meet fellow scientists was too great to miss. For many, it was the first in-person gathering since the start of the COVID-19 pandemic. A keynote lecture with 500 people in the audience now felt intimate and a 50-person open exchange with a Nobel Laureate became a scientific soiree. (A scientific soiree has a nice ring to it, don't you think? I think we should have more of them!)

Even though we came from all corners of the world, the one thread in common was enthusiasm, and when it came to Nobel Laureates, they had lots of it! As a science communicator, I was so inspired by the way they shared their science – uncondescending, engaging and filled with hope. You know when a talk is good when you leave feeling curious. But a talk is great when you leave feeling empowered with self-belief. Some of the more memorable quotes include Louis Ignarro: "Go where there is no path", and Ada Yonath quoting Albert Einstein: "I have no special talent. I am only passionately curious".

Inspiration is one thing, but inspiring action is what we should aim for. In STEM, one of the biggest challenges the sector is dealing with is how to increase female representation. However, with all the talk of increasing diversity, there runs a risk where diversity becomes trivial. And by trivial, I mean more talk than action. During #LINO22, I was saddened when only 2 out of 13 Young Scientists selected to present their research were female-identifying. But more than this, I realised that diversity in STEM is more than just a 'binary' issue. It should encompass all kinds of diversity such as academic and ethnic diversity. In practice, we should look beyond the face value of traditional factors such as high-impact journals. Instead, we should contextualise research based on circumstance and promote all kinds of research outcomes.

For example, if you're conducting research in a third-world country with limited funding, your research would likely be dictated by topics that would quickly and radically improve the country's social and economic condition. However, such research would be unlikely to result in a 'high-impact' publication. But does that diminish the quality or impact of the research? I don't believe so. Looking forward, the STEM landscape is at the precipice of change, and we have the power to shape the future. As a sector, we must be cognisant of showing not telling and turning our values into action.

I mentioned the zeal of the Nobel Laureates. This is 100% true. But what are they really like as humans? They're exactly that. Nobel Laureates are, in fact, just humans. This means that like us, they are also fallible. For some, mistakes were made and that resulted in unfortunate incidents (one in which I was on the receiving end of but I won't discuss further) and for others, their human quality impressed you more than anything they had achieved in their career. It's the latter that I choose to focus on.

Peter Agre was one of those amazing human beings and easily one of my favourite Nobel Laureates that I met. Peter was awarded his Nobel for discovering water channels and has had a prolific career as a medical doctor and a long-serving science diplomat. He was also diagnosed with Parkinson's Disease ten years ago. Yet, despite everything that he has been through, his gentility, humility and positive outlook on life moved me to tears.

The Lindau Nobel Laureate Meetings are truly a once-in-a-lifetime opportunity. For me, the drawcard is actually the young scientists, not the Nobel Laureates. And if you're from Australia, you will come back with treasured memories featuring your Lindau Aussie family.

Find the full article, and a recollection on her travels through Germany as part of the Australian delegation, on Diana Zhang's personal blog.

Application Process

Requirements

Undergraduates, Master
or PhD Students, or Post-Docs
<35 Years of Age
Top 5% of Their Class

Application

Regular:
Nomination
by Academic Partners
(Internal Selection)

Exception:
Open Application
(If No Academic
Partner is Responsible)

Evaluation and Selection

Review Panel of the Council
400 – 600 Participants
(Depending on Meeting Type)

Pre-evaluation

Participation

One-Time Only

Lindau Alumni Community

About 35,000 Former Participants
Since 1951

The application process for the 73rd Lindau Nobel Laureate Meeting 2024 starts in September 2023.

Vital Nodes in a World-Spanning Network

To ensure the scientific excellence of those attending, the Lindau Nobel Laureate Meetings maintain a strong global network of more than 200 Academic Partner institutions.

Signed during the 71st Lindau Meeting: Memoranda of Understanding with the Republic of Austria represented by Martin Polaschek, Federal Ministry of Education, Science and Research and the University of California represented by Jagdeep Singh Bachher, Chief Investment Officer and enabler of the UC President's Lindau Nobel Laureate Meetings Fellows Program

World-renowned entities in science and research both from the public and private sectors are entitled to nominate Young Scientists/Economists for participation in the Lindau Meetings. These institutions include academies of sciences, leading universities, research institutions, foundations and innovative enterprises throughout the world. Without this support, the Lindau Nobel Laureate Meetings would not be able to identify and invite the most gifted scientific talents worldwide.

For the meetings in 2022 – the 71st Lindau Nobel Laureate Meeting (Chemistry) and 7th Lindau Meeting on Economic Sciences – about 300 institutions worldwide received a 'Call for Nomination' of Young Scientists and Young Economists, respectively. Nearly all of them participated in nominations. Generally, Young Scientists are nominated by official Academic Partner institutions and apply through them. In exceptional cases, applications can be submitted directly to the Council via Open Applications, for example, when an applicant studies or works in a country where the Lindau Meetings do not yet have an Academic Partner.

The partner network is continuously being expanded by means of memoranda of understanding. In these, both the Lindau Meetings and their partners commit themselves to the interconnection and promotion of aspiring Young Scientists and Young Economists and thus spreading Lindau's 'Mission Education' worldwide. By engaging in a symbiotic relationship, Academic Partners become vital nodes in a world-spanning network of progressive young minds for which the Lindau Meetings function as a hub. They are the trustees of a constant pursuit of excellence and enablers of intergenerational and intercultural dialogue.

Dr. Estela Susana Lizano Soberón

Kian Teik Beh

"Through our collaboration, the Ragnar Söderberg foundation and the Royal Swedish Academy of Sciences give young researchers from Sweden the opportunity to participate in the Lindau Meetings. Our hope is that the participants will grow as researchers but also as people and come back from the meeting with a multitude of new ideas, potential collaborators and friends."
Louise Dahlgren, Member of the Secretariat,
The Royal Swedish Academy of Sciences
Dr. Anna Wetterbom, Chief Executive Officer,
Ragnar Söderberg Foundation

"The Mexican Academy of Sciences is convinced that the participation of promising Mexican scientists in the Lindau Meetings is a unique opportunity for them to interact with extraordinary people who have contributed with their scientific work to help humanity. Meeting Nobel Laureates will positively impact their careers and help them acquire a long-range vision for their work."
Dr. Estela Susana Lizano Soberón,
President, Mexican Academy of Sciences

"Singapore continues to be a strong supporter of exchange among young people working in science, technology and engineering and is especially pleased to be associated with the Lindau Meetings. Young scientists profit from exciting opportunities to engage with their peers from around the world and with Nobel Laureates, in this way drawing inspiration for their own work and future endeavours. The National Research Foundation also appreciates the support of the Lindau Foundation for the annual Global Young Scientists Summit (GYSS) in Singapore."
Kian Teik Beh, Chief Executive Officer,
National Research Foundation Singapore

Nominating Institutions

Academia Sinica, Taiwan
Academy of Science of South Africa (ASSAf)
Academy of Sciences Malaysia
acatech – National Academy of Science and Engineering, Germany
Alexander von Humboldt Foundation, Germany
Australian Academy of Science
Austrian Academy of Sciences
Bangladesh Academy of Sciences (BAS)
Bavarian Academy of Sciences and Humanities, Germany
Bielefeld University, Germany
Brazilian Academy of Sciences (BAS)
Bulgarian Academy of Sciences
Calouste Gulbenkian Foundation, Portugal
Canadian Institutes of Health Research (CIHR)
Carl von Ossietzky University of Oldenburg, Germany
Carl Zeiss Stiftung, Germany
Chilean Academy of Sciences
China-Singapore Guangzhou Knowledge City Investment and Development Co. Ltd
Clausthal University of Technology, Germany
Columbus Association
Croucher Foundation, Hong Kong
Czech Academy of Sciences
Department of Science & Technology, Government of India
Eberhard Karls University of Tübingen, Germany
Elite Network of Bavaria, Germany
Else Kröner-Fresenius-Stiftung, Germany
European Commission
Forschungszentrum Jülich GmbH, Germany
Foundation for Polish Science
Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., Germany
Freie Universität Berlin, Germany
Friedrich Schiller University Jena, Germany
Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany
Fund for Scientific Research – FNRS, Belgium
Georg-August-Universität Göttingen, Germany
German Academic Exchange Service
German Academic Scholarship Foundation
German Aerospace Center (DLR)
German National Academy of Sciences Leopoldina
Global Young Academy, Germany
Goethe University Frankfurt, Germany
Göttingen Graduate Center for Neurosciences, Biophysics, and Molecular Biosciences (GGNB), Germany
Heidelberg University, Germany
Heinrich Heine University Düsseldorf, Germany
Helmholtz Association of German Research Centres, Germany
Honoris United Universities
Human Frontier Science Program
Humboldt-Universität zu Berlin, Germany
ICREA – Catalan Institution for Research and Advanced Studies, Spain
Internationale Bodensee-Hochschule, Switzerland
Irish Research Council
Jacobs University Bremen gGmbH, Germany
Japan Society for the Promotion of Science (JSPS)
Julius-Maximilians-Universität Würzburg, Germany
Justus Liebig University Giessen, Germany
King Abdullah University of Science and Technology, Saudi Arabia
Leibniz Association, Germany
Leibniz University Hannover, Germany
Leipzig University, Germany
Ludwig-Maximilians-Universität Munich, Germany
Luxembourg National Research Fund
Max Planck Society, Germany
Mexican Academy of Sciences
Ministry of Education, Tertiary Education, Science and Technology, Mauritius
Ministry of Research, Technology and Higher Education of the Republic of Indonesia
Mongolian Academy of Sciences
National Academy of Sciences of the Republic of Armenia
National Academy of Sciences of Uruguay
National Biomedical Foundation, Hungary
National Institute of Materials Physics, Romania
National Research Foundation, Singapore
National Science and Technology Development Agency, Thailand
Otto von Guericke University Magdeburg, Germany
Paderborn University, Germany
Pakistan Institute of Engineering & Applied Sciences (PIEAS)
Philipps-Universität Marburg, Germany
Ragnar Söderberg Foundation, Sweden
Research Foundation – Flanders (FWO), Belgium
Royal Netherlands Academy of Arts and Sciences
Ruhr-Universität Bochum, Germany
RWTH Aachen University, Germany
Saarland University, Germany
Sharif University of Technology, Iran
Sino-German Center for Research Promotion, China
Swiss Academy of Sciences (SCNAT)
Technical University of Darmstadt, Germany
Technical University of Munich, Germany
Technische Universität Braunschweig, Germany
Technische Universität Dresden, Germany
The African Academy of Sciences
The Council of Finnish Academies
The European Molecular Biology Organization (EMBO)
The Korean Academy of Science and Technology
The Lithuanian Academy of Sciences
The Research Council, Oman
The Royal Society, UK
The Slovenian Academy of Sciences and Arts
TU Dortmund University, Germany
TÜBİTAK, Türkiye
TWAS – The World Academy of Sciences, Italy
Ulm University, Germany
Universität Hamburg, Germany
University of Augsburg, Germany
University of Bayreuth, Germany
University of Bonn, Germany
University of California (UC), USA
University of Cologne, Germany
University of Freiburg, Germany
University of Iceland
University of Konstanz, Germany
University of Liechtenstein
University of Nicosia, Cyprus
University of Potsdam, Germany
University of Regensburg, Germany
University of Rostock, Germany
University of Stuttgart, Germany
Verband der Chemischen Industrie e.V. (VCI), Germany
Volkswagen Foundation, Germany
Weizmann Institute of Science, Israel
Wilhelm Sander-Stiftung, Germany

In a few years, when we choose our work teams in a lab, I hope we remember this week. Good science comes in many colors and shapes, all important and necessary.

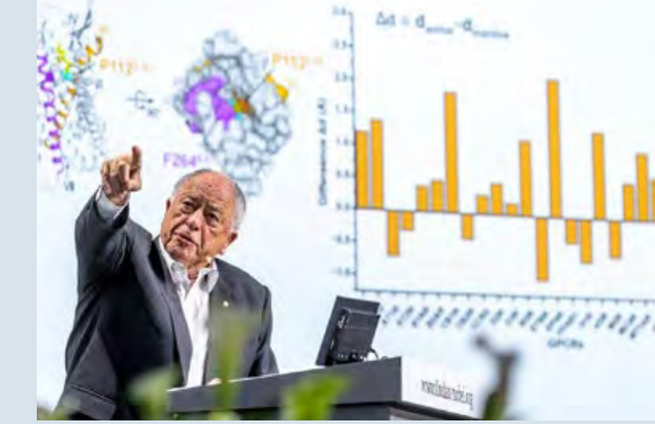
María-Fernanda Cornejo-Granados, Young Scientist

Programme Structure

Lindau Time	Sunday, 26 June	Monday, 27 June	Tuesday, 28 June	Wednesday, 29 June	Thursday, 30 July	Friday, 1 July
07		*Partner Events* • Austrian Federal Ministry of Education • C5 Capital *Break* **Morning Workout**	*Partner Events* • Mars, Incorpa-rated • Rolex SA *Break* **Morning Workout**	*Science Breakfast* **Scientific Collaboration in Challenging Times** Bruce, Schekman, Vetterli	*Partner Event* • Toyota Mobility Foundation *Break* **Morning Workout**	
08						*Social Event* **Baden-Württemberg Boat Trip to Mainau Island** hosted by the State of Baden-Württemberg
09		*Lecture* **Feringa**	*Lecture* **Schmidt**	*Next Gen Science* **presentations by Young Scientists**	*Lecture* **List**	
10		*Lecture* **Strickland**	*Lecture* **Kaelin** *Lecture* **Moerner**		*Lecture* **Hell** *Lecture* **Lehn**	
11		*Agora Talk* • Frank • Ramakrishnan	*Agora Talk* • Ciechanover • Huber	*Agora Talk* • Warshel • Wüthrich	*Lecture* **Novoselov** *Lecture* **Schekman**	*Panel Discussion* **The Diversity Challenge** Günenç, Restrepo Schild, Strickland, Wittung-Stafshede
12	*Opening Ceremony*	*Agora Talk* • Agre • Ignarro	*Agora Talk* • Neher • Schrock	*Agora Talk* • Shechtman • Michel	*Life Lecture* **Yonath**	*Closing Ceremony*
13	*Reception* **hosted by the Bavarian State Government**	*Break* **Lunch Break** **City Reception**	*Break* **Lunch Break** **Laureate Lunches**	*Break* **Lunch Break** **Laureate Lunches**	*Break* **Lunch Break** **Laureate Lunches**	*Social Event* **Science Picnic on the Castle Meadow** hosted by the Ministry of Science, Education and the Arts, State of Baden-Württemberg
14						
15	*Lecture* **MacMillan**	*Open Exchange* Agre, Chalfie, Feringa, Frank, Ignarro, Ramakrishnan, Strickland	*Panel Discussion* **Artificial Intelligence in Chemistry** Levitt, Nigel, Paiz, Warshel	*Panel Discussion* **Catalysis & Green Chemistry** Feng, Li, MacMillan, Schrock, Serrano	*Open Exchange* Hell, Lehn, List, Novoselov, Schekman, Yonath	
16	*Panel Discussion* **Trust in Science, Trust in Chemistry** Boetius, Gutenthaler, Miserendino, Ramakrishnan, Schmidt	*Science Walks*			*Science Walks*	
17						*Social Event* **Baden-Württemberg Boat Trip to Lindau** hosted by the State of Baden-Württemberg
18	*Social Programme* **Opening Concert** hosted by the Republic of Austria	*Next Gen Science* **presentations by Young Scientists**	*Open Exchange* Chu, Ciechanover, Huber, Kaelin, MacMillan, Moerner, Neher, Schmidt, Schrock	*Open Exchange* Blackburn, Hershko, Levitt, Marcus, Michel, Shechtman, Warshel, Wüthrich	*Workshop* • Mentoring • Lindau Guidelines	
19	*Social Programme* **Dinner** for Young Scientists	*Social Programme* **International Get-Together** hosted by the United Kingdom	*Social Programme* **Academic Partner Dinners** hosted by Academic Partners	*Heidelberg Lecture* **Zelmanov**	*Social Programme* **Bavarian Evening** hosted by the Free State of Bavaria	
20	**Foundation Dinner** hosted by the Foundation Lindau Nobel Laureate Meetings		**Grill & Chill** hosted by the Lindau Nobel Laureate Meetings and supported by the City of Lindau	*Social Programme* **Dinner** for Young Scientists		
21						

Browse the programme booklet.

Impressions



Lectures

Ben L. Feringa	The Joy of Discovery
Stefan W. Hell	Molecular-Scale Resolution in Fluorescence Microscopy
William G. Kaelin, Jr	The VHL Tumor Suppressor Protein: Insights into Oxygen Sensing and Intercellular Communication
Jean-Marie Lehn	Perspectives in Chemistry – Supramolecular Chemistry and Beyond
Benjamin List	Toward Universal Catalysts for Selective Synthesis
Sir David W.C. MacMillan	The Path to Invention and Discovery in Catalysis
W.E. Moerner	What Can Single Molecules Tell Us About Coronavirus RNA and Cryo-Electron Tomography?
Sir Konstantin S. Novoselov	Materials for the Future
Randy W. Schekman	Tackling Parkinson's Disease with Basic Science
Brian P. Schmidt	Astronomy in 2022
Donna Strickland	Generating High-Intensity, Ultrashort Optical Pulses
Ada E. Yonath	Life Lecture: The Everest Beyond the Everest

Heidelberg Lecture

The Heidelberg Laureate Forum (HLF) was founded in 2013 by Klaus Tschira after the model of the Lindau Nobel Laureate Meetings. The HLF dedicates its meetings to prize-winning and aspiring young scientists from mathematics and computer science. To emphasise the close links and the outstanding partnership between the two meetings, Lindau hosts Heidelberg Lectures and Lindau Lectures are part of the HLF programme.

In this year's Heidelberg Lecture, Efim I. Zelmanov (Fields Medal in 1994), known for the solution of the restricted Burnside problem, discussed the beauty and utility of mathematics, citing examples from the mid-19th century right up to the challenges of our times.

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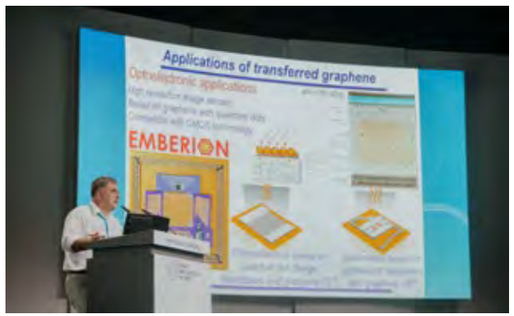

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1 Stefan Hell introduces Efim I. Zelmanov.
2 Ada E. Yonath
3 Ben Feringa
4 Won the audience over as well: Jean-Marie Lehn
5 W.E. Moerner
6 Sir Konstantin S. Novoselov
7 Brian P. Schmidt

Rewatch your favourite lecture from the chemistry meeting in the Lindau Mediatheque.

Panel Discussions

Trust in Science, Trust in Chemistry

- Brian P. Schmidt, The Australian National University (online)
- María Clara Miserendino, Universidad Nacional de Córdoba, Argentina
- Antje Boetius, Alfred Wegener Institute, Germany
- Sophie Marie Gutenthaler, Ludwig-Maximilians-Universität Munich, Germany
- Venki Ramakrishnan, MRC Laboratory of Molecular Biology, United Kingdom
- Adam Smith, Nobel Prize Outreach, Sweden (Moderator)

Artificial Intelligence in Chemistry

- Gunnar Schröder, Forschungszentrum Jülich, Germany (Moderator)
- Michael Levitt, Stanford University, USA
- Arieh Warshel, University of Southern California, USA
- Neo Neng Kai Nigel, National University of Singapore
- Paulina Paiz, University of California, San Francisco, USA

Catalysis & Green Chemistry

- Liang Feng, Northwestern University, USA (online)
- Sir David W.C. MacMillan, Princeton University, USA (online)
- Jiangnan Li, University of Manchester, United Kingdom
- Richard R. Schrock, MIT Massachusetts Institute of Technology, USA
- Carla Casadevall Serrano, University of Cambridge, United Kingdom
- Valeria Nicolosi, Trinity College Dublin, Ireland (Moderator)

The Diversity Challenge

- Paul Walton University of York, United Kingdom (Moderator)
- Vanessa Restrepo Schild, Bio-Techne, United Kingdom
- Donna Strickland, University of Waterloo, Canada
- Aybeg Nafiz Günenç, Georg-August-Universität Göttingen/Max Planck Institute for Multidisciplinary Sciences, Germany
- Pernilla Wittung-Stafshede, Chalmers University of Technology, Sweden

All panels: order from left to right

Agora Talks

Peter Agre	Aquaporin Water Channels and Medical Science in Africa
Aaron Ciechanover	The COVID-19 Pandemic and Bioethics
Joachim Frank	Biological Molecules Captured in Motion by Cryo-EM
Robert Huber	The Century of Vision in Molecular Biology
Louis J. Ignarro	Dr. NO – The Discovery That Led to a Nobel Prize and Viagra
Hartmut Michel	Structures of Intermediates of the Cytochrome C Oxidase Reaction Cycle Suggest a Revolution
Erwin Neher	Synaptic Plasticity: Short- and Longterm
Venki Ramakrishnan	The Quest for the Structure of the Ribosome: Nature's Ancient Protein Factory
Richard R. Schrock	Tungstacyclopentane Ring-Contraction Yields Olefin Metathesis Catalysts and More
Dan Shechtman	Quasi-Periodic Materials – A Paradigm Shift in Crystallography
Arieh Warshel	Multi Scale and Artificial Intelligence Studies of Biological Systems
Kurt Wüthrich	Protein Large-Amplitude Dynamics by NMR Spectroscopy in Solution

The Agora Talks were moderated by
Rainer Blatt, University of Innsbruck, Austria
Stefan Kaufmann, Max Planck Institute for Infection Biology, Germany
Wolfgang Lubitz, Max Planck Institute for Chemical Energy Conversion, Germany
Valeria Nicolosi, Trinity College Dublin, Ireland
Adam Smith, Nobel Prize Outreach, Sweden
Pernilla Wittung-Stafshede, Chalmers University of Technology, Sweden

Find all Agora Talks of #LINO71 in the Lindau Mediatheque.

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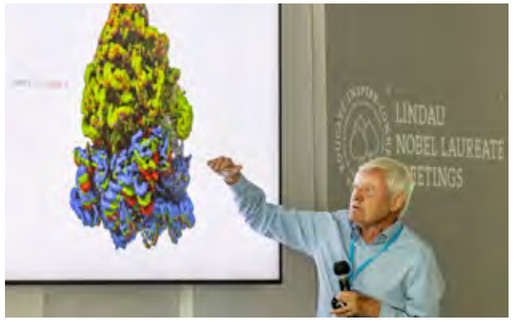

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1 Peter Agre
2 Joachim Frank
3 Louis J. Ignarro
4 Robert Huber
5 Aaron Ciechanover

The Great Variety of Chemistry

Fourteen Young Scientists were selected to present their current cutting-edge projects to an audience of Nobel Laureates and their peers. Recordings of both Next Gen Science sessions during the chemistry meeting are available in the Lindau Mediatheque.

Young Scientists Jason Lim ...

... and Erika Schaudy presenting their research

Accessibility for Young Scientists who could not travel to Lindau was key to the Lindau Meetings 2022: Liang Feng presenting to the audience in the Inselhalle

Monday, 27 June 2022

Seven Young Scientists presented during the first session in Lindau's city theatre, moderated by alumni manager Christoph Schumacher:

Light-Directed Synthesis of Complex Nucleic Acid Libraries
Erika Schaudy, University of Vienna, Austria

Models and Measurements to Decipher Initiation Modes
Yonatan Chemla, MIT Massachusetts Institute of Technology, USA

Developing Covalent Biologics Through Genetic Code Expansion for Cancer Therapeutics and Diagnostics
Paul Klauser, University of California, San Francisco, USA

Therapeutic Strategies for Erythropoietic Protoporphyria (EPP)
François Halloy, University of Oxford, United Kingdom

Sustainable Biodegradable Materials and Devices Integrating Energy Conversion and Storage
Abdelaziz Gouda, University of Toronto, Canada

Turning Waste Commodity Plastics Into Resources for a Sustainable Future
Jason Lim, Institute of Materials Research and Engineering (IMRE), Singapore

Smart Rust Makes Clean Water
Lukas Müller, Friedrich-Alexander-University Erlangen-Nuremberg, Germany

Wednesday, 29 June 2022

Seven Young Scientists talked about their work during the second session, which was moderated by scientific co-chair Valeria Nicolosi:

Mechanisorption: Storing Energy in Non-Equilibrium Materials Through Active Adsorption
Liang Feng, Northwestern University, USA (online)

Deciphering Biochemical Amino Acid Synthesis
Robert Mayer, Université de Strasbourg, France

Accelerating Organic Synthesis With Chemical Language Models
Philippe Schwaller, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Discovering Photochemical Reactions With Machine Learning
Julia Westermayr, University of Warwick, United Kingdom

Atomically Precise Synthesis of Single-Wall Carbon Nanotube Fragments
Han Yi, National University of Singapore

Direct Catalytic Copolymerization of Ethylene With Carbon Monoxide to Polyethylene Materials With In-chain Ketones
Maximilian Baur, University of Konstanz, Germany

Metal Electrodes in Complex Organic Synthesis
Sebastian Beil, University of Groningen, Netherlands

Collaboration is Key

Collaboration results in better science – but the current system does not reward scientists who support each other. This problem was discussed during the Science Breakfast.

Numerous contributions from Young Scientists enriched the discussion during the Science Breakfast.

Moderator Adam Smith with Nobel Laureate Randy Schekman and Martin Vetterli, EPFL

In Lindau, it is never too early in the day to discuss ideas. Titled 'Scientific Collaboration in Challenging Times', Randy Schekman, 2013 Nobel Laureate for Physiology or Medicine, and Martin Vetterli, president of EPFL, met with moderator Adam Smith on the Wednesday morning of #LINO22. The audience enjoyed breakfast while attending the event as early as 7am.

Current issues like COVID-19 and the war in Ukraine got a brief look-in before moderator Adam Smith wisely allowed the discussion to flow naturally towards what the attendees regarded as the greatest threat to scientific collaboration: science's reward and evaluation structure.

Panellist Randy W. Schekman set out his stall from the outset: "One of the problems with academic science, as I see it, is that the reward structure tends to favour the individual scientist and his or her own research team." The vast majority of the scientific community is locked in a publicly funded system that does not reward collaboration. Instead, it rewards publication in high-profile journals, particularly as a first author. But how to fix it? "My suggestion is that you guys take over", said Vetterli, addressing the Young Scientists.

Full review of the Science Breakfast with, additionally, the perspective of the #sticktoscience initiative

Session Formats

12
Lectures
By Nobel Laureates

12
Agora Talks
Laureates Interact During Presentation
Moderator Leads Q&A from the Audience
Flexible and Interactive

4
Panel Discussions
Topical and Relevant Issues
High Profile Panelists: Laureates, Young Scientists, Civil Society
Attendees

14
Next Gen Science Presentations
Research by Selected Young Scientists
Opportunity for Q&A

29
Open Exchanges
Informal Discussions
Between a Laurate and Young Scientists Only
Time for Q&A – Online Open Exchanges,
Hosted by Lindau Alumni, with Elizabeth H. Blackburn, Steven Chu, Martin Chalfie, Rudolph A. Marcus and Sir David W.C. MacMillan

7
Partner Events
Discussions Hosted by Partners of the Lindau Meetings

Partner Events

New Outlook on Nuclear Fusion to Combat Climate Change

hosted by C5 Capital

- Ian Chapman, UK Atomic Energy Authority (UKAEA), United Kingdom
- André Pienaar, C5 Capital, United Kingdom (Moderator)
- Tom Scott, UK Atomic Energy Authority (UKAEA) and Royal Academy of Engineering Research, Chair in Advancing the Fusion Energy Fuel Cycle, United Kingdom (online)
- David Kingham, Executive Vice Chairman and a Co-Founder of Tokamak Energy, United Kingdom (online)

Chemical Data Provide Information About Astronomical Events in the Geological Record

hosted by the Austrian Federal Ministry of Education, Science and Research

- Christian Köberl, University of Vienna, Austria (Moderator)
- Hipassia Moura, University of Konstanz, Germany
- W.E. Moerner, Stanford University, USA

Hydrogen Meets Science

hosted by h2connect.eco

- Exhibition in front of the Lindau Inselhalle for meeting participants and the public
- Initiated by Lindau Alumnus 1980 Werner Tillmetz and Winfried Hamann

All panels: order from left to right

How Can Chemistry Unlock Meaningful Insights in Health and Nutrition?

hosted by Mars, Incorporated

- Adam Smith, Nobel Prize Outreach, Sweden (Moderator)
- Lena Neufeld, Tel Aviv University, Israel
- Aaron Ciechanover, Technion – Israel Institute of Technology, Israel
- Hagen Schroeter, Chief Science Officer at Mars Edge, USA

Hydrogen: Energy Carrier and Fuel for a Sustainable World

hosted by Toyota Mobility Foundation

- Julia Müller-Hüllstede, German Aerospace Center (DLR), Germany
- Hartmut Michel, Max Planck Institute of Biophysics, Germany
- Nobuhiko Koga, Chief Officer, Frontier Research Center, Toyota Motor Corporation, Japan
- Werner Tillmetz, University of Ulm, h2connect.eco Bodensee, Germany (Moderator)

Excellence in Science and Exploration

hosted by Rolex SA

- Faith McLellan, Scientific Writer and Editor, Switzerland (Moderator)
- Brian P. Schmidt, The Australian National University
- Gina Moseley, University of Innsbruck, Austria

Curious Minds

hosted by Obrist DE, Felix Wankel Institute

- Thorsten Rixmann, Director Marketing & Communications, OBRIST Powertrain, Austria
- Rainer Blatt, University of Innsbruck, Austria
- Hartmut Michel, Max Planck Institute of Biophysics, Germany

Celebrating Science, Cooperation and Culture

Summer Festival of Science

hosted by the German Federal Minister of Education and Research Bettina Stark-Watzinger

Reception and Dinner at Hotel Bayerischer Hof, Lindau

Addresses
- Federal Minister Bettina Stark-Watzinger
- Countess Bettina Bernadotte, President of the Council for the Lindau Nobel Laureate Meetings

Federal Ministers Martin Polaschek (Austria) and Bettina Stark-Watzinger (Germany) with Nobel Laureate Venki Ramakrishnan

Carsten Könneker and Beate Spiegel, Managing Directors Klaus-Tschira-Stiftung, in conversation with Nobel Laureate Stefan Hell

Countess Bettina Bernadotte, Federal Minister Stark-Watzinger and Council Vice-President Helga Nowotny

International Day

hosted by the United Kingdom
facilitated by C5 Capital

Partner Breakfast

hosted by C5 Capital (see p. 48)

The First Leiblach Valley Pipes and Drums outside of the Inselhalle

International Get-Together

Welcome
- Countess Bettina Bernadotte, President of the Council for the Lindau Nobel Laureate Meetings
- André Pienaar, C5 Capital
- Sir Peter Bruce, Physical Secretary & Vice President, Royal Society, United Kingdom

Discussion on Science in the UK
- Nobel Laureate Venki Ramakrishnan, André Pienaar, Adam Smith

Cultural Performances
- The First Leiblach Valley Pipes and Drums
- The Bodensee Players

British Dinner

Sir Peter Bruce delivered his Welcome online.

Musicians from Trachtenverein Altusried and Young Scientist Gaukhar Khassenova

Bavarian Evening

hosted by the Free State of Bavaria

Welcome
- Countess Bettina Bernadotte

Bavarian Music & Folk Dance
- Trachtenverein Altusried

Bavarian Dinner

Finally Time for Personal Encounters

Grill & Chill

Upon invitation of the Lindau Nobel Laureate Meetings in cooperation with the City of Lindau

Welcome Adresses
- Claudia Alfons, Lord Mayor of Lindau
- Countess Bettina Bernadotte, President of the Council

Donations
The proceeds and donations benefit the Lindau city museum 'Cavazzen', projects with young people in Lindau and the surrounding area run by the Mentor Foundation Germany as well as marshland renaturation projects.

Support
- City of Lindau
- Mineralbrunnen Krumbach GmbH
- TV Reutin 1905

Grill & Chill in the Toskanapark

Donna Strickland talking to Young Scientists during the Grill & Chill

Nobel Laureates and representatives of Council and Foundation with State Secretary Andrea Lindlohr

Academic Partner Dinners

Hosts
- Austrian Federal Ministry of Education, Science and Research
- Bayer Science & Education Foundation
- Carl Zeiss Foundation
- German Academic Exchange Service (DAAD)
- German Research Foundation (DFG)
- Lindau Spirit Fellowship
- Max Planck Society
- Obrist Group

Participants of the Bayer Foundation Dinner ...

Baden-Württemberg Boat Trip to Mainau Island

hosted by the State of Baden-Württemberg

Welcome Addresses
- Countess Bettina Bernadotte
- Andrea Lindlohr, State Secretary at the Ministry of Regional Development and Housing, Baden-Württemberg

Music
- La Diri

Closing Panel Discussion
"The Diversity Challenge"

Conclusion & Farewell
- María Clara Miserendino, Young Scientist, Universidad Nacional de Córdoba, Argentinia
- Benjamin List, Nobel Laureate in Chemistry 2021, Max-Planck-Institut für Kohlenforschung, Germany

Science Picnic
hosted by the Ministry of Science, Research and the Arts, State of Baden-Württemberg

... and the Carl Zeiss Foundation Dinner

Highlights of the #LINO22 Social Programme

It is in between and after formal meeting sessions when new professional networks and friendships start to form. That's why the International Dinner and the Bavarian Evening, two highlights of the social programme, were also 'celebrated' digitally for the online participants worldwide.

Musical performances in the appropriate style, suitable food and lively exchange characterise the International Get-Together and the Bavarian Evening.

The International Get-Together was this year hosted by the United Kingdom. Greeted at the entrance to the Inselhalle by traditional British weather and Scottish music, performed by the First Leiblach Valley Pipes and Drums band from Austria, Laureates and Young Scientists enjoyed an evening of English cuisine, brief talks from the likes of Sir Peter Bruce, Physical Secretary and Vice President of the Royal Society, and a Sherlock Holmes play by the Bodensee Players, a German theatre group that performs plays in the English language. The message from the night that the UK organisers clearly wanted to convey was that, despite Brexit, the UK remains inclusive, international and innovative when it comes to science.

"I would leave Brexit to the politicians and not let it interfere with scientific decisions", remarked former President of the Royal Society Venki Ramakrishnan, 2009 Nobel Laureate in Chemistry. "The UK has several characteristics that make it a great place for science: one is that Young Scientists are allowed a great deal of independence – and this has really created a kind of tradition of innovation and creativity; another aspect is that it's an amazingly international place to work." But the talks and entertainment merely served as a backdrop for the true purpose of the event: providing a space where scientists from all over the world can meet and talk informally.

In the same way, the Bavarian Evening began with traditional music at the Inselhalle entrance, this time alpenhorns. Inside was complete Bavarian cultural immersion. Bavarian folk music from an accordion accompanied a traditional Schuhplattler folk dance by a troupe of dancers. Attendees could taste Bavarian cuisine and Bavarian beer. And many German attendees were dressed in lederhosen or dirndls.

But looking a little closer, the traditional dress was not only from Bavaria – a huge diversity of people in varied attire from around the world were dotted around the room, including Countess Bettina Bernadotte, President of the Council for the Lindau Nobel Laureate Meetings, in her Swedish dress. Brian Malow, who was scheduled to host the Bavarian Evening for all online participants asked a number of Young Scientists who had donned their culture's customary dress about what they were wearing and their experience of Lindau.

"I think when someone asks me 'what were the greatest days in your life?', I will say to them the visit to the Lindau Meeting with the Nobel Laureates", said Qaisar Khan from the University of Malakand, Pakistan, dressed in smart traditional Pashtun garments.

"I had a small, tiny dream to wear this dress one day and when I heard that in Lindau people are inspired to wear their traditional dress, it was a big honour for me to represent not only my university here in Germany, but also my home country", said Gaukhar Khassenova from the University of Münster, sporting colourful and intricate traditional Kazakh attire. "I have seen the Bavarian dress and national dress from many Asian countries and also from Africa – it's a great event, scientifically and culturally."

Away from the video cameras, those who had dressed up had the ideal ice-breaker for conversations with people from other parts of the world potentially working on similar scientific topics or facing similar challenges. As with any event in these demanding times, the spectre of COVID-19 has hovered over the meeting throughout. Malow was one of several speakers to deliver talks remotely, and around 100 young scientists could participate from home.

Both Monday's and Thursday's evening events were streamed live for these participants, with an online space exclusively dedicated for them to chat and connect. In addition, several Online Open Exchanges took place throughout the week via Zoom, and Tuesday evening's event 'Networking Through Proactivity' was dedicated solely to these attendees. The interactive Zoom workshop allowed remote Young Scientists to rapidly connect with each other in a fun and entertaining way.

Though these attendees unfortunately did not get to experience Lindau in person, the online programme at least gave them a flavour of the Lindau spirit and hopefully provided them with the chance to catalyse their new networks and friendships.

Blog author Ben Skuse attended the meeting's social events online and was fascinated by 'constellations'.

Interesting and thought-provoking discussions with passionate fellow Young Scientists from all over the world. An eye-opening experience!

Yashoda Chandorkar,
Young Scientist

Brain Trust

How can the public trust in an enterprise that's built on what appears to be such shifting sands? This was the question posed on the first day of the 71st Lindau Nobel Laureate Meeting during the Panel Discussion 'Trust in Science, Trust in Chemistry'.

Chemistry, and science as a whole, can be described as a never-ending quest to expose the truths of nature. But, at the same time – by its very iterative consensus-led disposition – science rarely provides instant certainty to the public, and almost never binary answers. To a straight 'yes/no' question a scientist will give you a probability with caveats. What's worse or even more challenging, a year later you may get a completely different answer.

For example, at the beginning of the COVID-19 pandemic, emphasis was placed on handwashing to halt the virus' spread via transmission from surfaces; but later this was proved to be less important than first thought. Public doubt crept in, and trust was shaken, even though the chemistry remained sound.

Diving straight into the effect of the pandemic on public trust in science was 2009 Nobel Prize in Chemistry recipient Venki Ramakrishnan: "In science, truth is always provisional", he said. "When [politicians] say they're following the science, there's often no 'the science' because scientists would often disagree on different aspects of the pandemic."

Ramkrishnan argued that this uncertainty, which scientists live with all the time at the frontiers of knowledge, has been hard for the public to stomach. "I think we have to convey to the public that just because things are uncertain, doesn't mean we shouldn't act", he said. "What scientists can really do is point out what the basis is for their conclusions or advice in a language that everyone can understand, and where the evidence is there for everyone to look at."

This emphasis on clarity and transparency was echoed and expanded upon by other panel members. "The pandemic response was about sharing knowledge really fast, when knowledge was absent because we didn't understand the virus at first", said Antje Boetius, a polar and deep-sea researcher, and Director of the Alfred Wegener Institute at the Helmholtz Centre for Polar and Marine Research.

Boetius felt that the scientific community's success in rapidly responding to the virus means there is a debate to be had about increasing public trust in science more generally by swiftly getting results out into the world without peer review, though she recognised this poses unique dangers, not least the rapid dissemination of misinformation.

Brian Schmidt, 2011 Nobel Prize in Physics recipient, agreed: "I think at the heart we need much more transparency than we have", he argued. "I am left wishing we had sort of a scientific Twitter, a place where you have to be registered and you have to agree to a certain code of conduct, so that we can more rapidly share information."

Beyond transparency, all panellists agreed that two further fundamental problems exist, that were heightened during the pandemic: a lack of understating of the scientific process and a lack of diversity in science itself.

Asked how the public can better appreciate that the scientific method does not bring absolute truths, Lindau Young Scientist María Clara Miserendino from the Universidad Nacional de Córdoba, Argentina, emphasised the importance of citizen science projects: "I think that it would be very cool to have more citizen science projects in which we can engage with society in research, so that they can maybe better understand what science is, how it works, and how we deal with uncertainty."

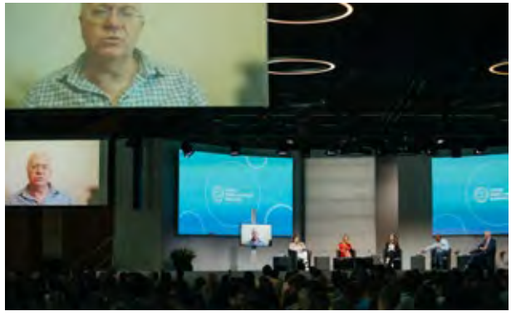
María Clara Miserendino

Sophie Marie Gutenthaler

Antje Boetius

Meanwhile, fellow Young Scientist Sophie Marie Gutenthaler from the Ludwig-Maximilians-Universität Munich, Germany, emphasised education: "I would say the key is education about how the scientific process works. Someday people leave school, [and for this] it is important to have meet-points where the general public can meet actual scientists... and see they can make mistakes."

A question from the floor prompted a discussion on how the inclusion of diverse voices in the scientific process can help in building trust in science. Ramakrishnan pointed to an infamous example of how a lack of diversity, combined with scientific wrongdoing, can and has eroded trust in a particular community. In the Tuskegee Experiment, between 1932 and 1972, 400 African American men with syphilis were promised free medical care but were left untreated without their knowledge for the purpose of observing the effects of the disease. "So now when coronavirus hits, and there's reluctance in the black community to take up these vaccines, you can understand why", he said. "The solution is to involve people from the black community, to engage with them."



Brian P. Schmidt participating in the discussion online

Schmidt summed up the importance of diversity and inclusivity in building trust in science with a recent example from Australia. "We have been doing quite a big project to sequence the DNA of First Nations people", he revealed. "What has been really important for us is to bring in First Nations scientists, as it's almost impossible to be trustworthy if you don't reflect the people that you're working with."

Two Lindau Premieres

Catalysis Makes the World Go Round

Creating new molecules is often such a delicate and complex process, that to the uninitiated, it almost seems like an arcane art. But while there's undoubtedly an element of creativity to producing new molecules, there's a lot more hardcore science that goes into it.

In his first Lindau lecture, Sir David W.C. MacMillan talked about photoredox catalysis.

Thanks to the work of Benjamin List and Sir David W.C. MacMillan, chemistry is one step further in our understanding of the major principle of catalysis. The two were awarded the Nobel Prize for Chemistry in 2021, "for the development of asymmetric organocatalysis", a process that can be used in the creation of various compounds of economic importance. As the 'newbies' in the Chemistry Nobel Laureate club, they gave their first Lindau lectures in 2022, presenting what makes their work (and catalysis, in general) so important.

"Over the years I realised that catalysis is among the most relevant cultural human accomplishments in the history of mankind", Benjamin List pointed out. "It's comparable perhaps to agriculture or the wheel or cars or the internet. It is probably the single most important technology for our future. That's my key message today."

If you think he's exaggerating, well, he's not. Many industries and research areas are directly dependent on chemists' ability to construct molecules with the desired properties, and this work requires catalysts substances that control and increase the rate of a chemical reaction undergoing any permanent chemical changes themselves. "I'd like to start with by far my favourite chemical reaction, photosynthesis. I couldn't envision a more beautiful process on this planet in which a plant converts CO_2 from air and water to make the materials we eat and the air we breathe, accomplished by the utilisation of light. Is there anything more useful for us on this planet?"

Another key catalysis area is the production of ammonia. Ammonia is a key element in the Green Revolution or the Third Agricultural Revolution, which enabled mankind to reach the population we have now. In fact, as List highlights, the production of ammonia correlates excellently with the global population, and it's hard to imagine that without catalysis, the world's population could have grown at the same rate.

Of course, producing different types of compounds requires different types of catalysis. In his lecture, Sir David W.C. MacMillan didn't focus on the organocatalysis that led him to the Nobel Prize but instead, discussed another type of catalysis: photoredox catalysis.

Whereas organocatalysis uses an organic compound to control or increase the rate of a chemical reaction, photoredox catalysis uses light-induced single-electron transfer. Basically, it's a branch of photochemistry that 'develops new reactivity' and uses visible light to power new organic chemical reactions, MacMillan explains. "So, one area that my group has focused on is metallic photoredox. The idea is to use the key steps and merge it with metal catalysis. The goal here is to take these two completely different types of catalysis to hopefully allow you to make bonds in a new (faster) way."

It's a promising approach, but the challenge isn't getting it to work – it's getting it to always work; or rather, to get it to generally work. "I would argue the most important reactions in the world are important because of the bonds that take place, but also because they're general", MacMillan says.

So how do you approach generality? There's no universal recipe, unfortunately; it takes a lot of time and hard work. But talking to industrial partners who are trying to translate academic ideas into large-scale practice can help. His work with pharmaceutical companies has helped zoom in on some of the real-life problems associated with catalysis and encouraged him and his team to find new solutions to these problems.

Despite decades of research, catalysis is still a very rich field with plenty of untapped opportunities. Perhaps, List suggests, we may one day be able to use catalysis to replicate an artificial version of photosynthesis, which could help us tackle climate change.

Benjamin List emphasised the importance of catalysis for mankind. For his experience at his first Lindau Meeting, see p. 20.

"The essence of photosynthesis, take CO_2 and convert it into C and O_2, nobody has ever worked on it. It might not be possible but think about it conceptually – you have to take the CO_2 out of the atmosphere and turn it into something stable or useful. I hope this inspires you."

Fighting Malaria, Cancer, Parkinson's and COVID-19

The modern-day fields of medicine and chemistry are fused together as never before, which is also evident in Nobel Prizes, where physicians often receive the prize in Chemistry and chemists become Laureates of Physiology or Medicine.

Nearly 20 years ago, Peter Agre was awarded the Nobel Prize in Chemistry for the discovery of aquaporin-1, a membrane water channel. Since 2008, Agre has served as Director of the Johns Hopkins Malaria Research Institute, and in this position he is able to connect research on aquaporins to a global health problem, which first caught his attention as a young backpacker in Asia.

Malaria kills over half a million people each year, the majority of which are children under five in Sub-Saharan Africa. "Malaria is a disease that we can take care of if the resources are available," noted Agre.

William G. Kaelin, Jr.'s chemistry professor was not overly impressed by his laboratory skills. "Mr Kaelin appears to be a bright young man whose future lies outside the laboratory", was his assessment in Kaelin, Jr.'s senior year at college. "The project I was given was uninteresting, unimportant and undoable", recalled Kaelin, but fortunately it didn't dampen his enthusiasm for lab work later on.

Kaelin received the Nobel Prize in Physiology or Medicine in 2019, along with Sir Peter J. Ratcliffe and Gregg L. Semenza "for their discoveries of how cells sense and adapt to oxygen availability." His independent research career centred on von Hippel-Lindau disease (VHL), a rare hereditary disease, which causes different types of cancer, particularly clear cell renal cell carcinoma, the most common form of kidney cancer.

VHL-associated tumours induce blood vessel formation and increase red blood cell production, which is linked to oxygen sensing. By figuring out how the oxygen-regulated machinery makes cancer cells grow, pharmaceutical companies were then able to produce new anti-cancer therapies, including belzutifan, the first drug for VHL-associated kidney cancer. "Of course, the (Nobel) Prize is wonderful," said Kaelin, "but there's something special also when you can see that what you're working on, if you're very, very lucky, occasionally touches people and improves their lives."

During his lecture on Parkinson's disease (PD), Randy Schekman remarked, "I'm on a steep learning curve." The 2013 Nobel Laureate in Physiology or Medicine spent many years looking at vesicle transport in the cell, but personal loss gave rise to a new research interest. Schekman lost his wife to PD in 2017.

In fact, there is a pandemic of Parkinson's disease, with over 10 million people worldwide living with the condition and millions more will be diagnosed in the coming years. Unfortunately, little can be done to help them. "In the last several decades we've enjoyed tremendous progress in the major killers, cancer and heart disease," said Schekman, "but with the scourge of neurodegenerative disease, there have been no treatments."

Schekman is Scientific Director for ASAP (Aligining Science Across Parkinson's), which is supported by the Sergey Brin Family Foundation. The programme brings together basic scientists from around the world in a collaborative effort "to finally crack the code of this scourge of humanity", concluded Schekman.

Aaron Ciechanover, who won the Nobel Prize in Chemistry in 2004, gave his lecture on the COVID-19 pandemic and the many "bioethical bumps" that arose with this international health emergency. The primary ethical issue faced by hospitals worldwide was priority of treatment – who gets to be treated first, and how can medical staff decide who will receive treatment and who won't?

Another problem that the pandemic threw up was that prioritising COVID-19 resulted in the neglect of patients with other diseases. Vaccine scepticism was a central part of Ciechanover's lecture, and for some of the roots of this occurrence, "we have to look in the mirror, at ourselves." This ethical issue is closely associated with the infodemic and the spread of disinformation. Ciechanover described the grim outcome of linking the MMR vaccine to autism and the refusal to take the HPV vaccine by many Japanese women.

The COVID-19 pandemic brought into focus many aspects related to health and disease, but also general problems in society – inequality and discrimination. "Gender medicine is an interesting, newly-evolving area", explained Ciechanover, providing the example of the focus on male participants in clinical trials (and even male mice in the laboratory!), which could lead to poorer health outcomes for women.

We still don't know what the future holds for the coronavirus pandemic. But if there's any silver lining in this public health crisis, it's perhaps the fact that many sensitive issues have been exposed and must be dealt with in order to move forward. These problems are now "sitting on our table", said Ciechanover.

William G. Kaelin, Jr. had his on-site premiere in Lindau.


Randy W. Schekman spoke on the pandemic of Parkinson's disease.


Peter Agre connects research on aquaporins and malaria.


Aaron Ciechanover gave a lecture on COVID-related ethical questions.

Artificial Intelligence

Folding Toward the Future

Initially, AI was applied by chemists to accelerate drug discovery and predict functional properties, as well as reduce the costs associated with computation and experimentation. But can AI truly bring about a revolution in chemistry, or has its promise been exaggerated? The topic was addressed by a stellar panel and an Agora Talk at #LINO22.

AI has already made a tremendous impact on chemistry, and progress in recent years has been particularly impressive. However, much of this progress doesn't necessarily come from better algorithms or smarter methods, but rather from an increase in processing power, says Nobel Laureate Michael Levitt.

AI was very popular in the 1960s, the big difference now has been the massive increase in computer power. So basically, what has been important for AI, in general, is the speed of modern computers. Much of Levitt's work included using rudimentary computers to simulate virtual molecules. He and Arieh Warshel laid the foundation for the powerful programmes that are now used to understand and predict chemical processes, which earned them both a share of the 2013 Nobel Prize in Chemistry.

Fellow Laureate Warshel, however, seems slightly disenchanted with AI in chemistry because it doesn't always help you understand things, and that's what he's most interested in. "The questions that interest me forever are how enzymes work", the Laureate said at an Agora Talk where he presented some of his past and current work.

Since AI is a bit of a black box, even for its makers, can we truly trust AI if we don't understand the decisions it makes? However, Warshel also concedes that sometimes, understanding isn't everything. If you have a cancerous mutation and you use AI to find a compound that is effective against it, that's great news, although it may not truly advance our understanding of the process.

Warshel also raises another concerning point: that AI is opening up a wider gap between chemists and the public. But panellist Neo Neng Kai Nigel, National University of Singapore, sees an opportunity for democratising science and making it more open. While some years ago, AI algorithms were restricted to big companies and research groups, now there's a myriad of algorithms that can be used by anyone. A lot of these machine learning models are rooted in the open-source community, which promotes transparency and democratisation of science. It's the big companies who typically produce the most un-transparent science, he adds.

Paulina Paiz from the University of California sees a similar advantage: AI in chemistry can make science a more open endeavour. "Traditionally, science is gated, but with these efforts, you get a lot of citizen science", Paiz says, which not only draws more people to science but also contributes to the system of checks and balances that is so important to science; this openness could also lead to some AIs being used to explain what other AIs are doing, opening up the 'black box'.

Of course, the panel couldn't avoid AlphaFold in this discussion. AlphaFold, an AI iteration from DeepMind, performs predictions of protein structure, a problem computational researchers have struggled with for years. The 3D structure of proteins is crucial to understanding their function; similarly, if you want a protein that can perform a certain task, you need to have a good idea about what shape it should have.

Paulina Paiz

Arieh Warshel

Michael Levitt

Neo Neng Kai Nigel

In 2021, AlphaFold proved its worth by predicting 3D models of protein structures with remarkable accuracy, something which its creators say has the potential to accelerate research in every field of biology. But the panel has mixed opinions on AlphaFold, and without minimising the accomplishment, they suggest that once again, it may be the extra computation power that is making a difference.

"Since AlphaFold there have been other groups that say they have performed marginally better but a lot of that can be attributed to more data," says Paulina Paiz. Neo Neng Kai Nigel highlights another problem: DeepMind hasn't exactly been very open about how its algorithm works. "AlphaFold itself wasn't really transparent in terms of how the model was creating the design, so I think more transparency by AlphaFold will definitely be better."

But ultimately, AlphaFold is a great example of what AI can bring to chemistry: it promises a lot, it's a bit mysterious, but it offers a lot of valuable information to the scientific community. Perhaps herein lies the key to AI in chemistry – and more broadly, in science in general. It works best when used in conjunction with human intuition and knowledge, and when high-quality data is provided in a transparent manner. AI isn't here to replace human researchers – it's here to complement them, concludes Michael Levitt.

Panel moderated by Gunnar Schröder

Women Need to Be Instilled With Belief

The 'Women in Research' series has been increasing the visibility of women working in science since 2016. Exciting new portraits from the areas of Chemistry and Economics were added to the blog this year. One of the featured participants is Nicole Foster from Australia, working in the field of the ocean environment.

What are you seeking to accomplish in your career?
I want to inspire the next generation of young women to pursue scientific careers. I want to be collaborative, not competitive, in my research and foster this among my peers and work colleagues. I would love to continue working to raise awareness of the importance of coastal/marine plant communities and particularly continue working to safeguard seagrass habitats for the future.

What should be done to increase the number of female scientists and female professors?
I think generally targeting girls at a young age and fostering scientific curiosity and interests is important. However, I believe this needs to be maintained throughout school and tertiary education, especially to increase the number of female professors. Women need to feel empowered during their university experience and instilled with the belief that they can go on to an academic career and professorship.

How would you describe your Lindau experience?
It was a sunny first day of the 71st Lindau Nobel Laureate Meeting, the Inselhalle was a buzz of excitement, and there was a flurry of people in grey lanyards. I looked down at my own grey lanyard, representing the young scientists attending the meeting, and had to pinch myself to remember that I was really here. For me, this experience started back in 2020, when I was selected for the interdisciplinary meeting. Unfortunately, the pandemic prevented an on-site experience, but the Lindau Council graciously invited Young Scientists to attend in person their discipline-specific meetings. This is how I found myself at the 71st Meeting on Chemistry, embarking on a week of incredible experiences. I had the opportunity to meet Nobel Laureates and was inspired both by their dedication to their work and science, but also their desire to help Young Scientists such as myself. They shared their triumphs and struggles and gave up their time to speak to us, providing advice and guidance for our future careers. The most memorable part of my Lindau experience, however, was meeting the other Young Scientists. I had never experienced a gathering of so many people from different walks of life, nationalities and research backgrounds all coming together with a shared love of science and desire to make the world a better place. I am so glad that I chose to pursue a career in science and feel fortunate to be part of the Lindau community.

Women in Research

The interviews in the series, conducted by physicist Ulrike Böhm with female participants of the Lindau Meetings and published on her own blog, show the diversity of women working in science. The wide variety of answers to the questions posed by Ulrike in the interviews shine a light on the female researchers behind the science and reveal their diverse motivations and career paths as well as the reasons for why they chose their research field. With two meetings in 2022, the series highlighted female scientists from areas related to chemistry and economics.

Nicole Foster from Australia carries out a lot of her research outdoors – one of the things she loves about her job.

Ajibola Abiodun Bayode, Nigeria, focuses on the facile synthesis of sustainable visible-light-assisted bifunctional photocatalysts from cheap sources for the degradation of contaminants in wastewater.

Gözde Barim, material chemist from Türkiye, is working as a post-doctoral researcher at Lawrence Berkeley National Laboratory, USA.

Katharina Bergant from Austria and Italy is a Research Economist at the International Monetary Fund in Washington, DC, USA.

Get to know the scientists presented in the 'Women in Research' series 2022.

7th Lindau Meeting on Economic Sciences

Opening Day

On an intense first day, the ceremonial beginning quickly segued to enlightening scientific discussions. The excitement felt by all who were finally able to attend the 7th Lindau Meeting on Economic Sciences in Lindau was palpable, and the Laureates had the first chance to see the Nobel Laureate Pier.

Volker Steger, Countess Bettina Bernadotte and Adam Smith

Young Economists during the reception

Lindau Nobel Laureate Pier

Jürgen Kluge welcoming Laureates and guests to the Foundation Dinner

Opening Ceremony

Welcome
Countess Bettina Bernadotte, President of the Council

Greetings from Stockholm (online)
Vidar Helgesen, Executive Director of the Nobel Foundation

Sketches of Science
Volker Steger, photographer and initiator of the project
Adam Smith, texts on Laureates and their research, master of ceremonies of the opening

Programme Preview
Scientific Chairpersons of the 7th Lindau Meeting on Economic Sciences: Torsten Persson, Klaus Schmidt, Antoinette Schoar

First Scientific Sessions

Markets for Water in California
Paul R. Milgrom, Laureate in Economic Sciences 2020

Auction Implementation of a Rational Expectations Equilibrium
Robert B. Wilson, Laureate in Economic Sciences 2020 (online)

Auctions
Panel discussion, see p. 92

Reception

for Young Economists and guests at the Lindau Nobel Laureate Pier with presentation of new entries for Laureates Joshua D. Angrist, Paul R. Milgrom, Richard E. Thaler

Dinner and Online Meet-Up

for Young Economists

Foundation Dinner

hosted by the Foundation Lindau Nobel Laureate Meetings

Welcome Addresses
Jürgen Kluge, Chairman of the Board of Directors, Foundation Lindau Nobel Laureate Meetings
Klaus Holetschek, Bavarian Minister of State for Health and Care

On Role Models and Promising Young Scientists

Vidar Helgesen, Executive Director of the Nobel Foundation (online)

Klaus Holetschek, Bavarian Minister of State for Health and Care

"It would have been even more delightful to be there in the beautiful surroundings, but I really would like to say how much we appreciate on the part of the Nobel Foundation that Laureates gather to address the pressing issues of the day: climate change, biodiversity loss, social and economic inequality. Meeting those challenges is even more difficult and calls for more creativity and interaction on the part of leading experts. And economic sciences are really at the heart of finding the necessary solutions.

As academics pouring over your analyses and your sources and your models, you might not realize that as much, but Nobel Laureates are such an important source of inspiration and hope. In today's world there aren't that many sources of unrivalled inspiration and hope for people, not least young people, to go to. And that's why Nobel Laureates should realise and understand the role you are playing as models: The world and not least young generations need to see and need to realize that through hard work and inspiration they can change the world, like many of you have indeed contributed to doing. I wish you a fruitful gathering in Lindau and every success in your deliberations."

"I imagine that the past two years may have been also of particular interest to research and economics. Rarely before has the globalized economy been subjected to a tougher stress test. As a Minister of Health, I had to experience these connections and dependencies firsthand. The whole world could see how important research is and how well science ideally works. In Bavaria, we know this, and that is why we have been investing in our universities and in non-university research for decades.

We are still on a growth trajectory in this field. In 2016, we established another medical faculty, including a university clinic in the city of Augsburg. And in 2021, we founded a completely new university in Bavaria. All of this is expensive, but we believe this money is well spent. This applies equally to the Lindau Nobel Laureate Meetings. Bavaria is very happy to support the Meetings. We are proud to welcome so many outstanding scientists to Bavaria every year and we are grateful that we are able to send promising young scientists to the meetings via the elite network Bavaria. Thus, Bavaria is highly visible on the world map of top-level research. May this stay that way for a long time."

On the Importance of Taking Breaks

During the opening ceremony, the audience had the opportunity to learn more about the selection process of the Young Economists as well as the expectations of the scientific chairs of the 7th Lindau Meeting on Economic Sciences for the programme.

The scientific chairs during the interview with Adam Smith

Torsten Persson, Stockholm University, Klaus Schmidt, Ludwig-Maximilians-Universität Munich, and Antoinette Schoar, MIT, really whet the appetite of all participants for the scientific programme. During the opening ceremony, they explained their considerations when preparing the programme. Professor Schmidt emphasised the importance of the exchange between Laureates and Young Economists – and among the young participants themselves. "We tried to identify topics of relevance to be debated in panel discussions", explained Professor Schoar who joined the two council members Persson and Schmidt to chair #LINOecon.

The three scientific chairs agreed on the fact that the Next Gen Economic Sessions would become an integral part of the programme. "But the real information will be exchanged during the breaks in an informal conversation – so, do talk to each other", was the advice of Professor Persson. With regard to the encounters with the Laureates, he called on the Young Economists to become inspired by their stories: "Look at the sparkle in their eyes!"

Participants in #LINOecon

Laureates in Economic Sciences

Eighteen Laureates of the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel took part in the 7th Lindau Meeting on Economic Sciences.

Joshua D. Angrist
Year: 2021
Prize Motivation:
"for their methodological contributions to the analysis of causal relationships"

Robert J. Aumann
Year: 2005
Prize Motivation:
"for having enhanced our understanding of conflict and cooperation through game-theory analysis"

Lars Peter Hansen
Year: 2013
Prize Motivation:
"for their empirical analysis of asset prices"

Oliver Hart
Year: 2016
Prize Motivation:
"for their contributions to contract theory"

James J. Heckman
Year: 2000
Prize Motivation:
"for his development of theory and methods for analyzing selective samples"

Finn E. Kydland
Year: 2004
Prize Motivation:
"for their contributions to dynamic macroeconomics: the time consistency of economic policy and the driving forces behind business cycles"

Eric S. Maskin
Year: 2007
Prize Motivation:
"for having laid the foundations of mechanism design theory"

Daniel L. McFadden
Year: 2000
Prize Motivation:
"for his development of theory and methods for analyzing discrete choice"

Robert C. Merton
Year: 1997
Prize Motivation:
"for a new method to determine the value of derivatives"

Paul R. Milgrom
Year: 2020
Prize Motivation:
"for improvements to auction theory and inventions of new auction formats"

Roger B. Myerson
Year: 2007
Prize Motivation:
"for having laid the foundations of mechanism design theory"

Edmund S. Phelps
Year: 2006
Prize Motivation:
"for his analysis of intertemporal tradeoffs in macroeconomic policy"

Sir Christopher A. Pissarides
Year: 2010
Prize Motivation:
"for the analysis of markets with search frictions"

Christopher A. Sims
Year: 2011
Prize Motivation:
"for their empirical research on cause and effect in the macroeconomy"

Vernon L. Smith
Year: 2002
Prize Motivation:
"for having established laboratory experiments as a tool in empirical economic analysis, especially in the study of alternative market mechanisms"

Joseph E. Stiglitz
Year: 2001
Prize Motivation:
"for their analyses of markets with asymmetric information"

Richard H. Thaler
Year: 2017
Prize Motivation:
"for his contributions to behavioural economics"

Robert B. Wilson
Year: 2020
Prize Motivation:
"for improvements to auction theory and inventions of new auction formats"

Learn more about all these Laureates in the Lindau Mediatheque.

18 Economics Laureates Altogether – 14 On Site in Lindau and 4 Participating Online

Age

Youngest
Joshua D. Angrist
62

Oldest
Vernon L. Smith (online)
95
Robert J. Aumann (on site)
92

Records

First Participation
Joshua D. Angrist
Paul R. Milgrom
Richard H. Thaler
Robert B. Wilson (online)

Most Participations: 6
Daniel L. McFadden (online)

Earliest Award: 1997
Robert C. Merton

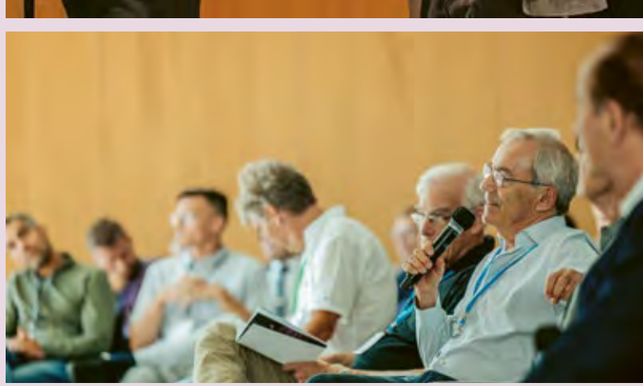
Most Recent Economics Prize: 2021
Joshua D. Angrist

Nationalities

United States 14
Cyprus 1
Israel 1
Norway 1
United Kingdom 1

Impressions



Personal Impressions From #LINOecon

Don’t Forget the Big Problems!

Paul R. Milgrom, recipient of the 2020 Nobel Memorial Prize in Economic Sciences, together with Robert B. Wilson, attended his first Lindau Meeting in 2022. Here, he tells us about his advice to Young Economists, what he learned himself, and what makes Lindau so special.

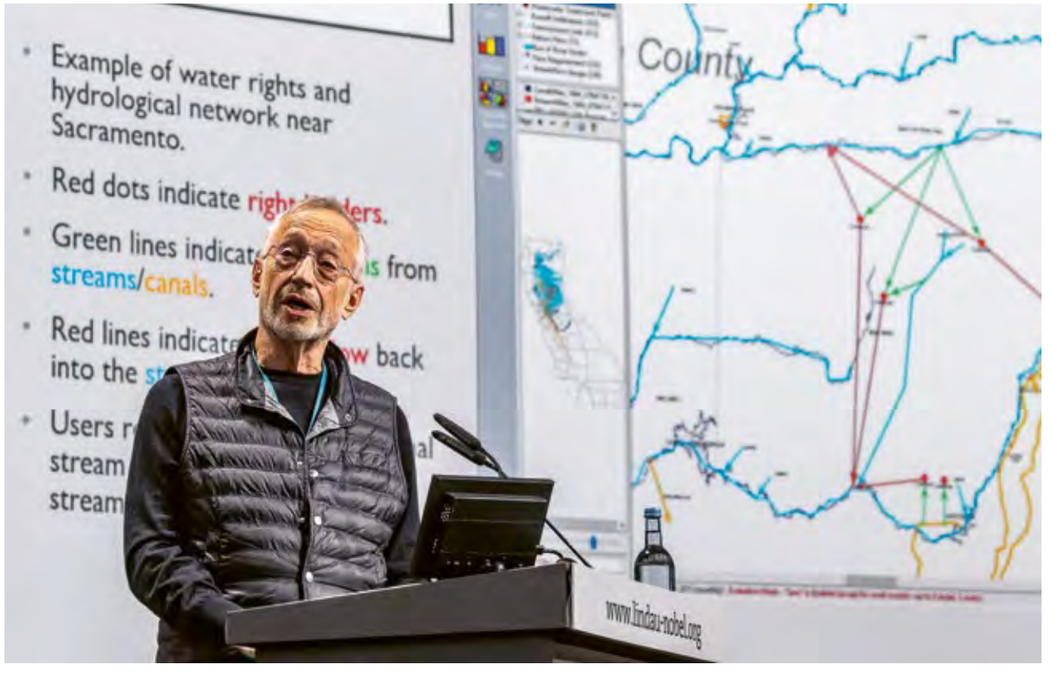
I participated in the whole range of formats that were on offer during the week in Lindau, including my own lecture, a panel discussion, the Next Gen Economics Sessions, a Laureate Lunch and a Science Walk with Young Economists. Two things really stood out for me. First, I really enjoyed giving my talk about water markets, which was the first time I had lectured about that. So I was surprised at how enthusiastically it was received, and I have even already gotten positive feedback from people who have watched a recording of the talk in the Lindau Mediatheque.

The other activities I enjoyed most were the individual meetings with students, including the Science Walk and the Laureate Lunch. During these interactions, the students mostly asked about two things. One was my history as an economist, that is, how did I end up doing what I was doing, what was my path as a young economist? Second were questions in the form of career advice. I told them that when you’re doing economics research, especially theory, there can be a lot of surprises and a lot of the ideas and methods one tries will fail.

With that in mind, I told the Young Economists what I tell my own students, which is that, on the one hand, I want them to focus some of their efforts on tractable problems, which will also enable them to have some tangible successes and will also allow them to hone their skills. However, on the other hand, they should not forget to look deeply at the important issues that matter most, even if the path forward is unclear. They should study problems, that, if solved, will have a big impact, for example, by fundamentally changing the way we think about something or by affecting a significant policy decision. The Young Economists were also eager to discuss their work with me and to take the opportunity to get my advice and thoughts on what they were doing.

What I learned from my week in Lindau are the concerns of the young researchers and also something about the places where they are doing their work. It was eye-opening to realise that although, as economists, we may hail from very different countries and societies, so many of us are working on very similar issues.

As Nobel Prize ceremonies had not been taking place due to COVID, this was the first time that I was in the company of other Nobel Laureates in this way. It was fascinating to see what the other Laureates were up to. For example, Robert Merton’s talk on financial engineering



Double Premiere: First Lecture in Lindau, first time on water markets

pointed me to an unexpected connection between market design, which is what I do, and financial instrument design, which was the subject of his talk. It was also particularly interesting listening to Oliver Hart describe his work about voice and exit in influencing corporate behavior.

I had heard of the Lindau Meetings from my friends Eric Maskin and Roger Myerson. They talked about how good a time they had. Like the other Laureates I receive many invitations, so when considering which to accept, I try to visit places that have something else special apart from the conference or meeting itself. For Lindau that meant spending time on the island – European towns are so different to American ones – which I had the chance to do when having lunch with one of the Young Economists. During the Science Walk, I was so engrossed in conversation that I didn’t have the chance to take anything in at all! And, of course, Lake Constance is such a special place. Another thing that I really appreciated is that my wife could accompany me on this trip.

Traditional last day excursion: on the boat trip to Mainau Island

I was also grateful for the opportunity I had to interact with Countess Bettina Bernadotte who was very charming. The unveiling of my bar on the Lindau Nobel Laureate Pier was a lovely surprise. It’s special to have something there that is tangible and lasting – an enduring testament to the Nobel Laureates.

Impressions

Young Economists at #LINOecon

Global Community in Numbers

The majority of our 329 Young Economists had to wait 851 days to finally participate in the 7th Lindau Meeting on Economic Sciences after it was postponed in 2020. Here are a few more interesting statistics:

Lindau Experience

73%
On Site

27%
Online

202 Young Economists Invited in 2020

Gender Balance

Female **38%**

Male **62%**

Representing 64 Countries and 212 Institutions

Tumisang Loate-Ntsoko's LINOecon Story

Queuing with Laureates

Tumisang Loate-Ntsoko is a researcher at the University of Pretoria in South Africa. During #LINOecon, she presented her findings on "Macroeconomic Effect of Fiscal Policy in South Africa". Here, she reflects on the time she spent in Lindau.

Tumisang Loate-Ntsoko shared her research in the Next Gen Science Sessions for the audience consisting of Young Economists and Laureates.

Having attended various international conferences, the 7th Lindau Meeting on Economic Sciences had different session formats that I had not experienced before. These include the lunches and science walks with Laureates, this was a first for me. Whereas I had never experienced close encounters with Laureates awarded the Sveriges Riksbank Prize in Economic Sciences, now I was suddenly queuing for food with Paul Milgrom and during our chat he told me about his trip to South Africa.

My two favourite Laureates were macroeconomists Joseph E. Stiglitz and Christopher A. Sims. As a macroeconomist, I have read their work during my PhD studies and still do in my current research. Having lunch with Christopher Sims was the highlight of the meeting. For years, I have read his work and to be able to put a real and humble face to the name is something I will not forget as a researcher. It was easy to converse with him and when I asked for a picture a day later after the lunch, he still remembered me and was happy for me to take a picture with him.

I also engaged with two researchers who share common interests and therefore we exchanged contacts to communicate further in the future. One researcher is doing research on South Africa and was interested in insights and feedback on his presentation from South Africans. I was able to share latest developments in our country which he was not aware of and that relates to his research. I have also extended an invitation to him to come and present his work at the University of Pretoria and other universities in South Africa. Having grown up in South Africa during his early childhood years, he is keen to visit the country again. I have also made contact with another young researcher who is just starting her PhD in monetary policy and banking, a topic I also looked at during my PhD, and have issued my invitation for her to visit the University of Pretoria if she wishes to present her work in progress during her PhD.

I enjoyed my presentation, a rare opportunity to present in front of the Laureates. I received good feedback from the moderator. However, Young Economist Marko Mlikota and I were surprised to be put in the Microeconomics session since we were both doing Macroeconomics.

I was encouraged to see a fair representation of young female economists at the meeting and especially during presentations. It was also good to see women being involved in research work on issues that affect women more, such as maternity leave.

My initial perception was that this was strictly a formal event. Through the pre-trip meeting with my country sponsor I learnt that there is also a social and informal aspect to it. Therefore, this meeting helped me to pack proper outfits for the event and to make the most of the event and enjoy the experience instead of only concentrate on the formal part of the meeting.

There were many opportunities to network. I found lunches and the boat trip as good opportunities to engage with people for longer, and conversations moved from professional to personal. I enjoyed the boat ride to the Mainau Island and the picnic. During the boat trip, I engaged with other researchers about traditional customs, and we had the opportunity to teach each other about our traditional customs and also see similarities between them. Exchanges like these make you realise that sometimes we share experiences more similar than we think.

I did not experience any challenges; both the transportation and accommodation were well organised. Overall, the trip was a great once-in-a lifetime experience and also my first time in Germany.

The author enjoyed the exchange with other economists.

Tumisang's Next Gen Economics presentation

Nominating Institutions

Reception for Academic Partners ...

with the University of California, among others ...

Academia Sinica, Taiwan
Académie Nationale des Sciences et Techniques du Sénégal
Academy of Science of South Africa (ASSAf)
acatech – National Academy of Science and Engineering, Germany
Aix-Marseille University, France
Austrian Academy of Sciences
Bank of Canada
Bocconi University, Italy
Boston College, USA
Boston University, USA
Brazilian Academy of Sciences (BAS)
Bulgarian Macroeconomics Association
Carnegie Mellon University, USA
CEMFI, Spain
China-Singapore Guangzhou Knowledge City Investment and Development Co. Ltd
Columbus Association
Cornell University, USA
Czech Academy of Sciences
East China Normal University (ECNU)
Elite Network of Bavaria, Germany
European Commission
European University Institute, Italy
Foundation for Polish Science
Foundation of the Swiss National Bank
Georgetown University, USA
German Academic Exchange Service
German Economic Institute
German Institute for Economic Research (DIW Berlin)
Global Young Academy, Germany
Harvard University, USA
HEC Paris
Honoris United Universities, UK
Humboldt-Universität zu Berlin, Germany
ifo Institute – Leibniz Institute for Economic Research at the University of Munich, Germany
Independent Research Fund Denmark
International Monetary Fund, USA
Irish Research Council
Jacobs University Bremen, Germany
Japan Society for the Promotion of Science (JSPS)
Kiel Institute for the World Economy – IfW, Germany
Klaus Tschira Stiftung gGmbH
Leibniz Association, Germany
London Business School, UK
Luxembourg National Research Fund
Massachusetts Institute of Technology, USA
Max Planck Society, Germany
Members of the Econometric Society
MIT Sloan School of Management, USA
Mongolian Academy of Sciences
National Research Foundation, Singapore
New York University, USA
Northwestern University, USA
Nuffield College, UK
Pakistan Institute of Engineering & Applied Sciences (PIEAS)
Paris School of Economics, France
Pennsylvania State University, USA
Princeton University, USA
Ragnar Söderberg Foundation, Sweden
Research Foundation – Flanders (FWO), Belgium
RWI – Leibniz Institute for Economic Research, Germany
Seoul National University, South Korea
Sino-German Center for Research Promotion, China
Social Sciences and Humanities Research Council, Canada
Solvay Brussels School of Economics & Management, Belgium
Stanford Graduate School of Business, USA
Stanford University, USA
The African Academy of Sciences
The Hebrew University of Jerusalem, Israel
The London School of Economics and Political Science, UK
The University of Chicago, USA
The University of Edinburgh, UK
The University of Warwick, UK
Toulouse Capitole University, France
Toulouse School of Economics, France
TÜBİTAK, Türkiye
Universidad de los Andes, Colombia

... and the Australian Academy of Science

Made a few friends that are going to stay for life. What a week! I wish we had more time together. Educated. Inspired. Connected.

Sachin Srivastava,
Young Economist

Programme Structure

Lindau Time	Tuesday, 23 August	Wednesday, 24 August	Thursday, 25 August	Friday, 26 August	Saturday, 27 August
07		*Partner Event* Beisheim Stiftung *Break* **Morning Workout**		*Partner Event* PwC Pricewater-house-Coopers *Break* **Morning Workout**	
08					*Social Event* **Boat Trip** to Mainau Island
09		*Lecture* **Angrist**	*Lecture* **Hart**	*Lecture* **Phelps**	
10		*Lecture* **Heckman**	*Lecture* **Stiglitz** *Lecture* **Maskin**	*Lecture* **Kydland** *Lecture* **Pissarides**	
11		*Next Gen Economics* **Research by Young Economists:** • Microeconomic Theory and Game Theory • Microeconometrics: Methodology and Applications	*Next Gen Economics* **Research by Young Economists:** • Macroeconomics: Macro, Labour/Search, International, Finance • Applied Microeconomics: Environment, Health, Labor	*Lecture* **Sims** *Lecture* **Merton** *Break* **Lunch Break Laureate Lunches**	*Panel Discussion* **Economics and Politics of War and Sanctions** Hart, Maskin, Meuchelböck, Pissarides
12					*Closing Ceremony*
13		*Break* **Lunch Break Laureate Lunches**	*Break* **Lunch Break Laureate Lunches**		*Social Event* **Science Picnic** on the Castle Meadow
14	*Opening Ceremony*			*Next Gen Economics* **Research by Young Economists:** • Applied Microeconomics: Environment, Development, Labour • Applied Microeconomics: Political Economics, Gender, IO	
15	*Lecture* **Milgrom**	*Lecture* **Myerson**	*Lecture* **Thaler**		
16	*Lecture* **Wilson** *Reception*	*Lecture* **Aumann** *Lecture* **Hansen**	*Lecture* **Smith** *Lecture* **McFadden**	*Science Walks*	*Social Event* **Boat Trip** to Lindau Island
17		*Panel Discussion* **Applied Micro Revolution** Angrist, Lassen, McFadden, Pollmann	*Panel Discussion* **Social Change and Social Media** Andreottola, Hartinger, Stiglitz, Thaler		
18	*Panel Discussion* **Auctions** Acquatella, Milgrom, Myerson, Wilson	*Reception*	*Social Programme* **Dinner** for Young Economists		
19	*Social Programme* **Dinner** for Young Economists	*Social Programme* **Get-Together**		*Social Programme* **Bavarian Evening** for Young Economists hosted by the Free State of Bavaria	
20					
21					

Browse the programme booklet.

Impressions

Lectures

Joshua D. Angrist	Designing Financial Aid for Research
Robert J. Aumann	Behavioral Economics and Mainstream Economics
Lars Peter Hansen	Confronting Uncertainty in Climate Change and its Ramifications
Oliver Hart	Corporate Social Responsibility
James J. Heckman	How the Welfare State Affects Inequality and Social Mobility: A Comparison of the U.S. and Denmark
Finn E. Kydland	When Economic Growth in Spain, Italy, and Portugal Came to a Full Stop!
Eric S. Maskin	A Resolution of the Arrow Impossibility Theorem
Daniel L. McFadden	Choice: What Can Go Wrong?
Robert C. Merton	Applying Financial Science to Improve Global Retirement Funding & Finance SDGs with a Single Bond Innovation: SeLFIeS
Paul R. Milgrom	Markets for Water in California
Roger B. Myerson	Game Theory and the First World War
Edmund S. Phelps	The New Theory of Innovation: Mass Flourishing and Dynamism
Sir Christopher A. Pissarides	The Future of Work and Well-Being; Post-Covid-19
Christopher A. Sims	Sharp Econometrics
Vernon L. Smith	Propriety, Property, and Price Discovery in Adam Smith and Classical Economics
Joseph E. Stiglitz	Economic Dynamics, Inflation and Macroeconomic Inconsistencies
Richard H. Thaler	The Importance of Seemingly Irrelevant Factors in Guiding Economic Policies
Robert B. Wilson	Auction Implementation of a Rational Expectations Equilibrium

Rewatch your favourite lecture from the economics meeting in the Lindau Mediatheque.

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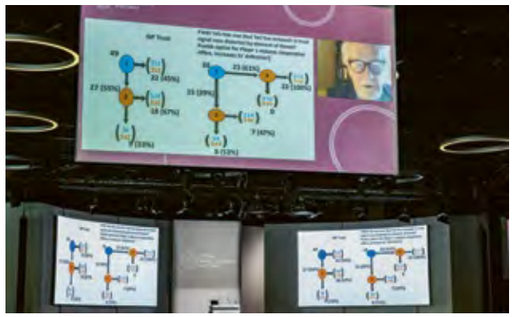

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4

5

6

1 Daniel L. McFadden (online)

2 Edmund S. Phelps

3 Vernon L. Smith (online)

4 Robert B. Wilson (online)

5 Robert C. Merton

6 Finn E. Kydland

Panel Discussions

Auctions

- Robert B. Wilson, Stanford University, USA (online)
- Roger B. Myerson, The University of Chicago, USA
- Paul R. Milgrom, Stanford University, USA
- Angie Acquatella, Harvard University, USA
- Klaus M. Schmidt, Ludwig-Maximilians-Universität Munich, Germany (Moderator)

Applied Micro Revolution

- Daniel L. McFadden, University of California, Berkeley, USA (online)
- Joshua D. Angrist, MIT Massachusetts Institute of Technology, USA
- Anne Sophie Lassen, Copenhagen Business School, Denmark
- Michael Pollmann, Duke University, USA
- Antoinette Schoar, MIT Massachusetts Institute of Technology, USA (Moderator)

Social Change and Social Media

- Joseph E. Stiglitz, Columbia University, USA
- Richard H. Thaler, The University of Chicago, USA
- Giovanni Andreottola, Vienna University of Economics and Business (WU), Austria
- Katharina Hartinger, Catholic University of Eichstätt-Ingolstadt, Germany
- Torsten Persson, Stockholm University, Sweden (Moderator)

Economics and Politics of War and Sanctions

- Klaus Schweinsberg, Centre for Strategy and Higher Leadership, Germany (Moderator)
- Sir Christopher A. Pissarides, University of London, United Kingdom
- Saskia Meuchelböck, Kiel Institute for the World Economy, Germany
- Eric S. Maskin, Harvard University, USA
- Oliver Hart, Harvard University, USA

All panels: order from left to right

Future Research in Economic Science

In 6 sessions, no less than 59 selected Young Economists had the chance to present their work to our community – and to receive feedback from the participating Laureates.

Laureates Paul R. Milgrom, Robert J. Aumann, Roger B. Myerson during the first Next Gen Economics session

Microeconomic Theory and Game Theory

Session I with Laureates Robert J. Aumann, Paul R. Milgrom, Roger B. Myerson

Zero-Knowledge Mechanisms
Yannai Gonczarowski, Harvard University, USA

Guidance via Narratives
Adam Brzezinski, University of Oxford, United Kingdom

Designing Labor Market Recommender Systems: The Importance of Job Seeker Preferences and Competition
Christophe Gaillac, University of Oxford and Nuffield College, United Kingdom

Portfolio Choice and Common Ownership in General Equilibrium
Marco Loseto, University of Chicago, USA (online)

War and Peace
Henk Schouten, University of Western Ontario, Canada

Optimal Design of Pharmaceutical Contracts for Static and Dynamic Efficiency
Angie Acquatella, Harvard University, USA

The Acquisition Option and Start-up Innovations
Katarina Warg, Stockholm School of Economics/Copenhagen Business School, Sweden

Endogenous Information Acquisition in Cheap-Talk Games
Sophie Kreutzkamp, University of Bonn, Germany

Investigating New Policies for Financial Stability That Do Not Create Inequality
Jagoda Kaszowska-Mojsa, Cracow University of Economics, Poland

Simplistic Rhetoric and Poe's Law
Giovanni Andreottola, Vienna University of Economics and Business (WU), Austria

Microeconometrics: Methodology and Applications

Session II with Laureates Joshua D. Angrist and James J. Heckman

Digitalization and Resilience to Disaggregate Shocks
Andreas Tryphonides, University of Cyprus

Causal Inference for Spatial Treatments
Michael Pollmann, Duke University, USA

Spillover Effects of Immigration Policies on Children's Human Capital
Esther Arenas Arroyo, Vienna University of Economics and Business (WU), Austria

Variable Selection in Linear Regressions with Many Highly Correlated Covariates
Mahrad Sharifvaghefi, University of Pittsburgh, United States of America (online)

Overworking Public Defenders
Aviv Caspi, Stanford University, USA

War Time Military Service Increases Religiosity: Causal Big-Data Evidence From the Vietnam War Lottery
Wladislaw Mill, University of Mannheim, Germany

Binary Response Dynamic Panel Data Models with Switching State Dependence
Eleni Aristodemou, University of Cyprus

Time Series Dynamics Based on Network Structure
Marko Mlikota, University of Pennsylvania, USA

The Macroeconomic Effect of Fiscal Policy in South Africa: A Narrative Analysis
Tumisang Loate-Ntsoko, University of Pretoria, South Africa

"Fabric of Federalism": The Impact of Litigant Rights' Reform and Women Empowerment in Nigeria
Oluwabunmi Adejumo, Obafemi Awolowo University, Nigeria (online)

David Torun presents his work to an audience of Laureates and Young Economists.

Katharina Hartinger discusses her work on individualism and innovation.

Macroeconomics: Macro, Labour/Search, International, Finance

Session III with Laureates, Finn E. Kydland, Robert C. Merton, Sir Christopher A. Pissarides, Christopher A. Sims

Robots and Wage Polarization: The Effects of Robot Capital Across Occupations
Daisuke Adachi, Aarhus University, Denmark

Monetary Policy and the Maturity Structure of Public Debt
Michele Andreolli, London Business School, United Kingdom

A Welfare Analysis of Occupational Licensing in U.S. States
Evan Soltas, Massachusetts Institute of Technology, USA

Private Activity Bonds as Investment Subsidy: Evidence From the 1986 Bond Volume Cap Reduction
Lisa Knauer, Technical University of Munich, Germany

Immigrant Networks: Implications for Wages and Employment Outcomes in a General Equilibrium Search Model
Luke Rawling, Queen's University, Canada

Moving Opportunity. Road Building and Education in Benin, Cameroon, and Mali
Luke Milsom, University of Oxford, United Kingdom

Quantifying the Extensive Margins of Trade and Production
David Torun, University of St. Gallen, Switzerland

The Natural Resource Boom and the Uneven Fall of the Labor Share
Andrés Davila Ospina, Universidad de los Andes, Colombia

What is the Source of the Health Gradient? The Case of Obesity
Uta Bolt, UCL and IFS, United Kingdom

Bank Debt Versus Mutual Fund Equity in Liquidity Provision
Yiming Ma, Columbia University, USA (online)

Applied Microeconomics: Environment, Health, Labour

Session IV with Laureates Joseph E. Stiglitz and Richard H. Thaler

Social Networks and Immigrant Integration: Experimental Evidence from Sweden
Olle Hammar, Uppsala University, Sweden

Evolution vs. Creationism in the Classroom: The Lasting Effects of Science Education
Benjamin Arold, ifo Institute and Ludwig-Maximilians-Universität Munich, Germany

How Do Homebuyers Adapt After Experiencing a Natural Disaster? Evidence From the Florida Real Estate Market
Timothy Hyde, University of Pennsylvania, USA

Are Pro-Environment Behaviours Substitutes or Complements? Evidence From the Field
Raisa Sherif, Max Planck Institute for Tax Law and Public Finance, Germany

Management Opposition, Strikes and Union Threat
Patrick Nüß, Kiel University, Germany

Signals of Charismatic Leadership in Virtual-Reality Communication
Theo Ravet-Brown, University of Liechtenstein

In Utero Exposure to Radiation Fear and Birth Outcomes: Evidence from Fukushima Nuclear Power Plant Accident
Rong Fu, Waseda University, Japan

Locked-in at Home: Gender Difference in Analyst Forecasts After the COVID-19 School Closures
Mengqiao Du, National University of Singapore

Individualism, Innovation and the Formation of Human Capital
Katharina Hartinger, Catholic University of Eichstaett-Ingolstadt, Germany

Mind-Reading Ability Predicts Sales Performance: Evidence from Financial Consultants
Josie Chen, National Taiwan University

Laureate Erik Maskin and Young Economist Sandra Kretschmer in conversation

Tomohjiro Hara during his Next Gen Economics presentation

Applied Microeconomics: Environment, Development, Labour

Session V with Laureates Finn E. Kydland, Eric S. Maskin, Christopher A. Sims

The Power of Youth: Political Impacts of the "Fridays for Future" Movement
Sebastian Wichert, ifo Institute – Leibniz Institute for Economic Research and Ludwig-Maximilians-Universität Munich, Germany

The Carbon Contract Curve: Which Climate Agreements are Mutually Beneficial?
Jonas Metzger, Stanford University, USA

A Revealed Preference Estimate of the Willingness-To-Pay to Avoid Power Outages: A California Case Study
Will Gorman, University of California, Berkeley, USA

Technology and State Capacity: Experimental Evidence from Illegal Mining in Colombia
Santiago Saavedra Pineda, Universidad del Rosario, Colombia

The Health Externalities of Downsizing
Alexander Ahammer, Johannes Kepler University Linz, Austria

Carbon Literacy – Can Simple Interventions Help?
Sandra Kretschmer, Friedrich-Alexander University Erlangen-Nürnberg, Germany

'Why', 'How Much' or Both? Comparing Social Comparison and Real-Time Feedback to Promote Resource Conservation
Lukas Tomberg, RWI – Leibniz Institute for Economic Research, Germany

Transforming Brick Manufacturing in Bangladesh to Promote Clean Air and Better Health
Moogdho Mahzab, Stanford University, USA (online)

Does Ignorance of Economic Returns and Costs Explain the Educational Aspiration Gap?
Katharina Werner, ifo Institute and Ludwig-Maximilians-Universität Munich, Germany

Improving Financial Literacy by Mitigating Behavioural Biases. A Causal Mediation Analysis on the Effects of Behavioural-Based Financial Education
Francisco do Nascimento Pitthan, KU Leuven, Belgium

Applied Microeconomics: Political Economics, Gender, IO

Session VI with Laureates Joshua D. Angrist, Paul R. Milgrom and Richard H. Thaler

The Geography of Black Economic Progress After Slavery
Lukas Althoff, Princeton University, USA

Can Wage Transparency Alleviate Gender Sorting in the Labor Market?
Lennart Ziegler, University of Vienna, Austria

The Unswayed Voter: How a Polarized Electorate Responds to Economic Growth
Robert Embree, University of Toronto, Canada

Gender Norms and Specialisation in Household Production: Evidence from a Danish Parental Leave Reform
Anne Sophie Lassen, Copenhagen Business School, Denmark

Who Is to Suffer? Quantifying the Impact of Sanctions on German Firms
Saskia Meuchelböck, Kiel Institute for the World Economy, Germany

Building the 'Rainbow Nation' Through Mass Media: Television, Cultural Diversity and National Unity in Post-Apartheid South Africa
Tomohiro Hara, Musashi University, Japan

Earnings Disclosure by Politicians
Carina Neisser, University of Cologne, Germany

The Racial Gap in the Patenting Process
Gaia Dossi, London School of Economics, United Kingdom

Modern Slavery – An Empirical Analysis
Bianca Willert, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

Session Formats

18
Lectures
By Economics Laureates

59
Next Gen Economics Presentations
Research by Selected Young Economists
Opportunity for Q&A

4
Panel Discussions
Topical and Relevant Issues
High-Profile Panellists:
Laureates, Young Economists

2
Partner Events
Discussions Hosted by Partners of the Lindau Meetings

Partner Events

Responsibility of Science and Business in Our Current Societies

hosted by Beisheim Stiftung, Germany

- Nadine Kammerlander, WHU-Otto Beisheim School of Management, Germany (Moderator)
- Reimar Belschner, WHU-Otto Beisheim School of Management, Germany
- Oliver Hart, Harvard University, United States of America
- Mei Wang, WHU-Otto Beisheim School of Management, Germany

Qrganizations as Quantum: A Surprising Consequence of Quantum Computer Proliferation

hosted by PricewaterhouseCoopers

- Dietmar Eglauer, PricewaterhouseCoopers, Germany
- Eric S. Maskin, Harvard University, United States of America
- Vera Daners, PricewaterhouseCoopers, Germany (Moderator)
- Stefan Holtel, PricewaterhouseCoopers, Curator of Digital Change, Germany

Both panels: order from left to right

Time to Connect

Get-Together

Welcome
- Countess Bettina Bernadotte, President of the Council for the Lindau Nobel Laureate Meetings

Lakeside Reception & Dinner

Bavarian Evening
hosted by the Free State of Bavaria

Welcome
- Countess Bettina Bernadotte, President of the Council for the Lindau Nobel Laureate Meetings

Bavarian Music & Folk Dancee
- Trachtenverein Altusried

Bavarian Dinner

Boat Trip to Mainau Island

Welcome
- Countess Bettina Bernadotte, President of the Council for the Lindau Nobel Laureate Meetings

Closing Panel Discussion
"Economics and Politics of War and Sanctions"

Conclusion & Farewell
- Raisa Sherif, Young Economist, Max Planck Institute for Tax Law and Public Finance, Germany
- Eric S. Maskin, Economics Laureate 2007, Harvard University, USA

Science Picnic

Going Micro for a Better World

Laureates and Young Economists illuminated the vast reach of microeconomics over the course of #LINOecon, presenting an eclectic mix of micro studies on a range of topics that, taken together, may form a whole greater than the sum of its individual parts.

Laureates and Young Economists discussing the 'Applied Micro Revolution'

In recent decades, the increasing use of large individual-level data sources to analyse economic behaviour alongside major advances in econometrics has allowed unprecedented insights into the role of personal and business decisions in evaluating potential outcomes. These insights are increasingly being sought by decision- and policymakers on a host of different and important topics.

In his lecture during #LINOecon titled 'Designing Financial Aid for Research', Joshua Angrist provided an impactful example of how microeconomics and the methods he developed to analyse causal relationships in natural experiments that earned him the 2021 Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel (alongside David Card and Guido Imbens) can be wielded to inform important policy decisions.

It is well known that the US Government and private organisations fork out billions of dollars in financial aid to undergraduates in the form of subsidised loans and grants. "So, you'd like to know whether the aid is actually boosting post-secondary education: that's a great causal question", said Angrist.

Following these study subjects for six years (and now continuing to follow them into adulthood), Angrist and colleagues have already revealed interesting trends. Unsurprisingly, those receiving scholarships have higher bachelor's completion rates than the control group, by about eight percentage points. "Most things that you try to do have no effect. So anytime you move the needle, you're quite pleased."

For all groups studied, optimal outcomes come from targeting aid early to students enrolling in four-year courses. "Aid works exclusively through this early engagement channel. In fact, we call that an exclusion restriction, and the strong causal claim that I'm making is outside of this channel, financial aid is irrelevant", Angrist argued. "Maybe we should think about spending the money a little bit more efficiently by front-loading it, thinking about ways to give people money that gets them into four-year programmes, but spending less as they work their way through the programme."

Today, economists are applying microeconomics methods to a plethora of specific and important problems. Nowhere has this been more clearly demonstrated than in the series of three 'Next Gen Economics: Applied Microeconomics' sessions at #LINOecon. In the first session, audience members were taken on a whirlwind trip around the world: one minute hearing about how an intervention to match immigrants with members of the resident population led to improved immigrant labour market outcomes in Sweden, the next minute learning of an investigation on how fear of radiation exposure from the Fukushima disaster in expectant mothers has impacted birth outcomes. The two last parallel sessions of the week followed a similar course, charting the impacts of international, national and local interventions on society, culture, the environment and the economy. Everything from the political impact of Greta Thunberg's Fridays for Future movement to the geography of black economic progress after slavery was interrogated through the lens of microeconomics.

This eclectic mix of microeconomics applications was reflected in the backgrounds of the panellists for the Panel Discussion 'Applied Micro Revolution'. Speakers included Angrist; fellow Laureate Daniel McFadden who, for example, applied his theoretical discoveries to determine demand for the San Francisco Bay Area Rapid Transport (BART) system; Young Economist Anne Sophie Lassen, who studies the mechanisms behind and implications of gender differences in labour market choices (and also featured in Applied Microeconomics: Political Economics, Gender, IO); and Young Economist Michael Pollmann, who has analysed the causal effects of grocery stores on foot traffic to nearby businesses during COVID-19 sheltering place policies.

Taken individually, it could be argued that each of these applications appears niche. On this point, an important question came from the floor: are micro studies so focused on tackling very specific questions in a causal way that they have little broader relevance?

"I don't really agree with that", argued Angrist. "What are my students working on? They're working on things related to public policy in the labour market, minimum wages, trade, levels of competition in labour markets, monopsony, the gig economy – these questions seem no less important."

McFadden agreed and took this argument further, suggesting that the accumulation of answers is driving the entire field forward. "I think we're at the same stage that the biologists were when they were busy classifying bugs in the species – we're just waiting for a Darwin."

From the Radio Spectrum to Water and Healthcare

Auctions have likely been around for as long as markets or money have, and while many of us don't often participate in auctions, they affect our lives in more ways than we imagine. The sessions on the #LINOecon opening day dealt with the impact of auctions, including the contributions of the two 2020 Laureates in Economics.

When you see an ad on a website, the odds are it's not a fixed ad, but an auction where different advertisers are bidding for the advertising space. Landing slots, spectrum frequencies, even gas and electricity, all can be real-world applications of auctions.

Yet despite all this, we've only started truly understanding the hidden intricacies of auctions relatively recently. Paul R. Milgrom and Robert B. Wilson, who shared the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2020, clearly showed this when they worked on a system to help the US government sell the radio spectrum to wireless telephone companies, raising $120 billion for something the government previously just gave away for free.

Much about auctions revolves around information – the information that the bidders know about the product and about what other bidders are doing. In his online lecture at #LINOecon, Robert B. Wilson took a deep dive into the concept of rational expectations equilibrium and pondered where prices truly come from.

People look at market prices as informative of things that are not directly observed or imperfectly observed. But there's a parallel concept of an efficient market, and Wilson wanted to get a better understanding of the rational expectations driving efficient markets. It took decades of work, and during the process, he ended up revolutionising many concepts in economics; however, in the end, it was all worth it.

Meanwhile, Paul R. Milgrom has been working on a practical application for bidding: water. Water scarcity is a problem in many parts of the world and climate change won't do us any favours.

In the face of such a challenge, you'd expect the market to step in and make water usage more efficient, prioritising those who need it most and who are willing to pay more to get it. But when Milgrom looked at what was happening in California, he saw a completely different picture.

"In California, less than 5 percent of water is reallocated, even in the most severe drought. The prices adjust, but the reallocation doesn't adjust even when there is insufficient water. The prices are responsive, but the value of trade isn't very responsive. So why doesn't the market work, and what can we do to fix it?"

Later on in the day, a panel featuring Milgrom and Wilson, as well as 2007 Laureate Roger B. Myerson, postdoctoral fellow Angie Acquatella, and moderator Klaus Schmidt from Ludwig-Maximilians-Universität Munich, discussed the impact and implications of auction market design.

Myerson recalled how, right around the time of the fall of the Soviet Union, he got the chance to interact with economists in Moscow, and how foreign the concept of an auction market design seemed to them, as at the time, the Soviet economy was just starting to change from socialism. It's a testament to the robustness and applicability of auctions that a concept that would have seemed bizarre to much of the world three decades ago is so influential now.

The panel approached a field where auctions could make a big impact: healthcare; and in particular, US healthcare. Unlike most countries that have some form of universal healthcare, US healthcare is so different, complex, and inefficient, that attempting to direct it with auctions would be a "Herculean task", says Wilson. But it may be worthwhile.

Paul R. Milgrom and Robert B. Wilson had their first Lindau experiences on the opening day – with their lectures and the participation in the panel discussion, here with Roger B. Myerson.

Acquatella notes that she made the switch to healthcare when she was taking an Uber. At the time, another Laureate, Joshua Angrist, was working as an Uber driver to learn more about the system. Inspired by this, Acquatella quizzed her Uber driver as to why he was working at Uber. As it turns out, the man had a career working in software, but because of medical problems, was forced to get a second job to pay for his healthcare. This came as a shock and motivated Acquatella to look more into healthcare.

However, to truly address healthcare with auctions or any type of efficient market design, Milgrom says, you need to understand the big problems and challenges in the field.

Ultimately, auctions have the power to revamp and shape many markets, but they are a tool, and it's not always clear how to best use this tool. Thanks to work from these pioneers, we're one step closer to understanding how to use it.

Angie Acquatella discussing auctions and healthcare

Behavioural Economics

Rules of Thumb and Irrelevant Factors

At the 7th Lindau Meeting on Economic Sciences, Laureates Robert Aumann, Richard Thaler and Daniel McFadden discussed how economists are getting to grips with how humans really behave to make better predictions and inform decision-making.

Richard H. Thaler, 2017 Laureate in Economic Sciences, during his first lecture in Lindau

Mainstream economics can be regarded as the study of what people should do, whereas behavioural economics – the application of psychological insights to explain economic decision-making – is more about what we actually do in real life. Perhaps worryingly, there is an uncomfortable and wide chasm between the two. This divide was probed deeply by three Laureates during the Lindau Meeting.

"Mainstream economics is based on the premise that people behave rationally", began Robert J. Aumann in his lecture 'Behavioral Economics and Mainstream Economics'. This means economic agents – people, firms, banks, governments – attempt to maximise their expected individual rewards.

Traditionally implied in this statement is the idea that individuals (economic agents) act perfectly: they are given perfect information and have the ability to calculate and weigh up the consequences of each available choice before reaching a logical conclusion and acting to promote their best interest. "That's not what people do", Aumann explained. "People act by rules of thumb."

But those rules of thumb, Aumann argued, evolved, biologically or culturally. "Evolution works by survival of the fittest. The rules that don't benefit the users will not survive. These rules of thumb are almost always beneficial because they evolved."

Using a number of entertaining and vivid examples – documented in the Lindau Mediatheque – Aumann proceeded to rip apart long-established notions of irrational behaviour to either show them to be rational or beneficial in most scenarios, or reveal the example to be overly contrived, and therefore irrelevant to economics.

"If the rules of thumb actually do promote the goals of their users, then behavioural economics and mainstream economics are entirely consistent. Behavioural economics is what makes mainstream economics work!"

Given Aumann's lecture provided examples of seemingly irrational economic decision-making almost exclusively derived from Richard H. Thaler's findings in behavioural economics, audience members were excited to attend Thaler's own lecture titled 'The Importance of Seemingly Irrelevant Factors in Guiding Economic Policies'.

Like Aumann before him, Thaler focused on bridging mainstream economics' characterisation of what people should do and behavioural economics' description of what people actually do. But instead of attempting to convince the audience of their consistency, Thaler instead focused on where mainstream economics gets it wrong in disregarding some factors as irrelevant noise.

Why are agent optimisation problems never qualified by the problem's difficulty? Why is no attention given to how a problem is worded (framed)? And shouldn't all the 'sludge', i.e., frustrating barriers to arriving at a beneficial outcome, like long-winded forms or protracted application processes, be factored into the economic analysis? "I call all things like this 'supposedly irrelevant factors' [which] economists say have a coefficient of zero", said Thaler. "And that's wrong, they're not irrelevant."

Thaler made his case with several examples where supposedly irrelevant factors turned out to be the most important ones in delivering the desired outcome. Perhaps the most impactful was a retirement saving plan called 'Save More Tomorrow' introduced by Thaler and Shlomo Benartzi in the noughties to nudge employees into increasing their retirement fund contribution rates. Under this plan, workers are offered the option to increase their savings rate over time until it reaches some cap, or the worker opts out. "In the first company that we got to try this, we tripled saving rates in three years", said Thaler. It has since been rolled out in companies around the world.

"If you want people to do something, make it easy", he concluded. "But we don't know what makes an economics problem hard. And if we knew more about that, then we could make some progress."

In his lecture 'Choice: What Can Go Wrong?', Daniel McFadden harkened back to Aumann's argument that seemingly irrational behaviour evolves biologically or culturally. Based on examples of his group's recent work, McFadden argued that such behaviours largely stem from how we process information and form perceptions. All lectures are available in the Lindau Mediatheque.

Find a comprehensive review of the discussions, including the lecture by Daniel McFadden, on the Lindau blog.

The Economics of Past, Current and Future Crises

Act Now or Wait Until We Learn More?

Beyond describing and analysing human behavior in the face of scarce resources, the methods used by economists may be leveraged to explain historical trends and current events, as well as to make predictions about the future.

When applied to the world's biggest challenges, such as climate change or war, economics has the power to provide insight into possible solutions to prevent future catastrophes. Sessions at the 7th Lindau Meeting on Economic Sciences applying such an economic lens were the lectures by Roger B. Myerson and Lars Peter Hansen. Myerson, who received the 2007 Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel "for having laid the foundations for mechanism design theory", outlined how economic theories of games and decisions can be applied to problems in World War I.

For his lecture, Lars Peter Hansen shifted the conversation at #LINOecon to what the World Health Organisation (WHO) calls "the single biggest health threat facing humanity": climate change. Hansen, who received the Prize in Economic Sciences in 2013 for "empirical analysis of asset prices", described his efforts to build quantitative models that can be useful tools for thinking about policy questions related to the climate crisis. Like all sessions of the scientific programme, these two lectures are available in the Lindau Mediatheque in their entirety, just like the discussion that concluded the meeting on Mainau Island: "The closing panel of #LINOecon would have also made for an excellent opening session", was to be heard as the meeting came to an end. Titled 'Economics and Politics of War and Sanctions' the panelists elaborated on the economic impacts of the war between Russia and Ukraine, particularly in light of the sanctions imposed on Russia by many countries.

Oliver Hart, who received the Prize in Economic Sciences in Memory of Alfred Nobel 2016 for "contributions to contract theory", described how sanctions can be thought of as a form of exit, similar to a consumer boycott. In terms of why a country would impose sanctions on another country, he gives two possible reasons. Using the war in Ukraine as an example, some countries may feel a need to take action against Russia and choose to express their disapproval by imposing sanctions. But ultimately, sanctions serve as an incentive to change the behaviour of that country.

He also mentioned that punishing a country with sanctions can actually entrench the current regime rather than causing regime change. Saskia Meuchelböck, a junior economist at the Kiel Institute for the World Economy, added that her colleagues have a working paper in progress investigating the 2014 sanctions against Russia that were implemented in response to the annexation of Crimea. "Those regions that were most affected by the sanctions – those were the ones where support for Putin increased", she said.

Eric S. Maskin offered his perspective as an expert in bargaining theory, noting that Russia – and Putin, in particular – cares deeply about NATO. The fact that NATO has moved eastward since the fall of the Soviet Union has been viewed by Russia as deeply antagonistic, he said. Maskin believes that membership in NATO for Finland, Sweden, and perhaps even Ukraine should be part of the negotiated settlement as bargaining chips.

"One principle in bargaining theory is that, to reach a mutual beneficial outcome, it's good to put as many items on the table as possible because that increases chance of agreement", said Maskin, recipient of the 2007 Prize in Economic Sciences "for having laid the foundations of mechanism design theory". "One item that I fear may not be put on the table is NATO membership."

Sir Christopher A. Pissarides spoke about his harrowing experience as a young man in Cyprus at the time of the Turkish invasion. His home country's instability was the reason he decided to leave and settle outside Cyprus, instead taking up residence in England, where he still lives today. "I sympathise entirely with what Ukrainians feel in the areas that have been invaded. [...] What I experienced is very similar in a sense that there was no reason for that invasion."

Pissarides, recipient of the 2010 Prize in Economic Sciences for the "analysis of markets with search frictions," also emphasised the importance of actual negotiation rather than just imposing sanction after sanction. He listed other wars in Europe that have occurred in recent history and warned that more will be forthcoming if we don't start seriously thinking about the consequences of our actions.

"We know that if we carry on like this, there's going to be another war in Europe, inevitably. What are we going to do?" he said. "Are we going to say, 'They cannot buy our olive oil, and they cannot buy our wines, and we won't buy their gas and hope that will stop the war? It's just nonsense."

Klaus Schweinsberg (Moderator), Sir Christopher A. Pissarides, Saskia Meuchelböck, Eric S. Maskin, Oliver Hart


Roger B. Myerson on 'Game Theory and the First World War'

'Confronting Uncertainty in Climate Change and its Ramifications' presented online by Lars Peter Hansen

Signed by 150 Nobel Laureates

Call for Peace

In March 2022, Nobel Laureates from all disciplines made a call for peace in the face of the war emanating from Russian soil. To this end, they signed a Call for Peace initiated by the Max Planck Society and supported by the Lindau Nobel Laureate Meetings.

The declaration continues the tradition of the Mainau Declaration 1955 on Nuclear Weapons (see next page). The current statement reads, in part: "The discovery of nuclear fission created the basis for the construction of nuclear weapons of destruction. Their current volume has the potential to make the Earth uninhabitable for humans and to wipe out human civilisation. Such weapons must therefore never be used!"

The 150 signatories of the declaration 2022 call on governments and business leaders to use scientific knowledge and technologies responsibly and with awareness of their long-term consequences. Russian President Vladimir Putin was called upon to respect the agreements under international law, to withdraw his armed forces, to start negotiations and to re-establish peace.

The Lindau Nobel Laureate Meetings and the Max Planck Society are convinced that science must continue the dialogue, even if politics remains silent – or engages in conflict. With this comes the hope that this initiative, along with countless others, e.g. an open letter by Nobel Laureate Sir Richard J. Roberts (Physiology or Medicine 1993), will lead as soon as possible to a return to peaceful interactions between nations.

The Mainau Declaration 1955

Banning Nuclear Weapons

"All nations must come to the decision to renounce force as a final resort. If they are not prepared to do this, they will cease to exist." – The timeless relevance of this last sentence of the declaration is as significant as it is terrifying.

Albert Schweitzer's participation in the Lindau Nobel Laureate Meeting in 1954 inspired Werner Heisenberg to "rethink the humanitarian side of science". Upon his initiative, all Nobel Laureates whose work dealt with nuclear research were invited to the 1955 meeting. Co-initiated by Otto Hahn, a 16-time participant in the Lindau Meetings and the first president of the Max Planck Society, they drafted an appeal to political decision-makers in both the East and the West "to reject force as the ultimate instrument of politics". In particular, they issued a warning against the use of atomic weapons.

The text of the declaration reads in English as follows (excerpt): "With pleasure we have devoted our lives to the service of science. It is, we believe, a path to a happier life for people. We see with horror that this very science is giving mankind the means to destroy itself. By total military use of weapons feasible today, the earth can be contaminated with radioactivity to such an extent that whole peoples can be annihilated. Neutrals may die thus as well as belligerents.

If war broke out among the great powers, who could guarantee that it would not develop into a deadly conflict? A nation that engages in a total war thus signals its own destruction and imperils the whole world.

We do not deny that perhaps peace is being preserved precisely by the fear of these weapons. Nevertheless, we think it is a delusion if governments believe that they can avoid war for a long time through the fear of these weapons. Fear and tension have often engendered wars. Similarly, it seems to us a delusion to believe that small conflicts could in the future always be decided by traditional weapons. In extreme danger no nation will deny itself the use of any weapon that scientific technology can produce." The 1955 appeal initially bore the signatures of 18 Nobel Laureates. Within a year, 34 more Laureates signed the declaration.

Find details on the 2022 Call and the 1955 Declaration.

I took a little time today to appreciate more of the beauty of Lindau and the Bodensee, what a very special place for science!

W. E. Moerner

Cooperation with Times Higher Education

Comprehensive Survey on Research Success

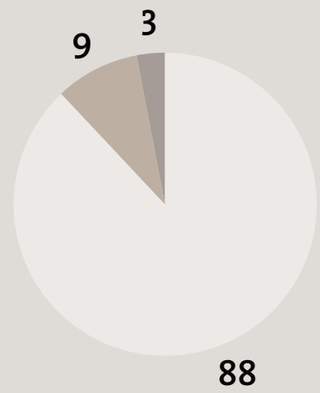
Times Higher Education, in cooperation with the Lindau Nobel Laureate Meetings, conducted a survey among early-career researchers and future leaders on some of the most pressing questions for higher education, academia and the research sector in 2022.

In 2017, Times Higher Education (THE), the world's leading provider of higher education analysis, data and news, collaborated with the Lindau Nobel Laureate Meetings to survey Nobel Laureates on the biggest issues facing science, education and society in 2017. Five years later, THE and the Lindau Meetings collaborated again, this time to ask the next generation of leading voices in the research sector – Lindau Alumni.

More than 400 former Young Scientists and Young Economists from the last 10 years have answered a wide array of questions on what it takes to be a successful researcher in 2022. These contributing Lindau Alumni commented on questions ranging from meritocracy and institutional factors to effects of the pandemic. Lindau Alumni from all disciplines contributed to the survey, including researchers in chemistry (42%), physics (21%), physiology or medicine (19%) and economic sciences (7%). The global Lindau community was well represented: While most participants are currently in Europe, Lindau Alumni in Asia and North America were well covered as were researchers currently in Africa.

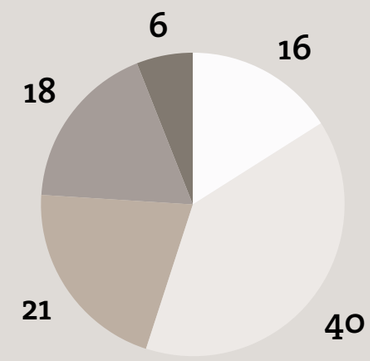
International Networks

International networks have a crucial impact on your research and career.



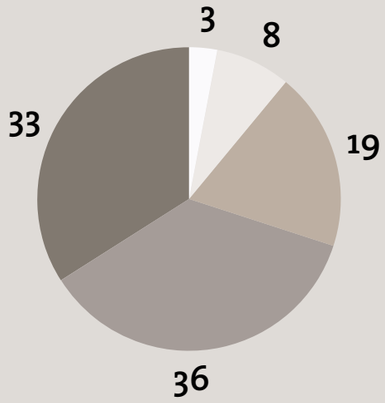
Mentoring

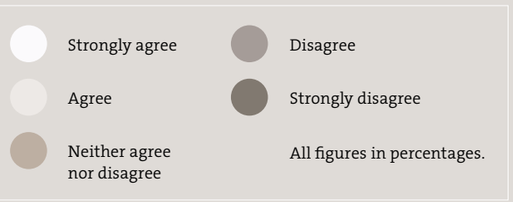
In your most recent academic position, you have/had the level of mentoring you need to be successful.



In-Person Events

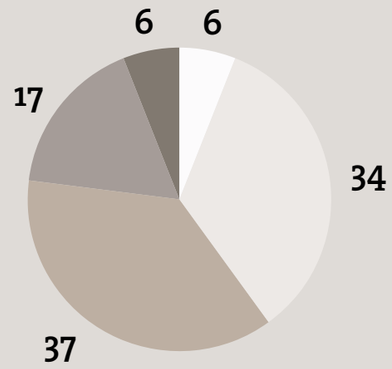
Online conferences are preferable to in-person events.





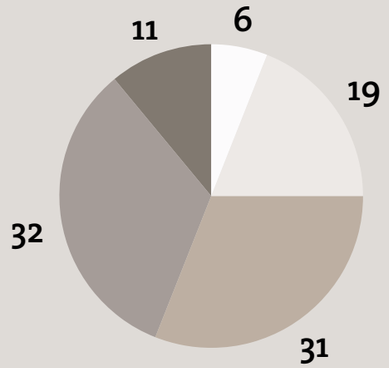
Diversity and Recruitment

Researchers from underrepresented groups should be preferentially recruited by universities and research organisations.



Family & Childcare

Academic institutions support pursuing an academic career while having obligations related to family/childcare.



Find more insights and the full analysis by Times Higher Education on their website.

Extending the Lindau Spirit Beyond One Week

From the Lindau Alumni Network to the Mentoring Hub, from peer review to hosting Open Exchanges, this year, Lindau Alumni had ample opportunities to get involved.

Alumni Peer Review

For both the Next Gen Science (see p. 44) and Next Gen Economics sessions (see p. 94) during the 2022 meetings, the organisers received a wealth of abstracts in the respective disciplines. Continuing the outstanding collaboration of the past four years, Lindau Alumni got involved in the review process for these sessions.

For the 71st Lindau Meeting, an international group of eminently qualified alumni volunteered to evaluate the abstracts submitted by Young Scientists. For the first time, abstracts submitted by Young Economists were evaluated by Lindau Alumni in economics willing to give back to the community. We would like to thank all Lindau Alumni reviewers for being actively involved this way and are looking forward to continuing this well-established, cooperative effort. For the upcoming 72nd Lindau Meeting, Lindau Alumni have once again supported our scientific chairs as reviewers in the nomination and application process of new Young Scientists.

Lindau Mentoring Hub

The goal of the new Lindau Mentoring Hub, launched in winter 2021/22, is to make sure that Lindau Alumni, Young Scientists and Young Economists have access to support and guidance. The idea for the mentoring platform was initiated by Group Mărgineanu, a group of Lindau Alumni and Young Economists, during the first Lindau Online Sciathon. After the group won first place in their category, the Lindau Nobel Laureate Meetings collaborated closely with Team Mentoring Hub and Dutch-Romanian software developers Busymachines to create the platform from the ground up. One of the strengths of the Lindau Mentoring Hub is the dual role for mentors: Lindau Alumni can sign up for the platform to seek advice as a mentee, to share advice as a mentor – or to do both. The Lindau Mentoring Hub is committed to the Lindau Guidelines and is ready for a future open-source release and expansion.

In May 2022, the Lindau Meetings organised the first event exclusively for members of the Lindau Mentoring Hub. During this online conversation, Nobel Laureate Bill Phillips and Lindau Alumna Fabiola Gerpott (WHU Otto Beisheim School of Management) discussed their experiences with mentoring, what effects good leadership can have on a researcher's career and more. Many members of the new platform joined live, asked questions or made comments. All Mentoring Hub members have access to a recording in the growing resource library of the platform.

At the 71st Lindau Nobel Laurate Meeting, Team Mentoring Hub members Michael Mărgineanu and Iris Odstrcil presented the project and discussed mentoring in academia with Nobel Laureate Sir Konstantin S. Novoselov, Ben Nelson (Minerva University) and moderator Karan Khemka during a panel discussion.

The Lindau Nobel Laureate Meetings and Team Mentoring Hub gratefully acknowledge the support of the Dieter Schwarz Foundation for the development of the platform. All Lindau Alumni are encouraged to join the platform at lindau.mentoringhub.org.

Lindau Alumni Network

Since 2017, the Lindau Alumni Network has been the digital space for Lindau Alumni. This online community includes tools that help users to find fellow alumni, share their work, swap stories and register for Lindau Alumni events. Either via browser or app, the platform makes it easier to stay connected to our growing global community.

In the new year, the Executive Secretariat will continue to organise online seminars and hopefully will return to organising local meet-ups and similar events to extend the 'Lindau Spirit' beyond the confines of a weeklong meeting. Members of the Lindau Alumni Network will always hear about these opportunities first.

The Lindau Meetings express their sincere gratitude to the German Federal Ministry of Education and Research for supporting the project. All former participants are invited to enrich the Lindau Alumni Network with their own ideas and perspectives on how to educate, inspire and connect.

Outlook: 3rd Lindau Online Sciathon

In the spring of 2023, Lindau Alumni will once again have the chance to collaborate for 48 hours during the Lindau Online Sciathon. Scheduled for 1–2 April 2023, the third instalment of the interdisciplinary competition will be the first chance for Lindau Alumni to welcome the newly selected Young Scientists for #LINO23 to the community.

Ben Nelson and Lindau Alumna Iris Odstrcil during the mentoring panel

Bill Phillips

Fabiola Gerpott

All Lindau Alumni are invited to sign up for the Lindau Mentoring Hub:

First Phase of Marshland Renaturation Complete

Since 2018, the Lindau Meetings have been promoting marshland renaturation in the Lindau district in order to offset the CO_2 emissions of the meetings. In 2022, a large renaturation project in the Geiwitzenmoos was successfully completed.

With the completion of the new Inselhalle in 2018, which in many respects marks a small turning point in conference history, efforts to make the Lindau Meetings CO_2-neutral were also intensified. Previously, many single measures (such as printed materials or flights) were made carbon-neutral through individual compensation measures. However, to obtain a holistic, fully comprehensive picture, an analysis of the entire emissions of a meeting, including the travel of the participants, was carried out. In order to compensate for these emissions, the Council decided to invest in a project that would both have a high impact and be located in close proximity to where the meetings take place. While projects in other parts of the world can boast impressive figures for CO_2 offset per euro, it is often unclear whether these projects really have long-term and sustainable effects.

Due to the geographical conditions, the choice was quickly made to focus on marshland restoration projects, as in Bavaria and also in the Lindau district, many peatlands were drained in the past centuries. The burning of the peat not only released massive amounts of CO_2; the destruction of the marshlands also robbed the areas of their ability to bind CO_2 in the soil. Two marshland areas in Lindau's vicinity are particularly suitable: The Degermoos, where peat was still cut for railroad fuel well into the 20th century, and the Trogener Moore, whose peat was mostly extracted for traditional hat manufacturing, which requires a lot of steam.

The first project, which was realised with support from the Lindau Nobel Laureate Meetings, is located in the Degermoos – which is why the project bears this name. However, the land ownership situation there turned out to be complicated, and the purchase of the necessary land a lengthy process. Therefore, the next project, much larger in scope, was realized in the Geiwitzenmoos, which is one of two sub-areas of the Trogener Moore. Here, a total of 50 hectares have been rewetted in recent years. The measures used for this are simple in principle: drainage ditches are removed, and artificial walls are built in suitable places. Nature takes care of the rest: Peat mosses begin to grow in the rewetted area, and over time the actual peat layers develop from them. However, quite some patience is required: peat grows at a rate of around 1 mm per year.

The implementation of these measures requires detailed knowledge about the geography of the worked area. Therefore, extensive exploration and mapping play an important role. In addition, all areas are designated as nature reserves and, moreover, are not easily accessible, which requires special care.

This year, the Geiwitzenmoos renaturation project has been successfully completed. The planning and implementation of this project was carried out by the Landschaftspflegeverband Westallgäu (LPV), an association of conservationists, farmers and politicians. The LPV was supported by numerous specialized authorities of the district and the state of Bavaria.

Final inspection of an overflow protection drainage

All in all, the project includes the building of 56 wooden sheet pile walls between 3 and 20 meters length each, as well as six steel sheet pile walls of up to 32 meter length each. These measures lead to the immediate rewetting of 10 hectares, which roughly equals an emmisison reduction of 50 tons of CO_2 per year, or 2.500 tons in 50 years. With every measure, the effects accumulate over the years.

Already now, supporters as well as Academic Partners of the Lindau Nobel Laureate Meetings have also contributed to the Degermoos project, offsetting the footprint of their participation. As part of a larger perspective, the Lindau Meetings aim at inviting and convincing all partners to do so. Only by calculating the true costs of products and activities, including the costs of usually mostly negative effects on our environment, a sustainable economy and society can be stablished.

As the land ownership and land usage rights situation in the Degermoos area has very recently seen some significant progress, also due to the help of friends of the Lindau Meetings, the next project is already in the planning phase: this time returing to the original location in the Degermoos.

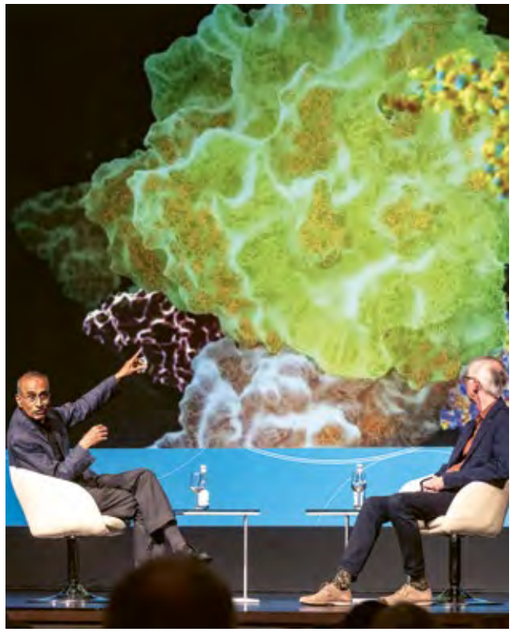
Peat mosses are the basis of peat.

Rewetted area in the Geiwitzenmoos

Inspiring Lindau

One of Life's Oldest Machines

In the run-up to #LINO22, citizens of Lindau were invited to a Public Lecture at the Lindau city theatre, where a conversation between Nobel Laureate Venki Ramakrishnan and moderator Adam Smith took place.



Although most people today have at least a vague idea that DNA is the carrier of genetic information, the vast majority are unlikely to have any notion of what the ribosome does. And yet, it is perhaps the most amazing "machine" in the world. The ribosome assembles long chains of molecules, rapidly and with high precision, by combining two central properties that define all life: genetics and metabolism.

Deciphering one of life's oldest machines, the "gene machine", was probably the greatest challenge a structural biologist could have chosen in the early 1980s. However, Venki Ramakrishnan succeeded in unravelling the secret of the ribosome, which earned him a share of the Nobel Prize in Chemistry in 2009. In his book "Gene Machine", published in 2018, he gives an exclusive insight into his research and the challenges he had to face in the race for scientific success.

The audience of the Lindau Public Lecture 2022 had the opportunity to hear Venki's personal account of the story. One of the many highlights of the night: those who wanted to learn more could get a signed copy of the book (Oneworld Publications, ISBN: 1786076713).

Lindau Online Matinee

Explaining the Nobel Prizes

Hendrik Groth, Moderator of the Lindau Online Matinee and Editor-at-Large, Schwäbische Zeitung

Rainer Blatt

Michael H. Myoga

Wolfgang Lubitz

Alexandra Heimisch-Röcker

At the beginning of the year, citizens of Lindau were once again invited to watch the traditional matinee from the comfort of their own homes via livestream. Council members and two Lindau Alumni gave accessible and entertaining presentations that explained the research findings of the Laureates awarded with the Nobel Prize in 2021.

The Nobel Prize in Physics:
Syukuro Manabe and **Klaus Hasselmann** for the physical modelling of Earth's climate, quantifying variability and reliably predicting global warming and **Giorgio Parisi** for the discovery of the interplay of disorder and fluctuations in physical systems from atomic to planetary scales
Explanation by **Rainer Blatt**, Member of the Council and scientific co-chairperson of the Lindau Meetings dedicated to physics

The Nobel Prize in Physiology or Medicine:
David Julius and **Ardem Patapoutian** for their discoveries of receptors for temperature and touch
Presentation by **Michael H. Myoga**, Lindau Alumnus 2014, BioMedical Center (BMC), Department of Physiological Genomics at Ludwig-Maximilians-Universität Munich

The Nobel Prize in Chemistry:
Benjamin List and **Sir David W.C. MacMillan** for the development of asymmetric organocatalysis
Background by **Wolfgang Lubitz**, Vice-President of the Council and scientific co-chairperson of the Lindau Meetings dedicated to chemistry

Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel:
David Card for his empirical contributions to labour economics and **Joshua D. Angrist** as well as **Guido W. Imbens** for their methodological contributions to the analysis of causal relationships
Introduction by **Alexandra Heimisch-Röcker**, Lindau Alumna 2017, Scientific Advisor Horizonte at acatech – National Academy of Science and Engineering, Munich

Lindau Nobel Laureate Pier

Numerous Premieres

The Lindau Nobel Laureate Pier gathers together all Laureates who have attended a Lindau Meeting so far. This summer, an unusually large number of Laureates could spot their names on the pier for the first time.

Reception on the pier during the opening day of #LINOecon

High-ranking visitors next to William G. Kaelin, Jr.'s entry on the pier

Paul R. Milgrom inaugurates his bar in the guardrail.

Sir David W.C. MacMillan captures the occasion with a photo.

The Lindau Nobel Laureate Pier first opened in 2019, enabled by the Beisheim Foundation. Since the previous Economics Meeting had taken place in 2017, all attending Laureates saw their bars for the first time. The focus during a reception to unveil the bars was on Joshua D. Angrist (Economics Prize 2021), Paul R. Milgrom (2020) and Richard H. Thaler (2017), who all had their Lindau premiere in 2022.

Already during the opening reception of the 71st Lindau Nobel Laureate Meeting, William G. Kaelin, Jr. (Physiology/Medicine 2019) and David W.C. MacMillan (Chemistry 2019) had inaugurated their entries on the pier. All year round, the Lindau Nobel Laureate Pier is a popular venue where locals and visitors to Lindau alike can enjoy the special ambience at the "Small Lake", learn more about the famous scientists who have travelled to this place and watch the sunset over Lake Constance.

The pier is an integral part of the Lindau Science Trail that highlights scientific topics with pylons at several locations in Lindau. Three science stations are located on Mainau Island, thus connecting the two islands that host the Lindau Meetings.

Impressions

Sylt Island and New York City

Comeback of the Lindau Exhibitions

In 2022, two 'NOBEL HEROES' exhibitions represented a welcome step back to normality. This flagship of the Foundation Lindau Nobel Laureate Meetings' outreach presented portraits of Nobel Laureates and drew attention to the meetings far away from Lindau.

Besides Lindau and Mainau Island, there is in Germany – in the very north – another famous island: Sylt, a popular summer destination for many Germans. For the Foundation Lindau Nobel Laureate Meetings, the local 'Kaamp-Hüs' turned out to be a suitable place to host the exhibition 'NOBEL HEROES' by Peter Badge in June and July 2022.

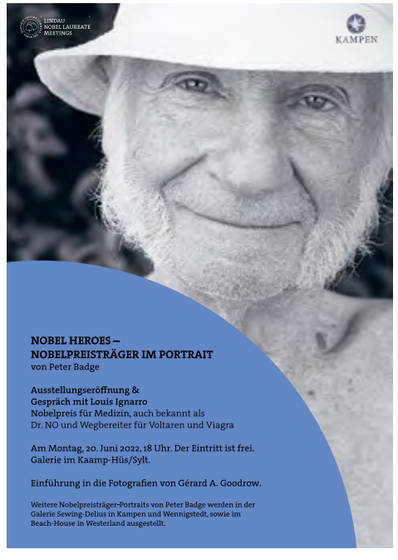
The accompanying programme included two dinners and a panel discussion with Nobel Laureate Louis J. Ignarro (Physiology/Medicine, 1998): Before attending the Lindau Meeting, he was happy to make a short detour to the North Sea to present his research and his new book 'Dr NO: The Discovery That Led to a Nobel Prize and Viagra', the German publication of which was enabled by the Lindau Foundation (ISBN 978-3-86965-390-7). For Klaus Hasselmann, Nobel Laureate in Physics 2021, who is based in nearby Hamburg and actually calls Sylt his home, the exhibition was also an opportunity to answer questions from an interested audience.

Only a few weeks later, in October and November, the exhibition opened at the German House in New York. In addition to the obligatory vernissage, various events related to the exhibition took place as well, for example, a dinner with Nobel Laureates at the Barbetta Restaurant, which is owned by Laura Maioglio, the widow of Günter Blobel (1936–2018). The Nobel Laureate in Physiology or Medicine 1999 had participated in four Lindau Meetings. A scientific fireside chat with Nobel Laureates Martin Chalfie and Joachim Frank (Nobel Prizes in Chemistry 2008 and 2017, respectively) in the residence of the German Consul General, David Gill, was very well received and dealt with the topic of mentoring, among other things.

NOBEL HEROES

By Peter Badge

It is quite natural to think of the Nobel Laureates as people inhabiting another universe. However, with his particular approach, the photographer Peter Badge manages to capture something quite different, although no less powerful. We get simplicity, we get curiosity, we get respect for their integrity, and there is mystery as well. In 2000, Peter Badge embarked on a long-term project to photograph every living Nobel Laureate. Commissioned by the Lindau Nobel Laureate Meetings, originally in cooperation with the Smithsonian Institution, the National Portrait Gallery in Washington, D.C., as well as the Deutsches Museum and ever since co-funded by the Klaus Tschira Stiftung, this project has taken Badge across the globe, to the Laureates' homes, labs and working places or even their holiday destinations.



Sketches of Science – 2nd Edition

Photo Sessions with 120 Nobel Laureates

In his series ‘Sketches of Science’, photographer Volker Steger takes unique pictures of Nobel Laureates and their discoveries. On the occasion of the 2022 Lindau Meetings, the second and enlarged edition of the art book was published together with the Nobel Prize Museum, presenting 120 Nobel Ideas in selected photographs and the interesting stories behind them.

“What the photographs mainly seem to radiate is the fun of doing science”, Nobel Laureate Tim Hunt once said about the long-term photo project which started about 12 years ago. Steger had the idea during a bike-ride while his mind had the liberty to wander: Why not ask Nobel Laureates to make a sketch of the research for which they won their Nobel Prizes? And then ask them to present their artwork to the camera? Such portraits could show the Laureates and their discoveries in a very personal way.

So it happens that when Nobel Laureates come to Lindau, Volker Steger addresses them with a surprise task. They are invited into a room with a desk, a chair, a blank sheet of paper and wax crayons. Each Laureate sketches his or her discovery, following the only guidelines to make the sketch big and use multiple colours. After finishing and signing the work, Steger photographs each Laureate with his or her drawing. Some stand, some sit, there are even those who lie on the floor. One Laureate was so baffled by the request for a sketch that his page is blank. Steger calls this mode of portraiture “engaging” because the subject has so much control, yet the frame and the style of portrait is in practice rather consistent.

The first edition of the art book was issued in 2012 together with an exhibition of about 40 photos of the series which was launched at the Nobel Prize Museum in Stockholm. About 10 years later and after many exhibits in different countries, a new and much enlarged version of the art book was published, featuring 120 Nobel Laureates on 536 pages. It comes with accompanying texts by Adam Smith, Chief Scientific Officer of Nobel Prize Outreach AB, describing the diverse discoveries depicted. The new volume was presented during the opening ceremonies of both Lindau Meetings in 2022.

Project Partner
Nobel Prize Museum, Stockholm

Principal Funder
Klaus Tschira Stiftung, Heidelberg

Publisher
Berliner Wissenschafts-Verlag
ISBN 978-3-8305-5176-8

Adam Smith and Volker Steger

Countess Bettina Bernadotte moderated the talk about the concept and the realisation of the project.

In great demand with the Young Scientists and Young Economists who received a copy thanks to the generosity of the project enabler Klaus Tschira Stiftung

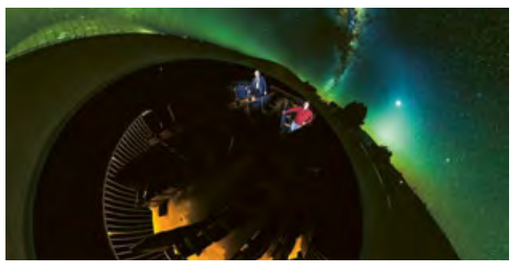
Edmund S. Phelps sketched his research during #LINOecon – to be featured in the 3rd edition to come.

Teaching Materials

In addition to the continuous development of educational material, the newly created, captivating design and technical infrastructure of the Lindau Mediatheque is aimed at optimising use in schools and other educational institutions to increase the interest in science.

Over 800 original lectures and discussions by Nobel Laureates are featured, including the presentations, talks and debates held by Laureates, Young Scientists and Economists during #LINO22 and #LINOecon. New productions in the following formats complete the Mediatheque's extensive offerings.

Teaching Guides
Teaching Guides are pedagogic, bilingual units (German/English) enhanced with appropriate worksheets, films and methodologies. The most recent unit presents selected examples to illustrate essential features of complex systems – a research field for which Klaus Hasselmann, Syukuro Manabe and Giorgio Parisi were awarded the 2021 Nobel Prize in Physics.



Nobel Labs 360°
23 Nobel Laureates have made their workplaces virtually accessible in the Lindau Mediatheque with Reinhard Genzel's workspace being the newest addition to this fascinating collection. The 360° panoramic photos, taken by photographer Volker Steger, depict their labs in great detail; embedded video and audio recordings add to the entertaining and educational experience of a virtual lab tour.

Topic Cluster Catalysis
This Topic Cluster explores a core area of chemistry – catalysis, based on the synthesis of new molecules. Readers get to know the central catalytic processes of this fascinating research field, starting with metal-catalysed reactions mostly applied in industry and enzymatic catalysis to newer methods of asymmetric organocatalysis, for which Benjamin List and Sir David W.C. MacMillan were awarded the 2021 Nobel Prize in Chemistry.

Nobel Posters
Every year, the Royal Swedish Academy of Sciences and the Karolinska Institute publish posters explaining the discoveries of the Nobel Laureates in Swedish and English. These posters are presented during the Nobel Week in December. As in previous years, the Lindau Nobel Laureate Meetings with the support of the Christa und Hermann Laur-Stiftung translated the posters for the 2021 Nobel Prizes into German and distributed about 4,000 copies among secondary schools in Germany and the region of the International Lake Constance Conference (IBK).

Engaging Future Generations

"Knowledge is overrated. It is far more important to have the freedom to form one's own thoughts." – Stefan W. Hell

During #LINO22, Nobel Laureate Stefan W. Hell gave an inspiring talk at the Bodensee-Gymnasium Lindau for high school students from the four-country region of Lake Constance, including Austria, Switzerland, Liechtenstein and Germany. Hell received the Nobel Prize in Chemistry in 2014 together with Eric Betzig and W.E. Moerner "for the development of super-resolved fluorescence microscopy". With the STED microscope, he had succeeded in overcoming Abbe's diffraction barrier in the focusing light microscope, enabling resolutions far below the wavelength of light.

His highly accessible lecture was followed by an intense exchange with the high school students, who were curious to learn more. Besides answering questions about his career, he also shared his experiences and insights on the at times difficult path that led to the Nobel Prize. Hell stressed the importance of persevering and believing in oneself – and that not knowing everything is okay. Instead, it creates mental space to discover new things. What is essential, in his opinion, is good education, joy and interest in the subjects one deals with and constant curiosity and willingness to learn.

To inspire the younger generation and to actively involve regional students in the Lindau Meetings, the Council organizes a visit to a local school for one of the participating Nobel Laureates every year. After two years with Online Science @ School, the on-site interaction was greatly appreciated by all participants.

New Look and Feel

The revamped Lindau Mediatheque provides a smooth and engaging user experience that showcases, in its extensive range of scientific content, the more than seven-decade history of the Lindau Meetings.

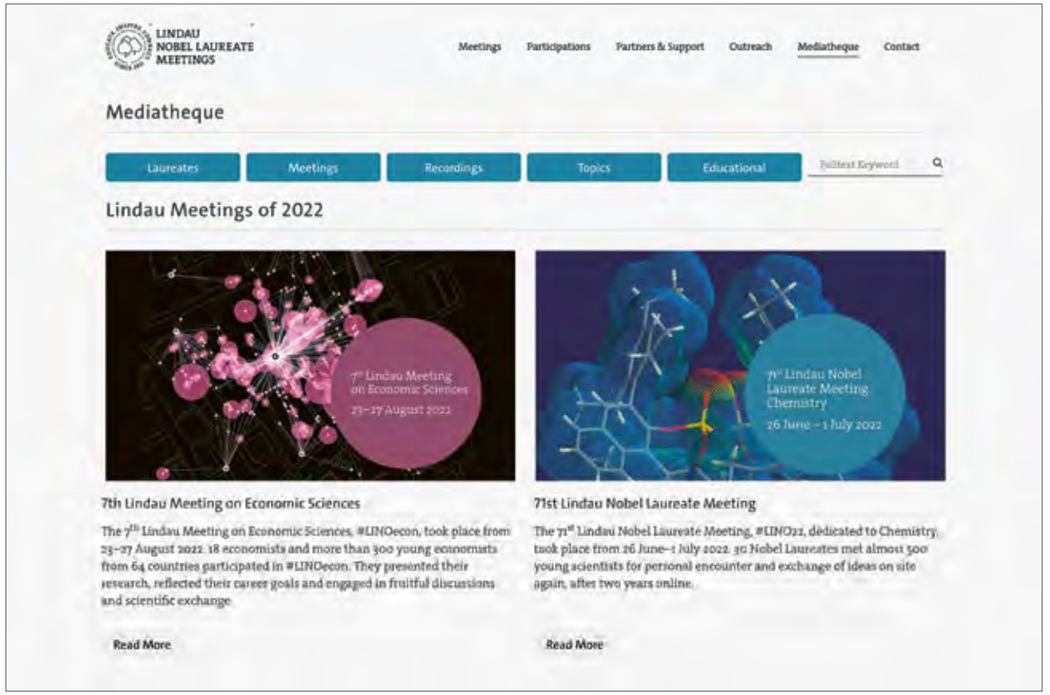
The Lindau Mediatheque shares archived knowledge going back over seventy years, thus fostering public engagement with and understanding of science as one of the core goals of the Lindau Meetings' "Mission Education". With content dating back to 1952, this archive offers a far-reaching historic perspective on the development of major research traditions in the areas of natural and social sciences. The numerous original audio recordings, images and videos represent a unique multimedia treasure trove. Year by year, first-hand scientific content is edited in various media formats.

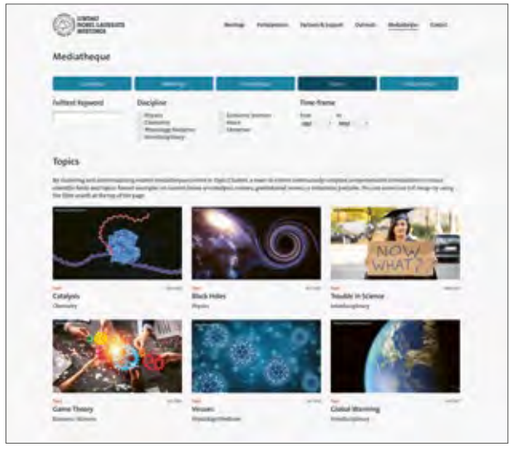
After thirteen years, the Lindau Mediatheque underwent an extensive relaunch this year with new layout implementations and improved performance functionalities to keep pace with up-to-date usability criteria. The new page design reflects the major research sources that are available in this unique online archive. Five clearly arranged entry pages encompass the Lindau Nobel Laureate Meetings and the associated science material in a concise and captivating manner.

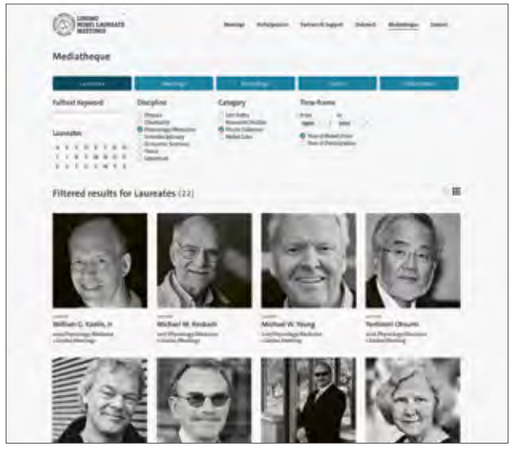
With its introductory teasers, clickable circles that inform visitors about the mediatheque's extensive science content, as well as intriguing highlight sections, the archive's introductory page mirrors the multifaceted dynamics of the Lindau Meetings themselves. It also grants a look into the mediatheque's historical archive with lecture presentations from the past decades. In order to enable targeted and rapid research, the mediatheque offers a page-specific search with combinable filter options in addition to a full text keyword search. The user is now able to easily retrieve comprehensive information about the Lindau Meetings and their participating Laureates. As a new feature, it is possible to view pages and results pages in clear list views or teaser views.

The revised Didactic Filter allows teachers and students to perform a targeted search for teaching material in the Lindau Mediatheque. The search can be structured by subject and grade level. Teaching relevant material such as explanatory films, downloadable worksheets and structured class lessons can be quickly found here. In this way, the Didactic Filter facilitates the teaching and learning of new areas of knowledge.

For teachers, students, scientists or the general public interested in science, the Lindau Mediatheque additionally offers a high-speed, easy-to-navigate knowledge platform with which to engage with the latest discoveries in cutting-edge research.







Explore the new Lindau Mediatheque.

Live From Lindau Again

After two years of the COVID-19 pandemic, in 2022 media representatives were once again able to report on the meetings from on site in Lindau.


Frankfurter Allgemeine

Zukunftslabor Lindau

Berichte von der 71. Tagung der Nobelpreisträger am Bodensee

Die Chemie des Wandels

Süddeutsche Zeitung
Verlagsgruppe
30. Juni 2022

25

NOBELPREISTRÄGERTAGUNG LINDAU

Drang nach Wissen und Einordnung

The focus of media relations at the 2022 meetings was back to on-site activities, with the majority of media representatives in Lindau and additional online accreditations. As in previous years, the Lindau Meetings assisted with organising interviews with both Nobel Laureates and Young Scientists/Economists, in some cases still remotely due to the hybrid format of the meetings.

The branding this year reflected the thematic foci of the meetings and included new digital displays in front of the meeting venue. In line with the emphasis on Chemistry and Economics, the Royal Society's Chemistry World and Kemisk Tidskrift from Sweden were among the reporting media, while the business and financial TV stations Bloomberg and CNBC broadcast live from the economics meeting. The Latin-American science communications initiative Ciencia Sí was accredited to further publicise the meetings in the Spanish-speaking world.

For journalists working on site, the trend of trans-media reporting continued, necessitating adequate premises and technical support. Berlin's Die Welt, for instance, produced their economics podcast in and around the Inselhalle. A return to the standard of previous years could also be achieved with editorial supplements in two of Germany's most renowned dailies, Frankfurter Allgemeine Zeitung and Süddeutsche Zeitung.

Digital Meeting Point

lindau-nobel.org is a rich source of information about the meetings for all groups of participants and future interested scientists. Our blog portrays the people behind the science: Young Scientists, Lindau Alumni and sometimes Nobel Laureates.


Sir David W.C. MacMillan shared ideas about what to talk to him about at the meeting – contributed by Wendy Plump, Princeton University.


Chiara Maniaci was looking forward to fostering cross-pollination of ideas from different areas.

After the successful relaunch in summer 2021, the extensively redesigned website contributed to a clear presentation of the meetings in 2022. In this way, all information regarding the organisation of the meetings was available, for example the current regulations regarding COVID-19. Via a livestream on the home page, the general public had the opportunity to watch integral sessions of the programme – such as the opening ceremonies and the panel discussions.

As in previous years, exciting stories from the world of science were published on the blog last year, and Young Scientists/Economists were featured in advance of the meetings. They explained their research and expressed their excitement for the upcoming meetings. Lindau Alumni shared their experiences and gave an update on their career paths. Even a Nobel Laureate contributed to the blog: Sir David W.C. MacMillan gave advice for participants before the start of the Chemistry Meeting for conversation topics with him – the hints might surprise you! Currently popular on the Lindau Blog: information about the brand-new Nobel Prizes and the people behind them.

The Lindau blog can be easily accessed and read on mobile devices.

Social Media

Watch out for #LINO23

Connecting people and sharing ideas are at the heart of the Lindau Meetings' mission. In 2022, connecting with our community through social media and on other digital platforms continued to be crucial.

More than 13,000 Lindau Alumni, Young Scientists, Young Economists, partners and other interested users follow @lindaunobel on Twitter. The excitement for #LINO22 started early, with the post announcing the next class earning over 300.000 impressions. During #LINOecon we also enjoyed exchanging thoughts with Econ Twitter.

On Facebook, over 18,000 users 'like' the Lindau Nobel Laureate Meetings. During both meetings, Brian Malow went live on this platform with interviews with our community from Lindau. We update our community on news from Lindau year-round.

The Lindau Meetings' page on LinkedIn is increasingly important for our outreach. Our presence in the networking site for professionals is a great way to create and uphold relationships with Lindau Alumni, partners and other friends of Lindau.

We also share visual highlights, videos and other digital content from the Lindau Meetings on Instagram. Young Scientists, Young Economists and Lindau Alumni are engaging with us, sharing snapshots and stories during #LINO22 and #LINOecon and throughout the year.

Our YouTube channel is a growing resource of short-form interviews and additional material from Lindau and beyond. Our channel also offers clips about the Sciathon and the Lindau Mentoring Hub, and Mini Lectures supplement our educational content.

Images from the Lindau Meetings are available to everyone on Flickr, be it to relive memories or to find high-quality pictures for reports on the Lindau Meetings. The images are free for editorial use, but the copyrights must be acknowledged accordingly.

Relive the action on social media on the @lindaunobel social media wall.

Video Productions

Lindau, Camera, Action!

After two years of remote video productions, the Lindau Nobel Laureate Meetings welcomed back video producers and camera teams to capture the Lindau Spirit on video.

Interview with Nobel Laureate Brian Schmidt

Young Economists live on camera from Lindau Harbour

In 2022, the Lindau Nobel Laureate Meetings collaborated with the London-based video production agency Econ Films. For the opening films of both meetings, we captured the anticipation by talking with Lindau Alumni, Young Scientists and Young Economists invited in 2020 about what it means to come to Lindau. During #LINO22, short videos featured input from Nobel Laureates and Young Scientists on topics important to science and society. Bringing Young Economists and Laureates together for short interviews gave further glimpses into the discussions at #LINOecon.

Engaging footage from the meetings and testimonies from Laureates, Young Scientists, Young Economists, friends and supporters are the basis for new films that will help promote the Lindau Meetings worldwide. In addition, local video journalist Theresia Keck caught the atmosphere of the week in moving images that will increase the anticipation for the next Lindau Meeting. The return to on-site meetings provided a new opportunity for interviews by science comedian Brian Malow – live from Lindau on social media. Hybrid interviews from locations across Lindau and Mainau Island introduced interested viewers to the research and lives of on-site and online participants. For the first time, live interviews with participants brought the atmosphere of the Bavarian Evening of both meetings to those who could not travel to Lindau. All interviews are available on YouTube.

Young Economist Moritz Janas with anticipation of #LINOecon

Amazed to interact with Nobel Laureates and Young Scientists from diverse research fields. Grateful to #LINO22 for providing this once-in-a-lifetime opportunity.

Raj Kumar, Young Scientist

Council and Foundation

The Council

The non-profit Council for the Lindau Nobel Laureate Meetings was founded in 1954 to run the Lindau Meetings inaugurated in 1951. To organise the annual Lindau Meetings, the Council today maintains an executive secretariat based in the Lennart-Bernadotte-Haus on Lindau Island.

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Head

Kai Lohbeck
(since 02/2022)

Nora Dávila Flores
(since 07/2022)

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(since 06/2022)

Manuela Diepolder
(until 03/2022)

The Foundation

The non-profit Foundation Lindau Nobel Laureate Meetings was established under German law in the year 2000 by 50 Nobel Laureates. Its main purpose is to ensure the continuance and further development of the Lindau Meetings. As of now, more than 370 Nobel Laureates have agreed to serve as advocates for the 'Lindau Spirit' in the Founders' Assembly.

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Roman Herzog †

Honorary Chairman
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Federal Minister Bettina Stark-Watzinger visiting the office of the Council and the Foundation

More Than 370 Members

Founders' Assembly

A
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B
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D
Angus Deaton, Hans G. Dehmelt, Johann Deisenhofer, Peter A. Diamond, Peter C. Doherty, Renato Dulbecco, Christian de Duve

E
Gerald Edelman, Manfred Eigen, Robert Engle, François Englert, Richard R. Ernst, Gerhard Ertl, Leo Esaki, Martin J. Evans

F
Eugene F. Fama, John B. Fenn, Bernhard L. Feringa, Albert Fert, Edmond Fischer, Ernst Otto Fischer, Robert W. Fogel, Joachim Frank, Jerome Friedman, Milton Friedman, Robert F. Furchgott

G
Caleton Gajdusek, Andre Geim, Murray Gell-Mann, Reinhard Genzel, Andrea Ghez, Riccardo Giacconi, Ivar Giaever, Walter Gilbert, Alfred G. Gilman, Vitaly L. Ginzburg, Donald Glaser, Sheldon L. Glashow, Roy J. Glauber, Joseph L. Goldstein, John B. Goodenough, Mikhail Gorbachev, Clive Granger, Paul Greengard, David J. Gross, Robert H. Grubbs, Peter Grünberg, Roger Guillemin, John B. Gurdon

H
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I
Louis Ignarro, Guido W. Imbens

J
Brian D. Josephson, David J. Julius

K
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Morten Meldal, Nobel Laureate 2022 in Chemistry, is one of the most recent members of the Founders' Assembly. He is also a Lindau Alumnus, in 1986 he participated in the 36th Lindau Nobel Laureate Meeting (Chemistry) – like Nobel Laureate and Lindau Alumnus 1963 Bert Sakman.

N
Shuji Nakamura, Yoichiro Nambu, John F. Nash, Jr., Ei-ichi Negishi, Erwin Neher, Marshall Nirenberg, Douglass C. North, Konstantin S. Novoselov, Ryoji Noyori, Christiane Nüsslein-Volhard, Paul M. Nurse

O
Yoshinori Ohsumi, John O'Keefe, George A. Olah, Satoshi Ōmura, Douglas Osheroff

P
Giorio Parisi, Ardem Patapoutian, Arno Allen Penzias, James Peebles, Saul Perlmutter, Sir Roger Penrose, Edmund S. Phelps, William D. Phillips, Christopher A. Pissarides, John Polanyi, John Pople, Lord George Porter, Edward C. Prescott, Ilya Prigogine

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Didier Queloz

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List as of November 2022

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The members of the most prestigious committee of the Foundation function as advisors to the board and distinguished ambassadors for the cause of the Lindau Meetings. They bring their formidable experience, expertise and dedication to bear on the goal of advancing the values and aims of Lindau's 'Mission Education'.

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Participating in the 2022 Lindau Meetings: Pamela Mars (top); Volkmar Denner (middle); Klaus Kleinfeld (bottom right)

Change at the Top of the Executive Secretariat

Thank You Wolfgang Huang

In early 2023, Wolfgang Huang, Director of the Executive Secretariat, will leave the Lindau Nobel Laureate Meetings. Council and Foundation look back on 12 very successful years with him and wish him all the best, both professionally and personally as he reaches out to new horizons.

"It is thanks to you that the Lindau Meetings successfully developed to what they are today. We hope to see you many more times during Lindau Meetings in the future as a guest of the Lindau Meetings." Thus, Countess Bettina Bernadotte acknowledged Wolfgang Huang's achievements during the last Council Meeting.

In addition to the day-to-day business, Huang was the driving force behind many crucial projects for the Lindau Meetings, of which only a selection can be mentioned here. Upon the initiative of Elizabeth H. Blackburn in 2018 and in cooperation with other Nobel Laureates, he developed the Lindau Guidelines and established them in the scientific community: self-commitment rules for an open and cooperative science in the 21st century.

Huang has also been instrumental in making the Lindau Meetings more sustainable. Thanks to his initiative, the Council has been involved in the renaturation of marshland in the Lindau district for several years now. The resulting potential for CO_2 storage capacities in nature will enable the annual events to take place in a climate-neutral manner.

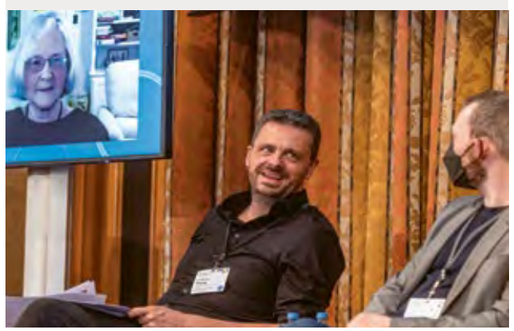
Since 2019, the Lindau Nobel Laureate Pier has been very well received by Lindau's citizens and many visitors to the city, and Huang played a leading role not only in its realisation but also its design.

Typical also for Huang's indefatigable efforts on behalf of the meetings: After convincing German astronaut-elect Alexander Gerst to participate in the Lindau Innovation Forum, he managed to get his Lindau name badge into the space luggage for Gerst to present it during

The Lindau team in summer 2022 – Executive Secretariat of the Council and Office of the Foundation

"I was privileged to work with Wolfgang on the Lindau Guidelines. His dedicated and effective commitment to producing the Lindau Guidelines for doing science, and to shepherd them to fruition, will always be inspirational. I know this is true not only for me, but especially for the many young scientists who joined him in the Lindau Foundation's path-breaking work on this endeavour."

Elizabeth H. Blackburn



"Among many other things, I greatly appreciate Wolfgang Huang's commitment to making the 'Innovation Forum' a truly outstanding event where top-notch speakers and moderators discussed the most pressing technology topics of our time."

Stefan W. Hell

"With his energetic leadership, Wolfgang has ensured that the Lindau Nobel Laureate Meetings are an unforgettable opportunity for sharing ideas, being inspired and forging new collaborations for thousands of young scientists through the years."

Adriana Marais, Lindau Alumna 2016, Theoretical Physicist, Technologist & Aspiring Extraterrestrial

"Organising big conferences and symposia is often compared to herding cats. But organising one with Nobel Laureates and gifted Young Scientists from all over the world is like herding lions; a challenge only few can rise to. Wolfgang did this with utmost passion, care and calm."

Philippe Narval, Director, SQUARE at HSG

Alexander Gerst took his Lindau name badge aboard the ISS.

a video aboard the ISS. Finally, the establishment and professionalisation of the Lindau Alumni Network is also worthy of special mention.

During his time as Director, he was able to continuously expand the Executive Secretariat, almost doubling its capacities compared to when he took office. The organisation benefited from his passion for and expertise in technical matters: in addition to expanding the IT infrastructure and digitalising many processes, the team under his leadership managed to successfully set up the Online Science Days 2020: a purely digital event format, from a standing start, all with on-board resources in times of maximum pandemic restrictions. The Online Sciathon is one of many lasting Lindau impulses for the global scientific community. The following year, he demonstrated further creativity and refined digital expertise, e.g. by having the Lindau Virtual Band and Orchestra perform for the 70th Lindau Meetings anniversary.

"The entire team at the executive office and I personally as well look back with great gratitude on 12 challenging as well as successful and collegially pleasant years together with Wolfgang Huang", sums up Nikolaus Turner, Member of the Boards. In the spirit of continuity that characterises the Lindau Meetings, Huang currently supports the handover to his successor and setting up the 72nd Lindau Nobel Laureate Meeting in an advisory capacity.

One of Wolfgang Huang's many personal creative inputs: a time-lapse tour all around Lindau Island, stand-up paddling!

New Fellowship Funds

Endowments Enable Participation

New funds of the Foundation Lindau Nobel Laureate Meetings award scholarships for the participation of Young Scientists in the meetings. These fellowships may also be named after future donors.

The Foundation Lindau Nobel Laureate Meetings was established in 2000 upon the initiative of 50 Nobel Laureates. Since then, more than 370 Laureates have joined the Founders' Assembly. To support the continuation of the Lindau Meetings in the long term and to safeguard their independence, the Foundation continues to pursue the goal of significantly increasing its assets.

To ensure that new donors can help to achieve this, the Lindau Foundation has set up Fellowship Funds for the awarding of scholarships. These are named after personalities who have had great significance so far for the Lindau Meetings, but they may also bear your name – or you could support the 'Lindau Spirit'. This describes the special atmosphere at the Lindau Meetings, the shining eyes of Nobel Laureates and Young Scientists when they meet in person and take part in inspiring conversations. The 'Lindau Spirit Fellowship' is the name of a participation scholarship that was initiated by supporters of the meetings during the pandemic. In the meantime, several such scholarships have been created, including a 'Countess Sonja Fellowship' which enables female Young Scientists to participate in the meetings, and a 'Sharon and Lou Ignarro Fellowship' which is also funded from the proceeds of the German edition of the book 'Dr. NO, my way to the Nobel Prize' (see p. 126f).

In grateful and loving memory of Edmond H. Fischer, recipient of the Nobel Prize in Medicine 1992, the Vallee Foundation has again endowed an Eddy Fischer/Vallee Foundation Fellowship Fund. With this fellowship, every year a postdoc is invited in his name to the meetings in Lindau.

Förderstiftung für die Lindau Nobel Laureate Meetings
Reference: Endowment to the Fellowship Funds
ODDO BHF
IBAN: DE70 5002 0200 0055 0039 09
BIC (SWIFT): BHFBDEFF500

I wish to thank you for a spectacular meeting and for the positive impact you are having on the future of science.

William G. Kaelin, Jr.

Preliminary Account 2022: Revenues

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Total Revenues	**4,102,309**

Please note: The calculated revenues refer to the meetings and selected outreach projects. Deficits have been covered by the Foundation Lindau Nobel Laureate Meetings as guaranteed to the Council for the Lindau Nobel Laureate Meetings.

Preliminary Account 2022: Expected Expenditures (Euro)

	71st Lindau Nobel Laureate Meeting (Chemistry)	7th Lindau Meeting on Economic Sciences
Travel		
Laureates	106,533	114,636
Young Scientists/Economists	11,731	2,557
Media	0	0
Others	15,912	7,446
Lodging		
Laureates	63,102	21,735
Young Scientists/Economists	289,470	136,599
Media	0	0
Others	55,978	31,863
Boarding		
Laureates	23,221	10,631
Young Scientists/Economists	231,610	111,943
Media	3,962	2,987
Others	51,444	32,827
Meeting Organisation		
Scientific Programme & Selection of Young Scientists/Economists	19,700	15,000
Rental Fees Locations	109,512	93,320
Technical Equipment (incl. hybrid)	370,812	285,317
Utilities & Services	10,353	4,201
Onsite Staff	73,002	46,406
Transfers (Buses, Limousines)	117,081	99,389
Supporting Programme	60,954	67,337
Printed Matters	44,796	8,709
Expendable Items	23,344	9,408
Audio & Video Productions	51,533	26,686
Science & Media Services	34,707	10,220
Website	6,706	2,874
Telecommunications, Postage	21,005	9,002
IT Services, Hardware, Software	63,077	27,033
Accounting, Legal Advice, Insurances	14,295	6,126
Other Costs	42,572	13,995
Executive Secretariat		
Staff	627,225	268,811
Office Operating Costs	55,046	23,591
Office Supplies & Equipment	9,082	3,892
Expected Total Expenditures	**2,607,766**	**1,494,543**

Please note: Two thirds of shared costs have been allocated to the 71st Lindau Nobel Laureate Meeting (Chemistry) and one third to the 7th Lindau Meeting on Economic Sciences. The budget contains € 377,600 of expected costs for Oct–Dec 2022.

Many Thanks to Our Supporters

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as of December 2022

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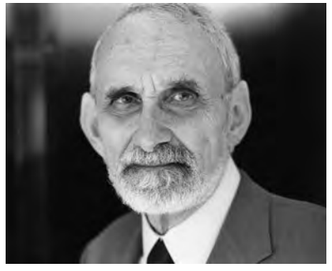
In Memoriam – Dearly Missed

Sidney Altman
1939 – 2022
Nobel Laureate in Chemistry 1989



Robert F. Curl, Jr.
1933 – 2022
Nobel Laureate in Chemistry 1996

Mikhail S. Gorbachev
1931 – 2022
Nobel Laureate in Peace 1990

Edward C. Prescott
1940 – 2022
Laureate in Economic Sciences 2004

David Trimble
1944 – 2022
Nobel Laureate in Peace 1998

Desmond Tutu
1931 – 2022
Nobel Laureate in Peace 1984

Robert H. Grubbs
1942 – 2021
Nobel Laureate in Chemistry 2005

Frederik W. de Klerk
1936 – 2021
Nobel Laureate in Peace 1993

Luc Montagnier
1932 – 2022
Nobel Laureate in Physiology or Medicine 2008

Dagmar Schipanski
1943 – 2022
Corresponding Member of the Council (2003 – 2015)

(Obituaries 2021 as after the editorial deadline of last year's Annual Report)

72nd Lindau Nobel Laureate Meeting (Physiology/Medicine) 25 – 30 June 2023

73rd Lindau Nobel Laureate Meeting (Physics) 30 June – 5 July 2024

74th Lindau Nobel Laureate Meeting (Chemistry) 29 June – 4 July 2025

8th Lindau Meeting on Economic Sciences 26 – 30 August 2025

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Cover Arts
Chemistry: asymmetric organocatalysis – the 2021 Nobel Prize in Chemistry was awarded for this process. Credit: MPI für Kohlenforschung/Ilija Ćorić

The economics cover art features Leah Meisterlin's 'Remapping John Snow's Cholera Map, London, 1854', thus referring to natural experiments – a concept for which David Card, Joshua Angrist and Guido Imbens were awarded the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2021. Visit leahmeisterlin.com/remappingsnow for more.

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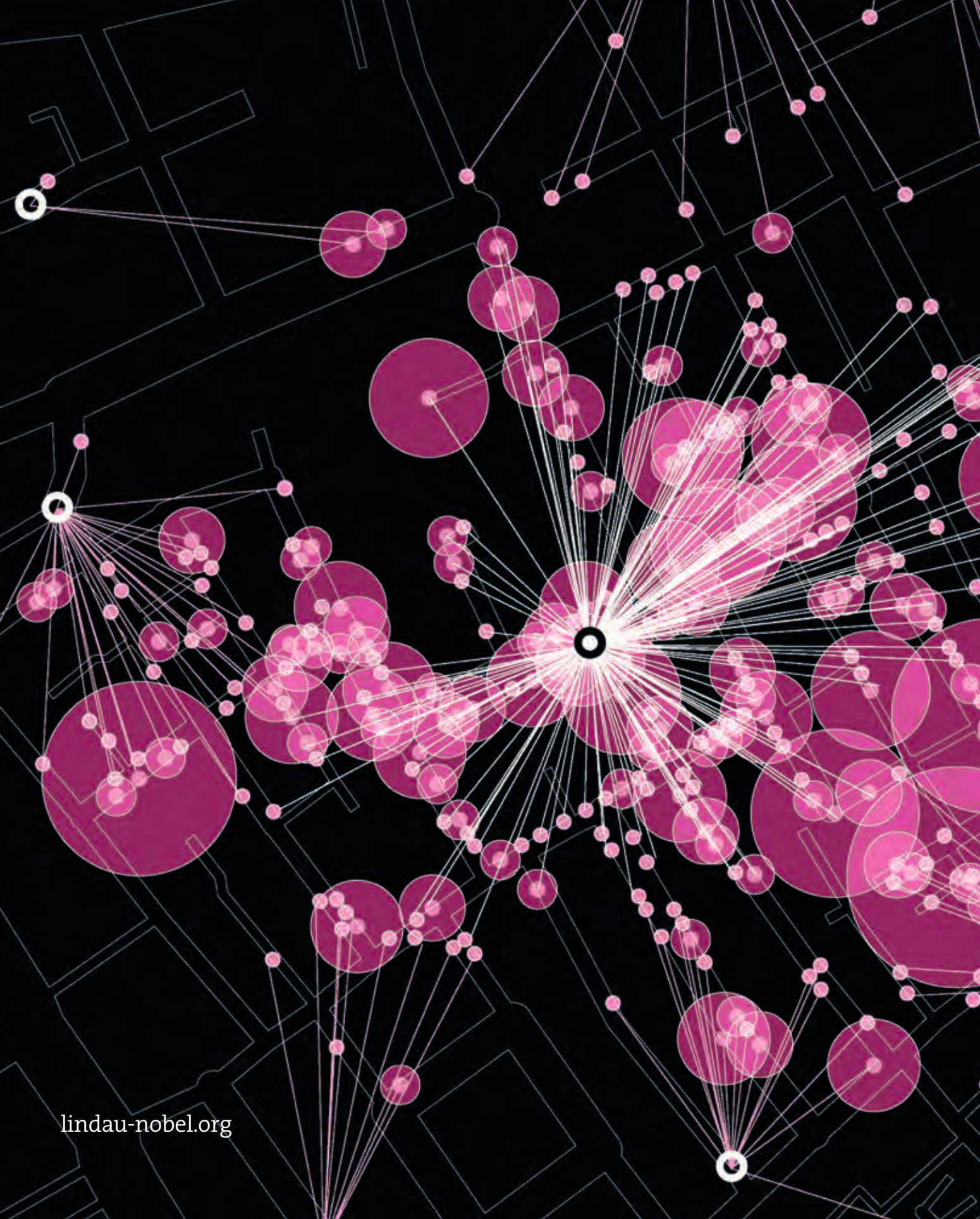
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