

66th Lindau Nobel Laureate Meeting
Annual Report 2016



LINDAU
NOBEL LAUREATE
MEETINGS

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Overcoming Barriers With Science

Greeting by Countess Bettina Bernadotte and Jürgen Kluge



Countess Bettina Bernadotte, President of the Council, and Jürgen Kluge, Chairman of the Board of Directors of the Foundation

Given the global political situation, it is easy to feel disillusioned and despondent. Millions of people have been displaced or have opted to flee, radical forces are sowing insecurity and terror, societies are splitting asunder, separatist and nationalist aspirations are gaining in popularity. We in Lindau, however, have always taken a stand against apathy and indifference! The Lindau Nobel Laureate Meetings were born in 1951 out of a desire to liberate German scientists from their isolation in the aftermath of World War II, to network once more with one another, and to surmount the barriers between states, but also between minds. The founding fathers Franz Karl Hein, Gustav Wilhelm Parade and Count Lennart Bernadotte nurtured a firm belief in the language of science which they regarded as a builder of bridges between peoples. Since the very beginning, the Lindau Meetings have been the antithesis of isolation, standing instead for a spirit of understanding between nations and generations. What was then seen as a part of the solution is more applicable now than ever before.

Complex global problems and conflicts can only be resolved by adopting a global approach, of which science offers us a living example. The inherent curiosity, the urge to break through conventional ways of thinking, forms the basis of a critical and enlightened society. Peter Agre, Nobel Laureate in Physics and a close friend of the Lindau Meetings, once summed it up as follows: "Science is a wide-ranging effort that naturally crosses borders, and so scientist-to-scientist collaboration can promote goodwill at the grassroots."

In our digitised reality, such collaboration can just as easily be virtual. Thanks to the new options for communication, scientists nowadays cooperate with one another across ever-greater distances. Science is in many cases global. The Lindau Meetings, however, are proof of the value of personal encounters, and of the power of face-to-face exchange of ideas. The annual meetings bring together 30-40 Nobel Laureates to engage in a joint dialogue with several hundred young scientists. When a 70 year-old Nobel Laureate meets a 29 year-old scientist, when a particle researcher meets an astrophysicist, when an Icelandic

enters into discussion with an Indian, when there is an interchange between generations, disciplines, cultures and philosophies of life, understanding and tolerance are the natural outcome. This change of perspective opens new horizons.

This year's 66th Lindau Nobel Laureate Meeting was devoted to physics, and revolved around quantum technology, dark matter and particle physics. Aspects of these topics were addressed in lectures, panel discussions, master classes and science breakfasts. In accordance with a frequent request by the laureates and above all with our guiding principle of "Educate. Inspire. Connect.", new formats put the focus of interest even more directly on the young participants during the conference week. With a poster session taking place for the first time in Lindau, we have introduced a forum which consciously places the work of young scientists in the foreground. As in the case of the master classes, both Nobel Laureates and young scientists were called upon to offer direct feedback, to help the presenters on their way as well as to prompt valuable debate. The Nobel Laureates' lifelong experience is of inestimable value, even if some of them no longer spend their daily lives in the laboratory. Another vital element of these formats are the young scientists' contributions and questions.

The extraordinary "Lindau spirit" does not end as the meeting week closes. Not only are new ideas born in Lindau that are carried across the world. This is the place where personal bonds and professional networks that can last a lifetime are formed. The goal of our alumni initiative planned for the coming years is to identify existing connections and retie loose ends. Since the founding of the Lindau Meetings 66 years ago, around 30,000 young scientists from across the world have taken part. We would like to bridge the age barriers and bring this huge community of scientists together, and appoint them as part of our "Mission Education" as ambassadors for the Lindau dialogue. Together they will embed the philosophy of science as a connecting medium within society and create a network that spans generations and the world. We have embraced the appeal of our friend Sir Harry Kroto, who passed away this

year far too early, that all participants should consider themselves as alumni, and as scientists accept responsibility for the needs of humankind as a commitment. He expressed this wish in 2015, in his last lecture in Lindau. We eagerly await the first encounters and events with our alumni.

The "Lindau spirit" is omnipresent at the meetings, and it also manifests itself in diverse outreach projects, which enable us throughout the year, to create both actual as well as virtual forums for the exchange of ideas. It has always been one of the meetings' aspirations to bring science to society. We therefore make our mediatheque, comprising the collection of over 500 videos of Nobel Laureates, available to all. We customise it for a wide variety of target groups, we adapt the content to various curricula, and we enter into joint ventures with learning platforms. We would be pleased and honoured if as many teachers and interested people as possible could benefit from our mediatheque, which we regard as a treasure trove.

The world of science must not be one of barriers and narrow-mindedness. On the contrary, in the spirit of Alfred Nobel it must champion the wellbeing of all humanity. The Lindau Meetings are committed to this spirit.



“A Platform for Communication and Understanding”

In her address at the 66th Lindau Nobel Laureate Meeting, German Federal Minister of Education and Research Johanna Wanka emphasised the importance of the Lindau Meetings as a focal point in Germany for excellent young researchers from all over the world. She honoured Wolfgang Schürer’s contributions to this cause over the past 15 years.



When the first Lindau Nobel Laureate Meeting took place in 1951, 65 years ago, the initiators were united by one objective: To relieve the isolation of German science in the aftermath of World War II and create a platform for communication and understanding. This objective has without a doubt been achieved: German science and research are now a recognised part of the European Research Area and the span of their networks is global.

The 2016 Meeting once again demonstrates that Germany as a science location is a magnet for excellent young scientists from throughout the world. The communication and understanding are working – as they have done for decades – at the highest level.

It is by no means self-evident that the interaction between researchers from 80 nations here in the beautiful island city of Lindau should be so outstandingly successful. Given the conflicts in our society and the numerous crises worldwide, we must allow that first meetings with strangers and the respect due to other cultures and opinions have become more difficult to manage in our daily lives. In politics and in society, we are even now at odds over the right degree of openness, generosity and consideration.

Science is frequently called upon for advice – on how to improve living conditions, how to better understand religions, and many other issues. But scientific insights alone are not enough to counter resentment and narrow-mindedness. It takes people who are willing to show how dialogue works, to practice understanding day to day, to approach the new with an open mind. People like you here in this room, with an enduring interest in progress.

It is my pleasure today at this 66th Lindau Nobel Laureate Meeting to honour a man who quite particularly embodies this attitude and upholds the tradition of Lindau’s founding fathers: Professor Wolfgang Schürer.

Professor Schürer, when you first put forward your ideas over 15 years ago for the future structure of the Lindau Nobel Laureate

Meetings, you faced a situation of awakening and upheaval. The conference [...] required renewal: It was to become more international, it should consistently create new networks linking the best young scientists the world had to offer, and improve the visibility of current research in the public eye and in society. It was also not least a question of financial security for the meetings. A major task indeed!

First steps had been taken under the prudent leadership of Countess Sonja with the expansion of the Council and the establishment of the Foundation. Then you stepped in, Professor Schürer, to use your expertise to develop the Lindau Meetings into a wellspring for global cutting-edge research.

The Sankt Galler Tagblatt newspaper once described you, quite fittingly, I believe, as a “service provider in the world of mighty ideas”. This indeed is how I see your many years of commitment to Lindau: Your desire was to be regarded not as “master” of the meetings, but as “servant” of the cause – ultimately of science. Your efforts were aimed not at imposing your own ideas, but at facilitating, as it were, the “mighty” ideas of science that are so important to our global society. [...]

Of course, dear Professor Schürer, you could not have achieved all this alone. You had colleagues and supporters, you had patrons and confidants; you had competent staff in the executive secretariat. But it is you personally whom we have to thank for the climate of awareness, dynamism and appreciation that prevailed in Lindau in which such developments were even possible. [...]

The many awards presented to you, most recently the Knight Commander’s Cross awarded by German Federal President Gauck in 2015, bear witness to the recognition your work has received.

But the finest recognition is what you see here before you: Hundreds of committed and knowledge-hungry scientists who have gathered in Lindau to exchange ideas beyond generations and nationalities. [...]

Prospects and Reflections – Statements from the Opening Ceremony

The 66th Lindau Meeting went back to its roots in Lindau's city theatre due to the refurbishment of the Inselhalle. It also celebrated the change of the guards at the position of Chairman of the Foundation from Wolfgang Schürer to Jürgen Kluge. Therefore, the opening ceremony was shaped by historical reflections as well as outlooks on the future.

Heinz Fischer

Federal President of the Republic of Austria



“Initially, the Lindau Nobel Laureate Meetings pursued the clear objective of contributing significantly to Germany's intellectual reconstruction. This impressive get-together rapidly evolved from this goal and is now renowned worldwide for its widely-recognised initiatives to promote young scientists and internationalised research. [...] It was not only the war, but also the

abominable ideology of national socialism that destroyed the intellectual, moral and scientific foundations of Germany and Austria. [...] I wish that all the young scientists gathered here at Lake Constance – regardless of the clouds on the horizon – enter a future marked by peace, trust and cooperation. Who, if not you, could contribute to this goal?”

Klas Kärre

Member of the Nobel Assembly for Physiology and Medicine
Member of the Board of Directors of the Nobel Museum, Sweden



“In Stockholm, we have great respect and admiration for Lindau's mission. We believe that you have found a fantastic forum for fulfilling one of Alfred Nobel's legacies. One that may not have been spelled out in his famous will but that is nevertheless implicit from it. [...] There is no such thing as a typical Nobel Laureate: they are male and female, from all over

the world and from every culture and creed. Some grow up in extreme privilege, others in abject poverty. Many hold multiple PhDs, others never went to college. The Nobel Prize is about achievement, not about pedigree. Their accomplishments are as varied as their life stories but they all have one important thing in common: a passion for making the world a better place for the benefit of mankind. Any of you young scientists can do the same, but you need to be inspired and that is what this Lindau Meeting is all about – inspiration.”

Countess Bettina Bernadotte

President of the Council for the Lindau Nobel Laureate Meetings

“Professor Schürer, from day one you directed huge amounts of your energy into developing the meetings. In your never-ending pursuit of excellence, you not only collected funds, you also re-activated strategic partnerships, you continuously sharpened the mission goals of the meetings and you invested all your knowledge into organisational quality.”

Nikolaus Turner

Managing Director of the Foundation
Member of the Boards of the Foundation and the Council

“We salute Wolfgang Schürer's contributions to the Lindau Meetings and to keeping them in Lindau, Germany. Deciding to step down just before his 70th birthday, his enormous contributions came to an end. Looking back, we shared 15 intense years, almost 24/7. It has not always been easy but driven by his strive for excellence.”

Thomas Ellerbeck

Member of the Board of the Foundation
Member and Spokesman of the Council

“Wolfgang Schürer, it was a privilege for all of us to work with you. Learning from you and getting to know your passion for excellence, you served as a role model for all of us involved in the Lindau Meetings, for the young people in attendance but also for me personally.”



Jürgen Kluge, Thomas Ellerbeck, Wolfgang Schürer, Countess Bettina Bernadotte, Nikolaus Turner

Prof. Jürgen Kluge

Chairman of the Board of Directors of the Foundation

“I can assure you that the Foundation will try hard to stay true to the principles you – Wolfgang Schürer – have implemented and to the very high standards you have established. We can see further by standing on the shoulders of giants – Wolfgang Schürer had been one of those giants and I'm happy to see a little bit further now.”

Opening Ceremony

Welcome

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

Greetings from Stockholm

Klas Kärre, Member of the Nobel Assembly for Physiology and Medicine, Member of the Board of Directors of the Nobel Museum, Sweden

Welcome Address

Heinz Fischer, Federal President of the Republic of Austria

Address and Laudation to Wolfgang Schürer

Johanna Wanka, Federal Minister of Education and Research, Germany

Awarding of the Lennart-Bernadotte-Medal in Gold to Wolfgang Schürer

Countess Bettina Bernadotte

Presentation of the Limited English Edition of Peter Badge's Ingenious Encounters in Honour of Wolfgang Schürer

Thomas Ellerbeck and Nikolaus Turner, Members of the Board, Foundation Lindau Nobel Laureate Meetings

Awarding of the Honorary Chair of the Board of the Foundation to Wolfgang Schürer

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

Remarks

Wolfgang Schürer, former Chairman of the Board of Directors (2000-15), Foundation Lindau Nobel Laureate Meetings

Performance

Brian Malow, "Earth's Premier Science Comedian", USA

Instrumental Accompaniment

Ensemble of the Vienna Philharmonic Orchestra

Master of Ceremony

Adam Smith, Chief Scientific Officer, Nobel Media AB, Sweden

» The full text of the farewell remarks by Wolfgang Schürer, former Chairman of the Board of Directors, can be found at p. 104 in this annual report.

The Nobel Laureates greet the audience



Awarding of the Lennart-Bernadotte-Medal in Gold to Wolfgang Schürer



Nobel Laureate Martin Karplus receives a copy of the English edition of Peter Badge's Ingenious Encounters, published in honour of Wolfgang Schürer.



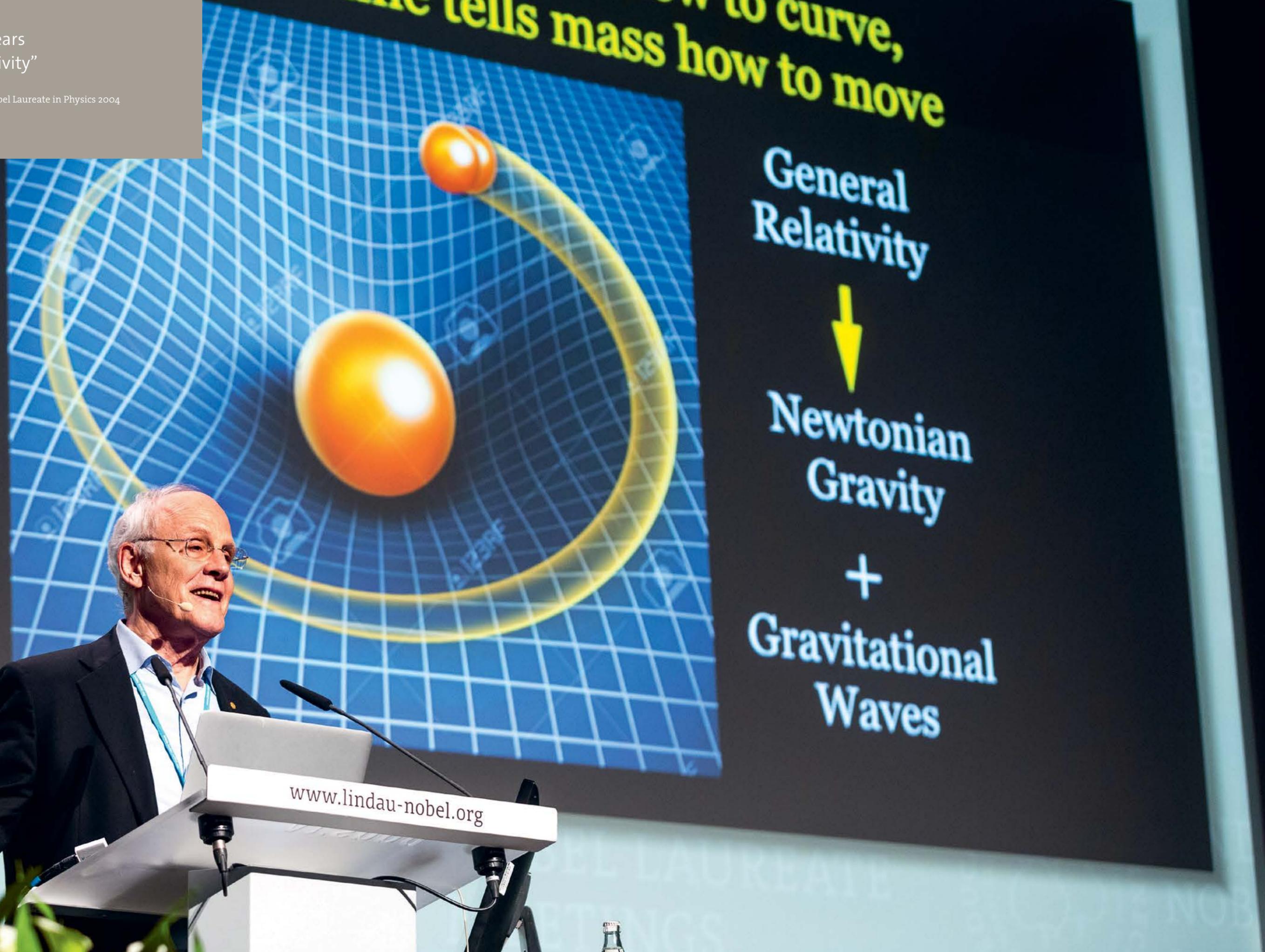
Ensemble of the Vienna Philharmonic Orchestra

Gerhard Ecker, Lord Mayor of Lindau, Margit Fischer, Ulrike Ecker, Heinz Fischer, Countess Bettina Bernadotte, Philipp Haug, Jürgen Kluge



“One Hundred Years
of General Relativity”

Lecture by David J. Gross, Nobel Laureate in Physics 2004



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Einstein tells mass how to curve,
mass tells how to move

General
Relativity

↓

Newtonian
Gravity

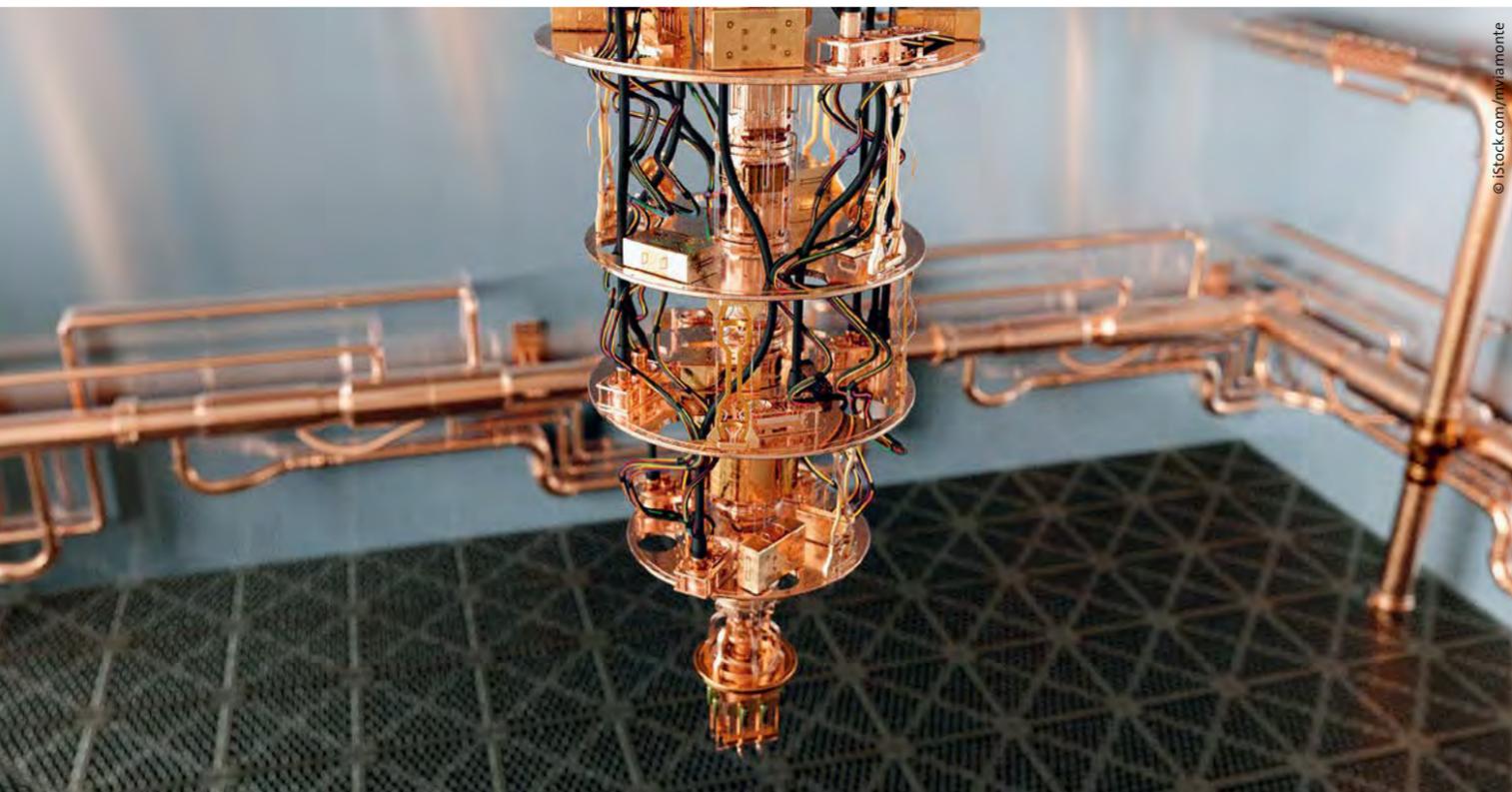
+

Gravitational
Waves

Quantum Technology – A Revolution in the Making

Will the advent of quantum technology redefine our lives in the 21st century? In this interview, Rainer Blatt, internationally renowned quantum physicist and scientific co-chairman of the 66th Lindau Meeting, talks to science writer Angela Grosse about one of the key topics of #LiNo16 and what we can expect from the “second quantum revolution”.

A quantum computer



Blatt has no doubt: quantum technologies are driving forward a technological revolution, the future impact of which is still unclear. Nothing stands in the way of these technologies becoming the engine of innovations in science, economics and society in the 21st century. Early laboratory prototypes have shown just how vast the potential of quantum technologies is. Specific applications are expected in the fields of metrology, computing and simulations. However, substantial funding is required to advance from the developmental stage.

Angela Grosse: Professor Blatt, the first quantum revolution laid the physical foundations for trailblazing developments

such as computer chips, lasers, magnetic resonance imaging and modern communications technology. In the Quantum Manifest published in mid-May, researchers talked about the advent of a second quantum revolution. What exactly does this mean?

Rainer Blatt: This second quantum revolution, as it is sometimes called, takes advantage of the phenomenon of entanglement. It's a natural phenomenon that basic researchers recognised as early as the 1930s. Until now, all these mentioned technologies derive their utility from the wave property upon which quantum physics is based. In the quantum world, its associated phenom-

“As quantum technologies become more widely available, ideas for their use and applications will rapidly follow.”

Rainer Blatt

ena are often discussed in the context of wave-particle duality. Though they are not recognized as such, quantum technologies are therefore already available, and without them, many of our instruments would not be possible. By contrast, the nature of entanglement, which has been known for 85 years, has only been experimentally investigated in the past four decades based on findings by John Bell in the 1960s. Today, entanglement forms the basis for many new potential applications such as quantum communications, quantum metrology and quantum computing. The second quantum revolution is generally understood to be the realisation of these new possibilities.

AG: How long will it take for the second quantum revolution to produce marketable applications and products?

RB: Marketable applications and products are already available in the field of quantum communications, meaning that such devices can already be purchased and commercially used. The use of entanglement for matter – not just for photons – will transform metrology by providing more sensitive and faster-responding sensors. Initially, it will produce small and later large quantum processors for a broad range of applications, for example simulations. Quantum processors will initially be used to solve a few (yet important) special problems, but in the more distant future also for universal calculations. There's actually no discernible obstacle to realising quantum technologies. Increasingly complex systems are being devised. This includes the development and use of new, previously unavailable technologies and methods. As quantum technologies become more widely available, ideas for their use and applications will rapidly follow.

AG: What far-ranging changes to society and economics do you expect from the second quantum revolution?

RB: At first, such technologies will lead to expanded and improved computing applications, which will continuously advance improvements in the sciences. It's difficult to predict how far-reaching the impact on society and economics will

be. Changes brought about by the development of the laser were similarly unpredictable. In the early 1960s, the laser was still seen as a solution to an unknown problem. Today, just over fifty years later, lasers have become an indispensable part of our lives. I expect quantum technologies to develop along similar lines.

AG: Will the second quantum revolution only benefit highly developed countries or regions in the world that invest heavily in cutting-edge research?

RB: Ultimately, everyone will benefit. But like all developments, only those countries and regions will really derive a benefit – including profit in the commercial sense – that play a role in the development and refinement of these technologies early on. We will need cutting-edge research for some decades to come, and this entails a degree of financial, institutional and above all personnel commitment in order to tap the potential of quantum technologies.

» Rainer Blatt is Professor of Experimental Physics at the University of Innsbruck, and Scientific Director of the Institute for Quantum Optics and Quantum Information (IQOQI) of the Austrian Academy of Science. Being a member of the Council for the Lindau Nobel Laureate Meetings, he serves as the scientific co-chairman for physics and thus conceived the scientific programme of the 66th Lindau Meeting together with Lars Bergström.

What a Time to be Alive in Physics!

Interview with Scientific Chairman Lars Bergström

Lars Bergström has served as scientific co-chairmen of the 66th Lindau Nobel Laureate Meeting. The theoretical physicist from the University of Stockholm was interviewed by Tamás Vámi, a Hungarian particle physicist at CERN and one of almost 400 young scientists who participated in #LiNo16.

Tamás Vámi: Lars, you have been one of the two scientific chairmen of this year's Lindau Meeting. What's your take on the scientific programme of #LiNo16?

Lars Bergström: We saw a vibrant programme with many memorable talks. Of course, it was especially gratifying that Takaaki Kajita and Arthur McDonald, the most recent Physics laureates at that time, had been present, and that also many Nobel Laureates in Chemistry have contributed to the programme. Taken as a whole, this year we had excellent overviews of diverse scientific areas from the persons who were instrumental in creating them.

TV: There are many candidates for Dark Matter. Which model is closest to your heart, which is the one that is the most promising in your opinion?

LB: This is a difficult question. Experience tells us that in science it is not always good to "fall in love" with a particular theoretical model. I think the answer is at the moment in the hands of our brilliant experimentalists, and we have to keep an open mind and see what they find. Weakly interacting massive particles (WIMPs) and axions belong to the most studied dark matter candidates, but nature could be more subtle.

TV: Dark Energy is one of the biggest mysteries of our days. There are many theories about it, but what are the experimental methods of studying it?

LB: The thing that distinguishes dark energy from dark matter is that dark matter is gravitationally attractive, whereas dark energy on the contrary is repulsive. This means that the expansion of the universe, which would slow down if there was only matter present, will instead accelerate. This accelerated expansion can be seen on very large length scales as it e.g. makes distant supernovas dimmer than they would otherwise appear. It seems, however, to be very difficult to see effects of dark energy locally, such as in the solar system.

TV: 2016 has certainly been a very exciting year for science: The LIGO experiment announced the detection of gravitational waves. How do you think this announcement could affect your field? (e.g. gravitational waves – dark energy connection?)

LB: I do not think it will affect the modeling of dark energy. However, a new subfield of astroparticle physics and cosmology will likely be created: gravitational astronomy. Here, one would study some of the most extreme events happening inside and outside our galaxy, like the merger of neutron stars or of black holes. This is an uncharted area where many surprises may be hiding.

TV: Are there any possible breakthroughs in science that you wish to live to see? What is it and why do you think it is important?

LB: Having worked for three decades with the dark matter problem, the identification of the particle constituting dark matter would be highest on my wish list. Then there are many areas of quantum physics, like quantum communication or quantum computing, where breakthroughs may happen that could even change our everyday lives. But of course many discoveries and inventions have been total surprises, and maybe that is how progress will be made. The young scientists attending the 66th Lindau Nobel Laureate Meeting live at a time when they can make use of past achievements to make such breakthroughs – if they just remember to be bold and creative, like the Nobel Laureates were that they got in touch with here in Lindau!

TV: How do you see the role of the individual vs. collaborations in science?

LB: Collaborations are of course made up of individuals, and in physics we often need very large collaborations to make progress, e.g. in particle physics or cosmology. Fortunately, for the Nobel Prizes in Physics, it has so far been possible to identify at most three persons that were crucial for the awarded discovery or invention, and hopefully that will be possible, although perhaps more difficult, in the future.

"The dialogue between Nobel Laureates and young scientists in Lindau alone can serve the collective good of humanity."

Lars Bergström

The scientific chairmen of the 66th Lindau Meeting, Lars Bergström (left) and Rainer Blatt together with Countess Bettina Bernadotte



» Lars Bergström is Professor of Theoretical Physics at Stockholm University, Deputy Member of the Board of Directors of the Nobel Foundation, and served for 12 years as Secretary of the Nobel Committee for Physics at the Royal Swedish Academy. Being a member of the Council for the Lindau Nobel Laureate Meetings, he serves as the scientific co-chairman for physics and thus conceived the scientific programme of the 66th Lindau Meeting together with Rainer Blatt.



Tamás Vámi

Gravitational Waves – a Whole new Window on the Universe!

George Smoot shared the 2006 Nobel Prize in Physics for the discovery of small temperature variations in the cosmic microwave background radiation, providing support for the big bang theory. Smoot spoke to Richard Hodson from Nature at #LiNo16 about this year's big cosmological discovery.

Nature: Is the fanfare around the detection of gravitational waves justified?

George Smoot: It is a really big discovery — not just because LIGO (Laser Interferometer Gravitational-Wave Observatory) detected gravitational waves and proved Einstein's 100-year-old theory right, but because it opens up a whole new window on the Universe. The first event was a pair of 30-solar-mass black holes circling each other and merging. That's an amazing thing to find in itself. The stellar theorists will tell you that even when 100-solar-mass stars go supernova, they don't leave behind black holes that big. The black hole would be more like 5 or 10 solar masses, not 30. So, immediately, there's a question of where these big black holes came from; we may have to correct our stellar theory.

N: How long have people been trying to detect gravitational waves?

GS: We've been looking for a long time. Rainer Weiss at the Massachusetts Institute of Technology (MIT) in Cambridge — one of the co-founders of LIGO along with Ron Drever and Kip Thorne at the California Institute of Technology in Pasadena — devised the interferometric gravitational-wave detector in 1972. I've known Weiss for a long time — I met him while I was a graduate student at MIT. He doesn't have a lot of patience, and 40 years is a long time to wait for an experiment to pay off. I know those guys have had a lot of fun over the past few months, but it wasn't so much fun to be working on gravitational waves before that!

N: LIGO detected the first wave while it was being calibrated, four days before it was due to start taking data. What does that swift result tell us?

GS: It tells us that binary black holes are abundant. We had little idea of how many black holes there are. We thought there would probably be more binary neutron stars, which are what LIGO was designed to spot. But in the first four months

of running the system we've seen two confirmed black hole mergers and possibly another event. That's at the very top of the range of what we expected to see. The LIGO team has already started to work out the population of black holes, and in the next couple of years the sensitivity of the two LIGO interferometers should improve and they will start seeing a lot more. If it's around one a month at the moment, we should be getting ten a month down the line. Improved sensitivity will give us an even better idea of how many there are.

N: What other experiments can we expect to see in the coming years?

GS: There are other laser interferometers coming online. Advanced Virgo, in Italy, is due to switch on at the end of 2016; there's KAGRA in Japan and LIGO-India is planned for the next two or three years. This is what we need: the more detectors you have, the more precisely you can tell the direction the wave is coming from. I've been pushing for a space-based interferometer as well, like the proposed European Space Agency eLISA mission. These would allow astrophysicists to see lower frequency gravitational waves from larger objects, such as from the merger of two supermassive black holes. There would be thousands to millions of big signals — if we can get an interferometer up there, we'd definitely be in business.

N: How big an impact do you think gravitational waves are going to have on astronomy?

GS: It's led to a new branch of astronomy, and we're going to be seeing things we've never seen before. Do I expect it to be as revolutionary as astronomy based on the electromagnetic spectrum? No, 99% of what we know about the Universe has come from photons. But there are phenomena, such as black holes, which we wouldn't expect to be associated with electromagnetic radiation, and the way we're going to detect them is through gravitational waves. It's a very exciting time. Over the next 20 years, people will be building more gravitational-wave detectors and developing new ways of observing the Universe. I think the

“I'm extremely excited about the detection of gravitational waves; it's like gaining a new sense.”

Lena Funcke, participant in the 66th Lindau Meeting, Max Planck Institute for Physics and University of Munich, Germany

20 years after that will be the heyday of astronomy. For young scientists getting started now, there's a great career path ahead if you like maths. It's a field in ascendancy. And experiments such as LIGO meet one of the criteria I have for awarding a Nobel Prize: it led not only to a great discovery, but also to a whole new area of enquiry.

Nature, Vol. 537, S200 (29 September 2016)



» Since 2010, the Lindau Nobel Laureate Meetings have each been featured in Nature Outlook, a supplement to the scientific journal. With their content mix of full-length features, articles and interviews, these publications serve as high-quality, enduring records of the vivid exchange among laureates and young scientists. The supplements could be produced thanks to the support of Mars, Incorporated.



Participants

» Nobel Laureates

For many Nobel Laureates, the Lindau Meetings have become an integral part of their yearly schedule. By accepting the invitation, they commit themselves each year since 1951 to foster the exchange among scientists. To this day, about 430 recipients of the Nobel Prize have made their way to Lindau to meet the next generation of leading scientists.

At the Lindau Nobel Laureate Meetings, the laureates shape the scientific programme with their topical preferences. As a result, the meetings provide the unique opportunity to experience both the professional and the personal side of Nobel Laureates.

The scientific focus of the Lindau Meetings alternates each year. In 2016, 29 Nobel Laureates and the ACM A.M. Turing Award Winner Vinton G. Cerf have followed the invitation for the 66th Lindau Nobel Laureate Meeting dedicated to physics.

» Young Scientists

Outstanding young scientists up to 35 years of age have the opportunity to take part in the Lindau Meetings. Among them: undergraduates, PhD students as well as post-doc researchers. In order to participate in a meeting, they have to pass a multi-step application and selection process.

For this emerging generation of leading researchers, it is a valuable opportunity to meet their real life science heroes, to seek their advice on special technical issues or in personal matters, to exchange thoughts and views, and to discuss current developments in science and beyond.

In total, 387 young scientists from 76 countries participated in the 66th Lindau Meeting. This reduced number of participants was due to the temporary relocation of the meeting to Lindau's city theatre. From particle physicists to cosmologists, from quantum- to biophysicists – the wide and fascinating field of physics was represented in its full diversity at #LiNo16.

Young scientist Zara Bagdasarian and Nobel Laureate Takaaki Kajita



Young Scientists at #LiNo16



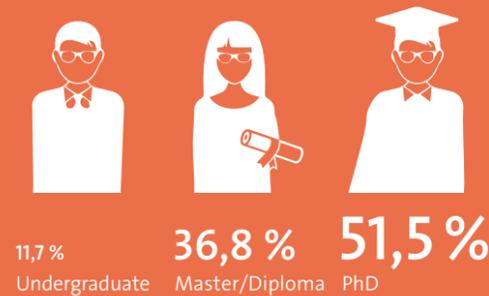
GENDER BALANCE



AGE

Oldest 35 years Youngest 18 years Average 28,5 years

ACADEMIC DEGREE





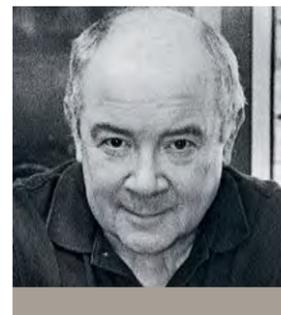
Hiroshi Amano
Nationality: Japan
Nobel Prize: Physics
Year: 2014
Prize Motivation: “for the invention of efficient blue light-emitting diodes which has enabled bright and energy-saving white light sources”



Steven Chu
Nationality: United States
Nobel Prize: Physics
Year: 2007
Prize Motivation: “for development of methods to cool and trap atoms with laser light”



Aaron Ciechanover
Nationality: Israel
Nobel Prize: Chemistry
Year: 2004
Prize Motivation: “for the discovery of ubiquitin-mediated protein degradation”



Johann Deisenhofer
Nationality: Germany
Nobel Prize: Chemistry
Year: 1988
Prize Motivation: “for the determination of the three-dimensional structure of a photosynthetic reaction centre”



Takaaki Kajita
Nationality: Japan
Nobel Prize: Physics
Year: 2015
Prize Motivation: “for the discovery of neutrino oscillations, which shows that neutrinos have mass”



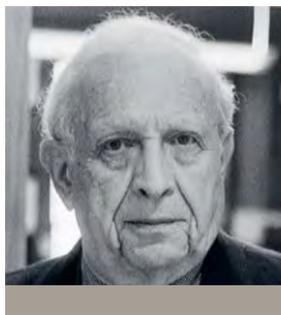
Martin Karplus
Nationality: United States
Nobel Prize: Chemistry
Year: 2013
Prize Motivation: “for the development of multiscale models for complex chemical systems”



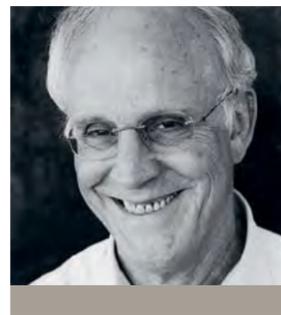
Klaus von Klitzing
Nationality: Germany
Nobel Prize: Physics
Year: 1985
Prize Motivation: “for the discovery of the quantised Hall effect”



Arthur B. McDonald
Nationality: Canada
Nobel Prize: Physics
Year: 2015
Prize Motivation: “for the discovery of neutrino oscillations, which shows that neutrinos have mass”



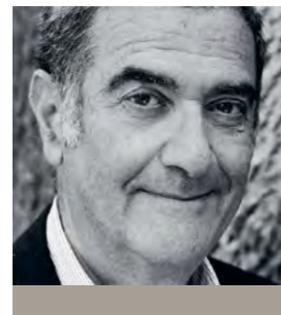
Roy J. Glauber
Nationality: United States
Nobel Prize: Physics
Year: 2005
Prize Motivation: “for his contribution to the quantum theory of optical coherence”



David J. Gross
Nationality: United States
Nobel Prize: Physics
Year: 2004
Prize Motivation: “for the discovery of asymptotic freedom in the theory of the strong interaction”



Theodor W. Hänsch
Nationality: Germany
Nobel Prize: Physics
Year: 2005
Prize Motivation: “for the contributions to the development of laser-based precision spectroscopy, including the optical frequency comb technique”



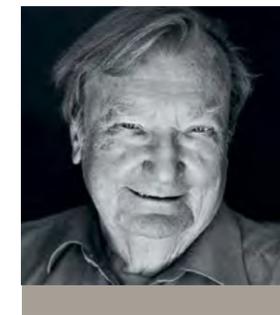
Serge Haroche
Nationality: France
Nobel Prize: Physics
Year: 2012
Prize Motivation: “for groundbreaking experimental methods that enable measuring and manipulation of individual quantum systems”



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



William D. Phillips
Nationality: United States
Nobel Prize: Physics
Year: 1997
Prize Motivation: “for development of methods to cool and trap atoms with laser light”



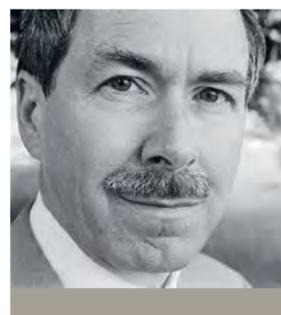
Carlo Rubbia
Nationality: Italy
Nobel Prize: Physics
Year: 1984
Prize Motivation: “for decisive contributions to the large project, which led to the discovery of the field particles W and Z, communicators of weak interaction”



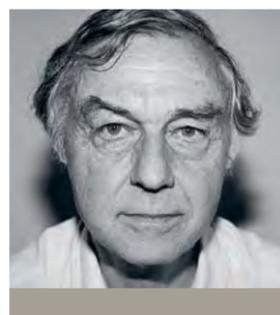
Bert Sakmann
Nationality: Germany
Nobel Prize: Physiology or Medicine
Year: 1991
Prize Motivation: “for discoveries concerning the function of single ion channels in cells”



Stefan Hell
Nationality: Germany
Nobel Prize: Chemistry
Year: 2014
Prize Motivation: “for the development of super-resolved fluorescence microscopy”



Gerardus 't Hooft
Nationality: Netherlands
Nobel Prize: Physics
Year: 1999
Prize Motivation: “for elucidating the quantum structure of electroweak interactions in physics”



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



Brian D. Josephson
Nationality: United Kingdom
Nobel Prize: Physics
Year: 1973
Prize Motivation: “for theoretical predictions of the properties of a supercurrent through a tunnel barrier, in particular those phenomena which are generally known as the Josephson effects”



Brian P. Schmidt
Nationality: Australia/United States
Nobel Prize: Physics
Year: 2011
Prize Motivation: “for the discovery of the accelerating expansion of the Universe through observations of distant supernovae”



Dan Shechtman
Nationality: Israel
Nobel Prize: Chemistry
Year: 2011
Prize Motivation: “for the discovery of quasicrystals”



George F. Smoot
Nationality: United States
Nobel Prize: Physics
Year: 2006
Prize Motivation: “for the discovery of the blackbody form and anisotropy of the cosmic microwave background radiation”



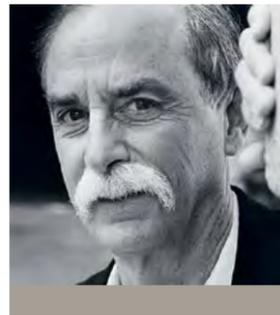
Samuel Ting
Nationality: United States
Nobel Prize: Physics
Year: 1976
Prize Motivation: “for pioneering work in the discovery of a heavy elementary particle of a new kind”



Martinus J.G. Veltman
Nationality: Netherlands
Nobel Prize: Physics
Year: 1999
Prize Motivation: "for elucidating the quantum structure of electroweak interactions in physics"



Carl E. Wieman
Nationality: United States
Nobel Prize: Physics
Year: 2001
Prize Motivation: "for the achievement of Bose-Einstein condensation in dilute gases of alkali atoms, and for early fundamental studies of the properties of the condensates"



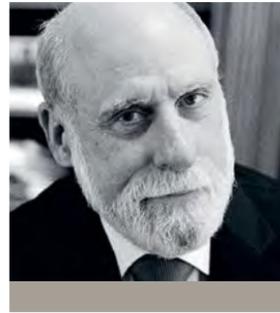
David J. Wineland
Nationality: United States
Nobel Prize: Physics
Year: 2001
Prize Motivation: "for groundbreaking experimental methods that enable measuring and manipulation of individual quantum systems"



Kurt Wüthrich
Nationality: Switzerland
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 Yonath
Nationality: Israel
Nobel Prize: Chemistry
Year: 2009
Prize Motivation: "for studies of the structure and function of the ribosome"



Vinton G. Cerf
Nationality: United States
Award: ACM A.M. Turing Award
Year: 2004
Prize Motivation: "for pioneering work on internetworking, including the design and implementation of the Internet's basic communications protocols, TCP/IP, and for inspired leadership in networking"

Nobel Laureates at #LiNo16

29 NOBEL LAUREATES



19
Physics



9
Chemistry



1
Physiology/
Medicine

+



1
ACM A.M.
Turing Award

NATIONALITIES

10

countries



11



7



3



2



2



1



1



1



1



1



RECORDS

Most Participations

1. Robert Huber 19
2. Hartmut Michel 18
3. Brian Josephson 17
Klaus von Klitzing 17

Longest Streak

Robert Huber –
14 consecutive Lindau
Meetings from 1998 to 2011

First Participations

Hiroshi Amano
Takaaki Kajita
Martin Karplus
Arthur McDonald
Carl Wieman
Vinton Cerf

Longest Gap

Samuel Ting – 16 years
(last attendance in 2000)

Youngest

Brian Schmidt 49

Oldest

Roy Glauber 91

BIRTHDAYS DURING #LINO16



Klaus von Klitzing (73)
Martinus Veltman (85)

» All portraits taken from the photo series "Nobel Laureates photographed by Peter Badge". For more information see p. 82.



The mediatheque contains profiles of more than 400 Nobel Laureates.



“Here at Lindau, I get insights into the work of the most important laboratories around the world. What could be better than that?”

William D. Phillips, Nobel Laureate in Physics 1997

Academic Partners

To ensure the scientific excellence of their participants, the Lindau Nobel Laureate Meetings maintain a strong global network of more than 200 academic partner institutions. World-renowned entities in science and research both from the public and private sectors are entitled to nominate young scientists for participation in the Lindau Meetings.

Among them: Academies of sciences, leading universities, research institutions, foundations, and innovative enterprises throughout the world. 136 of these academic partners were involved in the application process of the 66th Lindau Nobel Laureate Meeting.

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 Application, 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 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 to which the Lindau Meetings function as a hub. They are trustees of a constant pursuit of excellence and enablers of intergenerational and intercultural dialogue.

NEW PARTNERSHIPS 2016

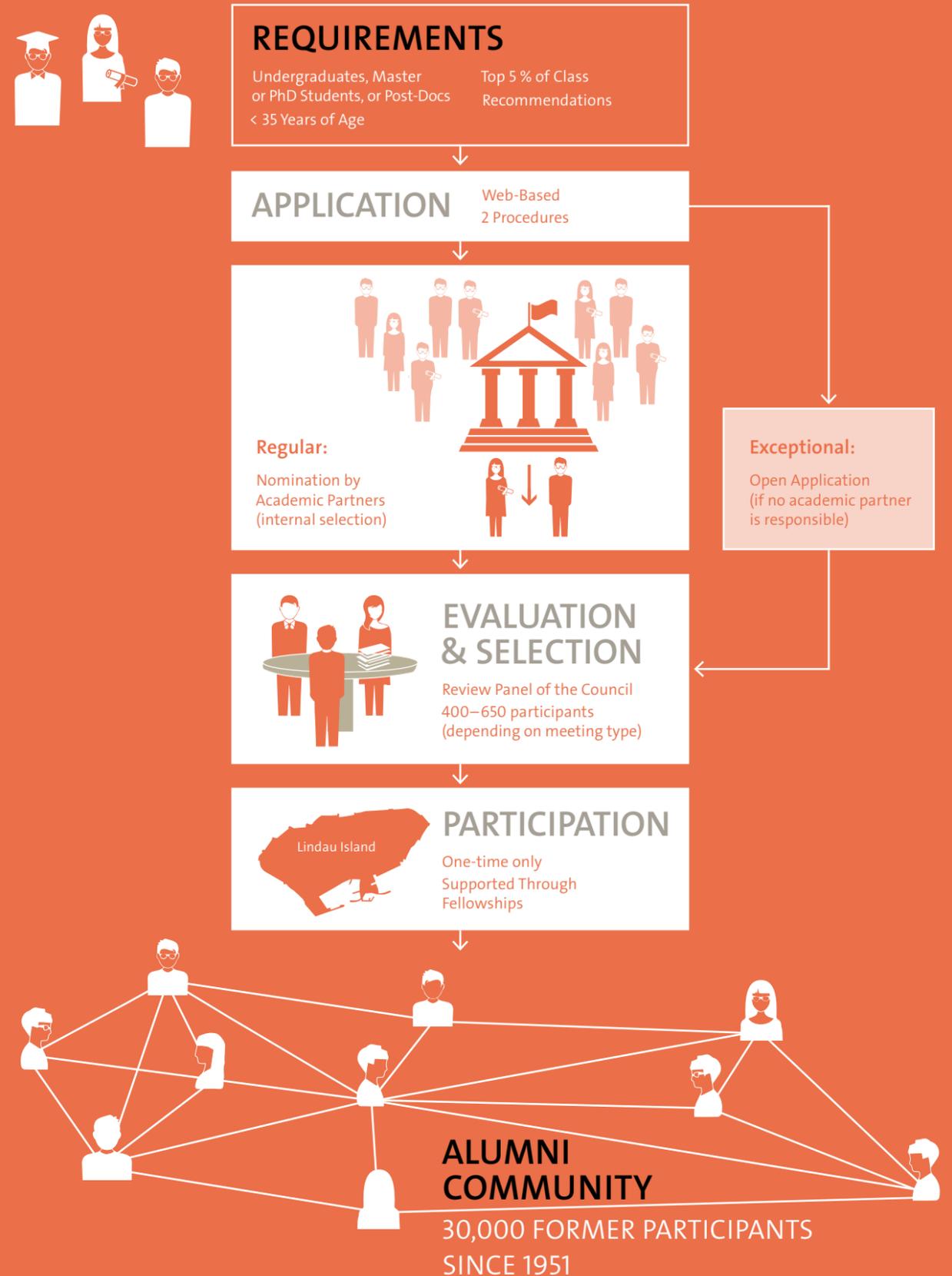
In 2016, official partnerships with the following international institutions have been established or renewed:

- Academia Nacional de Ciencias del Uruguay
- Académie Nationale des Sciences et Techniques du Sénégal
- Alexander S. Onassis Public Benefit Foundation, Greece
- American University of Beirut, Lebanon
- Australian Academy of Science
- Austrian Federal Ministry of Science, Research and Economy
- Centre National de la Recherche Scientifique, France
- Estonian Academy of Sciences
- Nobel Laureate José Ramos Horta, Timor-Leste
- Lithuanian Academy of Sciences
- Ministry of Education and Human Resources, Tertiary Education and Scientific Research of the Republic of Mauritius
- Pakistan Institute of Engineering and Applied Sciences
- Sino-German Center for Research Promotion, China
- Slovenian Academy of Sciences and Arts
- Social Sciences and Humanities Research Council of Canada
- Weizmann Institute of Science, Israel



Renewal of the memorandum of understanding:
 (front row) Harald Mahrer, State Secretary, Austrian Federal Ministry of Science, Research and Economy, Countess Bettina Bernadotte, Jürgen Kluge,
 (back row) Heinz Fischer, Federal President of Austria, Cornelia Quennet-Thielen, State Secretary, German Federal Ministry of Education and Research

Application Process



» Nominating Institutions 2016 with accepted candidates

Academia Nacional de Ciencias del Uruguay (ANCIU)
 Academy of Science of South Africa (ASSAf)
 Academy of Sciences Malaysia
 acatech – National Academy of Science and Engineering, Germany
 African Union Commission
 Albert-Ludwigs-Universität Freiburg
 Alexander S. Onassis Public Benefit Foundation, Greece
 Alexander von Humboldt-Stiftung
 Bangladesh Academy of Sciences
 Bulgarian Academy of Sciences
 Canadian Institutes of Health Research (CIHR)/Instituts de recherche en santé du Canada (IRSC)
 Centre for the AIDS Programme of Research in South Africa (CAPRISA)
 Centre National de la Recherche Scientifique (CNRS), France
 CERN European Organization for Nuclear Research
 Chilean Academy of Sciences
 Christian-Albrechts-University Kiel
 Croucher Foundation, Hong Kong

Danish Council for Independent Research
 Department of Science & Technology (Government of India)
 Deutsche Telekom Stiftung
 Elite Network of Bavaria
 EMBO European Molecular Biology Organization
 Ernst-Moritz-Armdt-Universität Greifswald
 Estonian Academy of Sciences
 European Commission
 Ferdinand-Braun-Institut
 Fonds Wetenschappelijk Onderzoek – Vlaanderen (FWO), Belgium
 Foundation for Polish Science
 Fraunhofer-Gesellschaft
 Friedrich Schiller University Jena
 Georg-August-Universität Göttingen
 German Academic Exchange Service (DAAD)
 German National Academy of Sciences Leopoldina
 Global Young Academy (GYA)
 Goethe University Frankfurt

Heidelberg University
 Helmholtz Association of German Research Centres
 Human Frontier Science Program
 Hungarian Academy of Sciences
 ICREA (Catalan Institution for Research and Advanced Studies), Spain
 Internationale Bodensee-Hochschule
 Irish Research Council
 Japan Society for Promotion of Science (JSPS)
 Jean Félicien Gacha Foundation
 Julius-Maximilians-Universität Würzburg
 King Abdullah University of Science and Technology, Saudi Arabia
 Körber Foundation
 Leibniz Association
 Leipzig University
 Lomonosov Moscow State University, Russia
 Ludwig-Maximilians-University
 Luxembourg National Research Fund (FNR)

Mars, Incorporated
 Max Planck Institute for Biophysical Chemistry
 Max-Planck-Gesellschaft
 McKinsey & Company, Inc.
 Mexican Academy of Sciences
 Ministry of Education and Human Resources, Tertiary Education and Scientific Research of the Republic of Mauritius
 Mongolian Academy of Sciences
 Myanmar Book Centre Co., Ltd.
 National Academy of Sciences of the Republic of Armenia (NAS RA)
 National Fund for Scientific Research, Belgium
 National Research Foundation Singapore
 National Science and Technology Development Agency, Thailand
 OIC Standing Committee on Scientific and Technological Cooperation (COMSTECH), Pakistan
 ORAU (Oak Ridge Associated Universities), USA
 Österreichische Akademie der Wissenschaften
 Pakistan Institute of Engineering and Applied Sciences
 Philipps-Universität Marburg

Academic Partner representatives from South Africa, Pakistan and Lebanon



Lesheng Chen, Miaogen Zhao, Vice-Directors of the Sino-German Center for Research Promotion, Countess Bettina Bernadotte and Nikolaus Turner (from right)



Fadlo Khuri, President of the American University of Beirut, Countess Bettina Bernadotte, Jürgen Kluge (from right)



MoU with Timor-Leste: Brian Schmidt, Nikolaus Turner, António da Conceição, Minister of Education of Timor-Leste, Dulce Jesus Soares, Vice Minister of Education, José Ramos-Horta, Nobel Peace Laureate and former President of Timor-Leste, and Martin Hellman, Turing-Award Winner (from left)



» Nominating Institutions 2016 with accepted candidates

Robert Bosch Stiftung
 Royal Netherlands Academy of Arts and Sciences
 Saint-Petersburg State University, Russia
 Sharif University of Technology, Iran
 Sino-German Center for Research Promotion, China
 Slovenian Academy of Sciences and Arts
 Spanish National Research Council (CSIC)
 Studienstiftung des deutschen Volkes
 Swiss Re Ltd.
 Technical University Darmstadt
 Technische Universität Berlin
 Technische Universität Braunschweig
 Technische Universität Chemnitz
 Technische Universität München
 The Czech Academy of Sciences (CAS)
 The Korean Academy of Science and Technology (KAST)
 The Nobel Foundation
 The Norwegian Academy of Science and Letters
 The Research Council, Oman
 The Royal Society, United Kingdom
 TU Bergakademie Freiberg
 TÜBİTAK – The Scientific and Technological Research Council of Turkey
 TWAS – The World Academy of Sciences

Universidad de los Andes, Colombia
 Universität des Saarlandes
 Universität Osnabrück
 Universität Siegen
 University of Bonn
 University of Cologne
 University of Duisburg-Essen
 University of Hamburg
 University of Kassel
 University of Konstanz
 University of Liechtenstein
 University of Malta
 University of Paderborn
 University of Rostock
 Verein Deutscher Ingenieure e.V. (VDI)
 VolkswagenStiftung
 Weizmann Institute of Science, Israel
 Westfälische Wilhelms-Universität Münster

» The nomination process in Germany was conducted in cooperation with the Konferenz der Fachbereiche Physik (KFP), serving as the national academic partner in physics.

The Mexican delegation with Nobel Laureates Martin Karplus and William Phillips



Chadaram Sivaji, Department of Science & Technology, Government of India



Hans-Albert Bachor, Australian Academy of Science, and Countess Bettina Bernadotte

Wolfgang Lubitz, Vice-President of the Council, addressing Academic Partner representatives

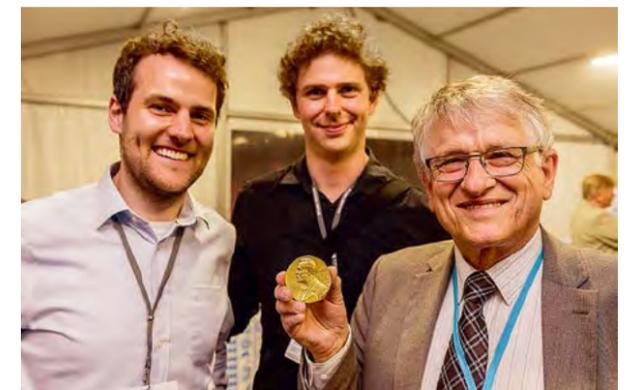


Impressions

Rainer Blatt, Scientific Co-Chairman of #LiNo16



Klaus von Klitzing and young scientists



Stefan Hell and participants of #LiNo16

Brian Schmidt in discussion with young scientists

The Future of Education in Sciences

How to generate more interest in studying science, how to teach science more effectively, and how to increase the number of female researchers? These questions were raised at the final panel discussion of #LiNo16 with Nobel Laureates Brian Schmidt, Dan Shechtman, Carl Wieman and young scientist Tamás Vámi.

The panellists from left to right: Tamás Vámi, Brian Schmidt, Dan Shechtman, Carl Wieman and moderator Karan Khemka



In a knowledge society, education is of pivotal importance, especially science education: that is how the moderator of the panel discussion, Karan Khemka, outlined the topic of the day. But there is much more to education besides stuffing one's head with facts, so improving education is not simply about better memorising strategies – it's about teaching how to “think like a scientist”: Nobel Laureate Carl Wieman is passionate about improving science teaching. He's been testing different teaching methods for many years – but only after his Nobel Prize in Physics in 2001, people really started to listen.

Wieman's key point is “active learning”: students learn best by solving scientific problems in groups, where they can discuss the task at hand and make their own decisions. In a setup like this, they can learn scientific reasoning from scratch. Learning on their own with good material also beats listening to lectures anytime, as Wieman explained in his #LiNo16 presentation. But learning in a group with an instructor is even better, because the more active the brain has to be in the learning process, the more synapses are being built – that is

pretty much “like training a muscle”. In contrast, listening to lectures is simply too passive. “We need a more scientifically literate populace,” Wieman wrote in a 2007 article, “to address the global challenges that humanity now faces and that only science can explain and possibly mitigate, such as global warming, as well as to make wise decisions, informed by scientific understanding, about issues such as genetic modification.” So teaching better science to a broader, more diverse population is also an inherently democratic approach to promote informed decision making, in contrast to political decision making that is mostly based on traditions or emotions.

Increasingly, universities adopt this approach, like Harvard's Active Learning Labs. Again, it is about providing better education, but novel approaches also attract more students and hopefully provide “better graduates”. Yet there is another dimension: Universities are being challenged from various sides, with free online courses like MOOCs providing higher education as well, and not only universities offer MOOCs (Massive Open Online Courses), but also private providers. Industry in turn relies

“Teachers are the most important people in the world, in every country, because they hold the future of countries in their hands.”

Dan Shechtman

increasingly on private providers of vocational training, as Nobel Laureate Brian Schmidt pointed out: he is vice-chancellor of the Australian National University since 2016.

Schmidt continued that the universities could be challenged in the future: “We as universities have a monopoly on credentialing, on providing degrees. That is going to be under threat, and that will bring a lot of non-university providers into the market.” Schmidt is actively creating and promoting MOOCs. He told the audience that when he discussed this novel tool with his predecessor, this man called it a “disruptive technology” that he didn't want to invest in because it posed a threat to classic university education. Schmidt countered: “That's exactly why you want to invest in it, because it's going to eat our lunch!”

If you want to create a good MOOC it is a lot of work, said Schmidt. “They're a lot harder to do than you might think. They take about sixty hours per hour of MOOC if you're going to do them well. You need to design lots of interactive bits. You realise very soon that the average attention span of a person is universally six minutes, so you design everything around these six minutes.” But after this effort, the professors get massive feedback from the users, which they in turn can utilise to improve the MOOC – and their teaching in general. “The process of this has taught us a lot: This is the basis for how we changed our entire physics curriculum!” Now the undergraduate physics curriculum at ANU is based on MOOC-experiences and feedback: a good example how active learning (on all sides) can become part of university teaching.

Nobel Laureate Dan Shechtman, who has been active in teaching science to all age groups for decades, argued that the main problem with MOOCs is that the majority of participants don't finish their courses: “So learning individually on your own from the internet doesn't continue as it should. But if you form a group, create a little class, then you can explain to each other, and then it works very very well.” With this statement, the discussion comes full circle to Wieman's favoured teaching method. When Shechtman talks about education, he thinks about

a person's entire education period, from kindergarten to postgraduate studies. For instance, Shechtman has created Science Kindergartens in Israel, and he has his own TV show explaining science to young children: ‘Being a Scientist with Professor Dan’, in Hebrew this rhymes. In his closing statement at the panel discussion, Shechtman repeated his firm view that “teachers are the most important people in the world, in every country, because they hold the future of countries in their hands.”

Dan Shechtman has also been teaching Technological Entrepreneurship at the Technion in Haifa for nearly thirty years: more than 10,000 science students have completed this course, and Shechtman is justly called one of the fathers of the ‘Start-up Nation’ Israel. As Karan Khemka said in his introduction: “The future is all about innovation, and innovation will come from the sciences.”

 A video of the panel discussion “The Future of Education in Sciences” is available in the mediatheque.

Poster Session

For the first time in the history of the Lindau Meetings, a poster session took place at #LiNo16. In addition to the other programme sessions, the two scientific chairmen of this year's meeting, Lars Bergström and Rainer Blatt, wanted to give young scientists the opportunity to present their own research in front of Nobel Laureates and the other meeting participants.

Approximately eighty people applied to present their posters, thirty of them made it to the final selection. The winners were then determined by a public vote among the participating Nobel Laureates and young scientists.

The 30 selected posters had been arranged in six different groups covering a broad range of topics within physics:

- “Atomic, Molecular, Optical and Fundamental Measurements”
- “Quantum Optics, Quantum Information and Photonics”
- “Astronomy, Astrophysics and Cosmology”
- “Bio-Physics”
- “Solid-State, Materials Science and Condensed Matter Physics”
- “High Energy Physics”

The Winners

1st Place

Matjaz Humar
Wellman Center for Photomedicine, Harvard Medical School, Massachusetts General Hospital, USA
for his poster
“Lasers inside live cells”

2nd Place

Joseph Callingham
University of Sydney, CSIRO Astronomy and Space Science & CAASTRO, Australia
for his poster
“Dying young and frustrated: Understanding the evolution of young radio galaxies”

3rd Place

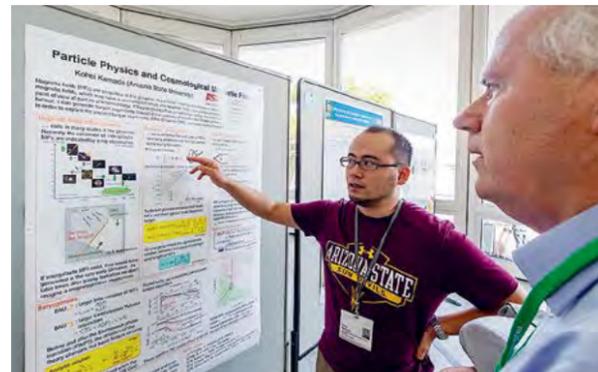
Sven C. Sidenstein
Max Planck Institute for Biophysical Chemistry, Department of Nanobiophotonics, Göttingen, Germany
for his poster
“Coordinate-targeted fluorescence nanoscopy with multiple off-states”



Countess Bettina Bernadotte congratulates the winners



A programme booklet with abstracts of all 30 posters presented is available for download in the mediatheque.



Kohei Kamada from Arizona State University presenting his poster to Lars Bergström, scientific co-chairman of the 66th Lindau Meeting

Nobel Laureate Arthur McDonald



Matjaz Humar, Joseph Callingham and Sven C. Sidenstein with their winner's certificates

Recollections of the Manhattan Project

At the age of eighteen, later Nobel Laureate in physics Roy Glauber was recruited to work at Los Alamos, birthplace of the atomic bomb during the Manhattan Project. At the 66th Lindau Nobel Laureate Meeting, Glauber shared unique memories of these historic events.

How did it come about that an 18-year-old was targeted by the project's recruiters? Glauber reports that, during wartime, there was a general attempt to reduce the time spent in education and training. By the time he was "lured" away from Harvard, he had attended more or less all of the courses necessary to obtain a doctorate. He was asked to complete a questionnaire at the time and, based on this, was then visited by an "unknown man in a black suit": the idea was to find suitable jobs for well-educated young men.

In Roy Glauber's case, the outcome was a train ticket to Chicago and a post office address for his personal possessions. Glauber did not know exactly where he was going and what he would have to do. Even today, it is obvious from his description of the train journey and his arrival at the second destination – Lamy, New Mexico – what an adventure this was for him. Fascinated by the countryside and indigenous people he observed at the train station, he arrived at his destination. He completed the last leg of the journey by car in the company of two men, one of whom looked like a cowboy to Glauber. They were engaged in a coded discussion about a scientific problem. For Glauber as a young man it was a truly bizarre experience to hear mysterious men discuss remarkable things in this new environment, which he describes as "godforsaken country". Later, it came to light that one of them was the renowned mathematician John von Neumann.

On his first day in Los Alamos, Glauber was given a list of persons who he was instructed to seek out. He spoke to Robert Bacher, the Director of the Department of Experimental Physics, among others. Bacher asked him what work he thought was being carried out there. Because Glauber knew that work was being done on the chain reaction for nuclear fission, and the topic had then disappeared from all of the newspapers, he expressed his suspicion that secret research was being carried out on this topic. He was informed that this had been successfully achieved one-and-a-half years earlier in Chicago and that they were now working there on the chain reaction for the construction of a bomb. Glauber was upset at the time, and it occurred

to him that this was no gift to humanity. He describes this moment similarly in his autobiographical notes on the occasion of the awarding of the Nobel Prize. The scientific challenges helped him to overcome this initial shock. However, something that everyone working on the project was thinking weighed much more heavily on his mind: The fact that the Germans had the same knowledge and were possibly also working on the bomb. According to Glauber, nobody was motivated by the conflict with Japan in supporting this project.

Over the next two years, Glauber was involved in the detailed calculation of critical mass, and according to him he wrote three detailed secret essays on this topic but he was not authorised to be in the vicinity during the big test ignition of the bomb – after all, he was just a theorist – but a small group of people, including him, managed to get to Sandia Peak near Albuquerque. They only knew that the test would happen during the night but had no contact or possibility of finding out anything else about it. According to Glauber, at some point the others gave up hope that they would see anything. But he was a bit more stubborn and stayed awake until 5:30 a.m. Then, it was "as if the sun rose in the south". This so-called Trinity Test was carried out in July 1945; the two atomic bombs were dropped on Japan in August. For the majority of the scientists and their families it simply meant an end to years of secrecy and the transition back to a civilian life "outside". As Glauber writes in his biographical notes, they did not celebrate the bomb, but rather the end of the war.

Looking back, did Glauber regret being part of the Manhattan Project? He says that what he regretted most was the fact that they did not finish faster and that there were repeated delays. Otherwise they could have had an influence on the situation in Europe. In his opinion, the decision about the bombs would have been different if they had been ready earlier.

He believes that complete disarmament will not be possible, as the question always remains as to who has the last atomic weapon in their possession. However, if it could be achieved, "it would have my vote".

"Late in 1943, my undergraduate education was interrupted by my transfer to an unstated and distant location. It proved to be an improvised but huge laboratory."

Roy Glauber



A video of Roy Glauber's lecture at #LiNo16 in full length is available in the mediatheque.

Women in Science

» TV Talk

The topics of creating equal opportunities for female scientists and inspiring more young girls to start careers in the STEM fields have been important parts of the Lindau Meetings' "Mission Education" for years. ARD-alpha, Germany's national public educational TV station and one of the Lindau Meetings' premier media partners, dedicated this year's TV talk from Lindau to the topic "Glass Ceilings – Is German top research male-dominated?". The high-profile panel discussed various political measures that could be taken to improve the current situation.

Panellists

- Johanna Wanka, German Federal Minister of Education and Research
- Irene Villa, sociologist and gender researcher, Ludwig-Maximilians-University, Munich
- Ulrike Böhm, biophysicist and initiator of "Women in Research", an information initiative across several social networks
- Anna-Christina Eilers, Max Planck Institute for Astrophysics, Heidelberg, Germany, participant of the 66th Lindau Meeting

Moderator

Sabrina Staubitz, Bayerischer Rundfunk

Ulrike Böhm and Johanna Wanka at the ARD-alpha Forum extra. Böhm also contributed to the blog and the social media outlets of the Lindau Meetings and functioned as a special correspondent for women in science.



» Press Talk

One of the three press talks at #LiNo16, aimed at the accredited journalists, revolved around women in science and equal opportunities.

"How much longer will it be before societies around the world are normalised to the idea, the fact, of women holding top science jobs, earning equal pay (to their male counterparts), and that women push boundaries in research as hard, if not harder sometimes, than some men?" It was presented by Deutsche Welle, Germany's international broadcaster, one of the Lindau Meetings' longstanding media partners.

Panellists

- Helga Nowotny, Vice-President of the Council for the Lindau Nobel Laureate Meetings
- Takaaki Kajita, Nobel Laureate in Physics 2015
- Ulrike Böhm, biophysicist and initiator of "Women in Research", an information initiative across several social networks

Moderator

Zulfikar Abbany, science and technology editor, Deutsche Welle

Helga Nowotny, Takaaki Kajita and Zulfikar Abbany



Focus Africa

» The Horst Köhler Fellowship Programme

In its second year, the Horst Köhler Fellowship Programme continued to give more African young scientists the chance to take part in the Lindau Meetings. Former German Federal President Horst Köhler is the patron of this initiative, and the Robert Bosch Stiftung serves as its primary funder. 23 young scientists from Africa participated in #LiNo16, representing the following countries: Algeria, Burkina Faso, Cameroon, Ghana, Madagascar, Mauritius, Nigeria, Rwanda, South Africa, Sudan and Togo.

A joint breakfast for the African participants of each year's Lindau Meeting is now firmly established as part of the meetings' social programme. The young scientists were joined by Katrin Rehak, head of the department of science at the Robert Bosch Stiftung, and Jürgen Kluge, Chairman of the Board of Directors of the Foundation, to discuss topics related to the meetings' field of physics and beyond.

African Breakfast at the 66th Lindau Meeting



» Africa Workshop

On 28 April 2016, the Lindau Meetings invited several of their partners and friends to a workshop in Berlin. There, it was discussed how to promote the outreach of the Lindau Meetings in Africa and how to expand and improve the Horst Köhler Fellowship Programme. The African Academy of Sciences, the Academy of Sciences of South Africa, the German Federal Ministry of Education and Research as well as the French Embassy in Germany among other institutions were involved.

Participants

- Berhanu Abegaz, Executive Director, African Academy of Sciences
- Thomas auf der Heyde, Deputy Director-General, Academy of Science of South Africa
- Tom Baden, Director, Trend in Africa, Alumnus 2011
- Ghada Bassioni, Head of the Chemistry Department, Ain Shams University, Cairo, Alumna 2012
- Nicolas Cluzel, Head of Division Research Cooperation and Analysis, Embassy of France (Germany)
- Dominic-Samuel Fritz, Office of the former Federal President Horst Köhler
- Yunusa Mohammed Garba, PhD candidate, University of Konstanz
- Stefan Kaufmann, Director Max Planck Institute for Infection Biology, Scientific Co-Chairman of the 65th Lindau Meeting
- Julie Klein, German Federal Ministry of Education and Research, Department 212
- Jean-Jacques Pierrat, Counsellor, Embassy of France (Germany)
- Katrin Rehak, Head of the Department of Science, Robert Bosch Stiftung
- Arun Sharma, Managing Director, Next Einstein Forum
- Stefan Wagener, German Federal Ministry of Education and Research

Participants from Africa at the traditional Bavarian Evening of the Lindau Meetings



Star Struck in Lindau

Vinton G. Cerf, winner of the ACM A.M. Turing Award in 2004, held the first “Heidelberg Lecture” at a Lindau Nobel Laureate Meeting. In his text, he not only reflects about his encounters in Lindau, but also about the high significance that computers and computer science have in the natural sciences.



Among the innovations pioneered by John White during his years as CEO of ACM was a new relationship with the Klaus Tschira Stiftung that sponsors the Heidelberg Laureate Forum (HLF) in the third quarter of each year. The attendees include about 200 mathematics or computer science students and recipients of the mathematics Fields Medal, the Nevanlinna Prize, the Abel Prize, and ACM’s A.M. Turing award for computer science.

I have had the pleasure of attending the first three meetings of the HLF. Since 1951, however, there has been an annual meeting of Nobel Laureates with support from several organisations

including the aforementioned Klaus Tschira Stiftung. The HLF is patterned after the Nobel meeting: students meet with a collection of participating laureates. It was decided last year to link these two events by having a Nobel Laureate address the participants of the HLF and to have an HLF laureate address the participants of the Nobel annual meeting. As I write this column, I am in the midst of the Lindau Meeting and, frankly, star struck at meeting people whose names have been in the news for their extraordinary work. I have the honour to be the first of the HLF participants to address the Lindau Nobel Laureate Meeting, and if you think this is not a daunting prospect, think again!

“I have the honour to be the first of the HLF participants to address the Lindau Nobel Laureate Meeting, and if you think this is not a daunting prospect, think again!”

Vinton G. Cerf

My theme, however, is not just the amazing collection of brilliance at both meetings but the clear and increasing role that computing and computer science are playing in basic research. To be sure, computers have long been utilized to make predictions based on theory and to assess measurements to determine whether the theoretical predictions match the experimental evidence. The 2013 Nobel Prize in Chemistry, however, underscored the potential for using computers to predict biochemical interactions on the basis of computer-based modeling. Three chemists won the Nobel Prize in Chemistry in 2013 “for multiscale models for complex chemical systems.” As I meet other basic and experimental scientists at this week-long event, I am struck by how often computers play a key role in discovery science. That our discipline touches almost everything in the scientific world is not an overstatement.

I met Martin Karplus at this event. He was among the 2013 Nobel Laureates and opened my eyes to the incredible complexity of processes found inside cells. This is not a simple sea of liquid in which organelles and chemicals are swimming. The cell actually has a very complex structure, including so-called microtubules that help to guide the transport of molecules where they are needed in the cell. They are like highways inside the cell. There are molecular robots (I am not kidding!) that literally travel along these highways, carrying specific molecules to targets in the cell. This looks sort of like Multiprotocol Label Switching guiding packets along optical channels! Moreover, like the Internet, there are “addresses” to indicate where the robots are supposed to deliver the molecules. The cells encompass a molecular package switching system (ok, bad pun)! I have not yet learned enough about the way in which the addressing is done, but it is apparently multi-layered and even has the property that a molecule can be targeted to get stuck in an intracellular membrane in addition to being delivered to a target organelle.

The cell uses DNA and RNA to guide the production of proteins by assembling amino acids and by delivering them on the intracellular highway to their destinations. The DNA is used to produce so-called “messenger RNA” that is used in the process of generating proteins using the cell’s ribosomes to interpret the RNA and to assemble the prescribed molecular structure. Of course Theorem 206 applies here and I have left out the roles of transfer-RNA and ribosomal-RNA in this process. As we learn more about the internal functionality of cells, and succeed in modeling their operation, we will shed additional light on the plausible paths by which this functionality has evolved. Research is under way to discover by experiment the simplest form of replicating cells and to use computer models to help postulate plausible origins of life.

It would be difficult to overstate the excitement I feel for the role our discipline is playing in surveying the scientific discovery landscape and modeling the processes we find to understand the “how” and maybe the “why” of their operation. This underscores for me and I hope for you, the importance of advancing the state of the art of computing and its capacity to analyse and model the complex phenomena that we are finding all around us at the micro and the macro levels.

» «HEIDELBERG LECTURE”

Klaus Tschira, one of the most committed supporters of the Lindau Meetings and member of the Honorary Senate of the Foundation, founded the Heidelberg Laureate Forum (HLF) in 2013 after the model of the Lindau Nobel Laureate Meetings. Since then, the HLF has become the annual meeting of prize-winning and aspiring young mathematicians and computer scientists. As both meetings are so closely correlated, the concept of the Lindau respective Heidelberg Lectures has been established to underline this outstanding partnership.

“Both 2015 Nobel Laureates Kajita and McDonald said that they are as excited as young scientists to listen to other laureates' talks!”

Zara Bagdasarian, Forschungszentrum Jülich, Germany/Tbilisi State University, Georgia (not in picture)



Scientific Programme

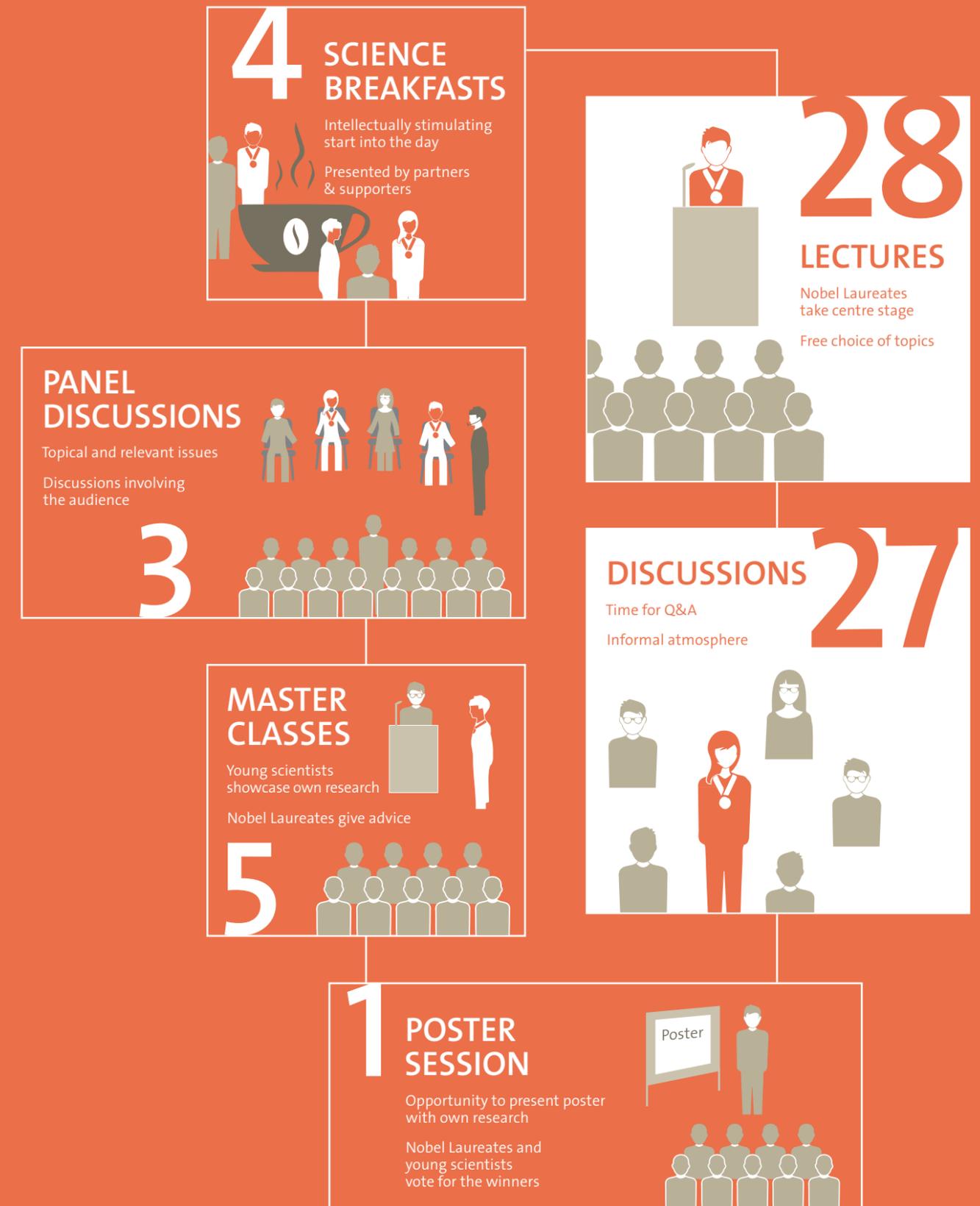
» Lectures

	LECTURE TITLE
Hiroshi Amano	Lighting the Earth by LEDs
Vinton G. Cerf	The Origins and Evolution of the Internet (Heidelberg Lecture)
Steven Chu	Optical Microscopy 2.0
Johann Deisenhofer	Photosynthetic Light Reactions, Revisited
Roy J. Glauber	Some Recollections of the Manhattan Project 1943–1945
David J. Gross	One Hundred Years of General Relativity – The Enduring Legacy of Albert Einstein
Theodor W. Hänsch	Changing Concepts of Light and Matter
Serge Haroche	Cavity Quantum Electrodynamics and Circuit QED: from Fundamental Tests to Quantum Information
Stefan W. Hell	Optical Microscopy: the Resolution Revolution
Gerardus 't Hooft	How One Single Elementary Particle Can Make the Difference
Robert Huber	Protein Structures in Translational Medicine and Business Development, My Experience
Brian D. Josephson	Emergent Self-Organising Activity as the true foundation of Reality
Takaaki Kajita	Atmospheric Neutrinos
Martin Karplus	Motion: Hallmark of Life. From Marsupials to Molecules



Gerardus 't Hooft

Sessions of the Scientific Programme



» Lectures

	LECTURE TITLE
Arthur B. McDonald	The Sudbury Neutrino Observatory: Observation of Flavor Change for Solar Neutrinos
Hartmut Michel	Oxygen Removal and Energy Conservation by Membrane Integrated Terminal Oxidases
William D. Phillips	Superfluid Atomic Gas in a Ring: A New Kind of Closed Circuit
Carlo Rubbia	The Future of Energy
Brian P. Schmidt	State of the Universe
Dan Shechtman	The Science and Beauty of Soap Bubbles
George F. Smoot	Gravitational Waves, Merging Black Holes
Samuel Ting	The Alpha Magnetic Spectrometer (AMS) on the International Space Station
Martinus J.G. Veltman	After Finding the Higgs Particle
Klaus von Klitzing	A New International System of Units in 2018!? How my Nobel Prize Contributed to this Development
Carl E. Wieman	A Scientific Approach to Learning Physics
David J. Wineland	Atomic Ion Clocks
Kurt Wüthrich	NMR in Physics, Structural Biology and Medical Diagnosis
Ada E. Yonath	What was First, the Genetic Code or Its Products?



Arthur B. McDonald



Along with approximately 500 videos, all lectures from #LiNo16 can be watched in the mediatheque.



Ada Yonath

Theodor Hänsch



Hiroshi Amano



» Panel Discussions

“GLIMPSSES BEYOND THE STANDARD MODEL”

Panellists

- Steven Chu, Nobel Laureate in Physics 1997, Physics Department, Stanford University, USA
- David J. Gross, Nobel Laureate in Physics 2004, Kavli Institute for Theoretical Physics, University of California, Santa Barbara, USA
- Takaaki Kajita, Nobel Laureate in Physics 2015, Institute for Cosmic Ray Research, University of Tokyo, Japan
- Carlo Rubbia, Nobel Laureate in Physics 1984, European Organization for Nuclear Research (CERN), Switzerland
- Fabiola Gianotti, Director General, European Organization for Nuclear Research (CERN), Switzerland (via video livestream together with young scientists from the LHC experiments)

Moderator

Felicitas Pauss, Professor for Experimental Physics, ETH Zurich, Switzerland

“IS QUANTUM TECHNOLOGY THE FUTURE OF THE 21ST CENTURY?”

Panellists

- Serge Haroche, Nobel Laureate in Physics 2012, Ecole Normale Supérieure, Collège de France, France
- Gerardus 't Hooft, Nobel Laureate in Physics 1999, Institute for Theoretical Physics, Utrecht University, Netherlands
- William D. Phillips, Nobel Laureate in Physics 1997, Laser Cooling and Trapping Group, National Institute of Standards and Technology (NIST), USA
- David J. Wineland, Nobel Laureate in Physics 2012, Physical Measurement Laboratory, National Institute of Standards and Technology (NIST), USA

Moderator

Christian Meier, Science Journalist, Scicaster, Germany

“THE FUTURE OF EDUCATION IN SCIENCES”

Panellists

- Brian P. Schmidt, Nobel Laureate in Physics 2011, The Research School of Astronomy and Astrophysics, Australian National University, Australia
- Dan Shechtman, Nobel Laureate in Chemistry, 2011, Department of Material Science and Engineering, Technion – Israel Institute of Technology, Israel
- Tamás Vári, Institute for Particle and Nuclear Physics, Wigner Research Center for Physics, Hungary
- Carl E. Wieman, Department of Physics, Stanford University, USA

Moderator

Karan Khemka, Managing Director, Co-head of Education, Parthenon-EY, Singapore

Panel discussion on quantum technology: Christian Meier, David Wineland, William Phillips, Gerardus 't Hooft and Serge Haroche



Takaaki Kajita



Panel discussion on particle physics: Felicitas Pauss, Steven Chu, David Gross, Takaaki Kajita, Carlo Rubbia and Fabiola Gianotti (on screen)



David Wineland

Karan Khemka, moderating the panel discussion "The Future of Education in Sciences"



» Master Classes

“ULTRA-COLD GASES OF NEUTRAL ATOMS AND MOLECULES”
chaired by William D. Phillips

Speakers

- Monika Aidelsburger, Ludwig-Maximilians-University Munich, Germany
- Logan Clark, University of Chicago, USA
- Hannah Price, Università di Trento, Italy
- Philipp Wessels, University of Hamburg, Germany

Additional Presentations

- Nicholas Ayres, University of Sussex, United Kingdom
- Jolijn Onvlee, Radboud University, Netherlands
- Benjamin Stickler, University of Duisburg-Essen, Germany
- Sebastian Zell, Ludwig-Maximilians-University Munich, Germany

“BIG QUESTIONS, BIG INSTRUMENTS, BIG IDEAS”
chaired by Brian P. Schmidt

Speakers

- Jean-Baptiste Fouvry, Université Pierre et Marie Curie, France
- Matthew Smith, Cardiff University, United Kingdom
- Cora Uhlemann, Universiteit Utrecht, Netherlands

“QUANTUM INFORMATION AND QUANTUM MEASUREMENT”
chaired by David J. Wineland

Speakers

- Gabriela Barreto Lemos, Institute for Quantum Optics and Quantum Information (IQOQI), Vienna, Austria
- Pascal Cerfontaine, Department of Physics, RWTH Aachen University, Germany
- Vanessa Chille, Max Planck Institute for the Science of Light, Germany
- Hendrik Weimer, Institute for Theoretical Physics, Leibniz Universität Hannover, Germany

“PHYSICS IN STRUCTURAL BIOLOGY, MEDICAL DIAGNOSIS,
AND PHYSICAL EXERCISE AND REHABILITATION”
chaired by Kurt Wüthrich

Speakers

- Antonio Benedetto, School of Physics, University College Dublin, Ireland
- Dominique Gisin, ETH Zurich, Switzerland
- Deblina Sarkar, Massachusetts Institute of Technology (MIT), USA
- Katarzyna Tych, Physics Department, Technische Universität München (TUM), Germany

“PHYSICS-BASED MEASUREMENTS OF OUR CHANGING
CLIMATE CHANGE, AND THE CLEAN ENERGY CHALLENGES FOR
CARBON-FREE ENERGY”
chaired by Steven Chu

Speakers

- Susanne Birkhold, University of Konstanz, Germany
- Asma Dhunny, University of Mauritius, Mauritius
- Raphaela Vogel, Max Planck Institute for Meteorology, Germany
- Ricarda Winkelmann, Potsdam Institute for Climate Impact Research, Germany

Gabriela Barreto Lemos at the master class chaired by David Wineland



Katarzyna Tych at the master class
chaired by Kurt Wüthrich



Matthew Smith at the master class
chaired by Brian Schmidt



Ricarda Winkelmann
presenting at the master class
chaired by Steven Chu



» Science Breakfasts

“QUANTUM INFORMATION: FROM FUNDAMENTALS TO A NEW TECHNOLOGY”

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

Panellists

- Gabriela Barreto Lemos, Institute for Quantum Optics and Quantum Information (IQOQI), Vienna, Austria
- Rainer Blatt, Institute of Experimental Physics, University of Innsbruck, Austria
- William D. Phillips, Nobel Laureate in Physics 1997, Laser Cooling and Trapping Group, National Institute of Standards and Technology (NIST), USA
- David J. Wineland, Nobel Laureate in Physics 2012, Physical Measurement Laboratory, National Institute of Standards and Technology (NIST), USA

Moderator

Anton Zeilinger, President of the Austrian Academy of Sciences

Welcome

Barbara Weitgruber, Director General, Austrian Federal Ministry of Science, Research and Economy



Anton Zeilinger

“EXCELLENCE IN SCIENCE AND SPORTS”

hosted by Rolex SA

Panellists

- Arnaud Boetsch, Director of Communication and Image, Rolex SA, Switzerland
- Bettina Heim, Department of Physics, ETH Zurich, Switzerland
- Kurt Wüthrich, Nobel Laureate in Chemistry 2002, The Scripps Research Institute (TSRI), La Jolla, USA

Moderator

Mark Kendall, The University of Queensland, Australia

Kurt Wüthrich



Science breakfast hosted by Rolex SA

“WHY DOES SOFT MATTER MATTER?”

hosted by Mars, Incorporated

Panellists

- Steven Chu, Nobel Laureate in Physics 1997, Physics Department, Stanford University, USA
- Adriana Marais, Quantum Research Group, School of Chemistry and Physics, University of KwaZulu-Natal, South Africa
- Antonio Redondo, Senior Scientist, Los Alamos National Laboratory, USA

Moderator

Adam Smith, Chief Scientific Officer, Nobel Media AB

Adam Smith and Adriana Marais



“DECODING SCIENCE LEADERSHIP: DEVELOPING CAPACITY FOR LEADING SCIENCE INNOVATION IN A RAPIDLY EVOLVING ‘24/7 WORLD’ WITH DISRUPTIVE OPPORTUNITIES AND CHALLENGES”

hosted by McKinsey & Company, Inc.

Panellists

- Frank Mattern, Senior Partner, McKinsey & Company, Inc., Germany
- Hannah Price, Department of Physics, INO-CNR BEC Center, Università di Trento, Italy
- Lukasz Rudnicki, Center for Theoretical Physics, Polish Academy of Sciences, Poland
- Brian P. Schmidt, Nobel Laureate in Physics 2011, The Research School of Astronomy and Astrophysics, Australian National University, Australia

Moderator

Matthias Evers, Senior Partner, McKinsey & Company, Inc., Germany

Science breakfast hosted by McKinsey & Company, Inc.



Innovation Forum

» Quantum Computing & Artificial Intelligence

The Innovation Forums have been established in 2010 upon an initiative of Nobel Laureate Martin Chalfie. Their aim is to bring together top-level scientists and business executives for an informal exchange of thoughts on current problems and solutions for tomorrow.

The Innovation Forum 2016 – the eighth of its kind – focused on two key areas that have seen astonishing developments and that may both severely impact our lives in the near future, especially when merged.

Communication which cannot be intercepted thanks to quantum encryption, extremely powerful quantum computers, new materials that have been discovered by analyses in quantum simulators – these are only some of the applications which will be based on the unusual properties of quantum physics in the near future.

Aaron Ciechanover and Vinton Cerf



Artificial intelligence may make the internet (of everything) super smart, yet the power of algorithms has also led to various debates in society. Autonomous driving will revolutionise individual traffic, making it safer, faster and greener, but it also raises many questions regarding regulation and, even more challenging, the implementation of ethics into computers. The power of quantum computers combined with intelligent data analysis may open completely new insights.

Nobel Laureate David Wineland started the Innovation Forum with an in-depth explanation of the physics behind quantum information technology and quantum computing. Building on this introduction, Alessandro Curioni (IBM) provided a richly illustrated history of modern computing and especially the latest steps from Watson to the cloud-based Quantum Experience, which allows to run algorithms, experiments, simulations and to manipulate individual qubits.

Turing Award Winner and Google Vice-President Vinton G. Cerf offered an impressive tour d’horizon on current applications of artificial intelligence – most of them from one of Google’s many activities. From AI robot animals to an interplanetary communications network, no idea seems too small to try.

Thomas Brohm’s presentation was a little more “down-to-earth”: describing the power of artificial and network intelligence for autonomous driving. Working for Continental, one of the leading automotive suppliers, it was no surprise that his approach combined the virtues of German engineering with very practical considerations regarding safety, regulation, and cost-effectiveness.

Finally, Kira Radinsky (Technion) dared the seemingly impossible: To predict the future. Her computer model combines big data analysis with real-life patterns. For example: If, repeatedly, oil spills in one part of the world are followed by famines in a different part of the world, there may be a causal relationship, even if impossible to prove. This assumption can help to identify correlation patterns in vast amounts of data, and subsequently may save many lives.

(Clockwise) Kira Radinsky, Thomas Brohm, Alessandro Curioni, Volkmar Denner, Chairman of the Board of Management, Robert Bosch GmbH



Keynotes

“Quantum Information Technology and Quantum Computing”
David Wineland, Nobel Laureate in Physics 2012, National Institute of Standards and Technology (NIST), USA

“Quantum Computing and its Industrial Application”
Alessandro Curioni, Vice President Europe and Director IBM Research, Switzerland

“The Impact of Artificial Intelligence on the Future of the Internet”
Vinton G. Cerf, ACM A.M. Turing Award Winner 2004, Vice-President and Chief Internet Evangelist Google, USA

“Autonomous Driving: Opportunities and Challenges”
Thomas Brohm, CTO Business Unit Advanced Driver Assistance Systems, Continental, Germany

“The Quest to Predict the Future”
Kira Radinsky, CTO SalesPredict, Visiting Professor, Technion, Israel

Social Programme

» Summer Festival of Science

hosted by the German Federal Minister of Education and Research Johanna Wanka

Reception

Welcome Addresses

Johanna Wanka, Federal Minister of Education and Research
Countess Bettina Bernadotte

Dinner at Hotel Bad Schachen

Fireworks

Johanna Wanka and Tony Tan Keng Yam, President of Singapore



» Bavarian Evening

hosted by the Elite Network of Bavaria and the Free State of Bavaria

Welcome Address

Ludwig Spaenle, Bavarian State Minister of Education, Science and the Arts

Presentations

“Bavaria – Land of Science and Research”

Hartmut Michel, Nobel Laureate in Chemistry 1988,
Max Planck Institute of Biophysics, Frankfurt/M., Germany

“Current Research Projects within the Elite Network of Bavaria”

Cora Uhlemann and Markus A. Huber,
Fellows of the Elite Network of Bavaria

Traditional Bavarian Music & Parade

Samerberger Tanzlmusi

Ludwig Spaenle, Countess Bettina Bernadotte, Cora Uhlemann, Markus Huber and Hartmut Michel



» International Day

hosted by Austria

SCIENCE BREAKFAST: “QUANTUM INFORMATION: FROM FUNDAMENTALS TO A NEW TECHNOLOGY”

hosted by the Austrian Federal Ministry of Science, Research and Economy (see p. 58)

INTERNATIONAL GET-TOGETHER

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

Boat Trip to Bregenz, Austria

Markus Wallner, Gerhard Ecker, Lord Mayor of the City of Lindau, Countess Bettina Bernadotte, Barbara Weitgruber and Markus Linhart, Mayor of the City of Bregenz



Welcome

Countess Bettina Bernadotte

Greetings

Markus Wallner, State Governor of Vorarlberg, Austria

Welcome Address

Barbara Weitgruber, Director General for Scientific Research and International Relations, Austrian Federal Ministry of Science, Research and Economy

Master of Ceremony

Bronwen Rolls, The Doing Collective, Austria

Music

Federspiel

Band “Federspiel”



» Grill & Chill

hosted by the Council and the Foundation
in cooperation with the City of Lindau

Welcome Address

Gerhard Ecker, Lord Mayor of Lindau
Countess Bettina Bernadotte

This year, the proceeds and donations have been divided upon three different Lindau institutions: the local branch of "Haus der kleinen Forscher" (Little Scientists' House), the Former Imperial Library and the association for the conservation of the historical "Cavazzen" building, now housing the city museum.

Support

Continental AG
IHK Schwaben

Markus Anselment, IHK Schwaben, Gerhard Ecker, Countess Bettina Bernadotte and Karlheinz Haupt, Continental AG



» Academic Dinners

Hosts

Alexander von Humboldt Stiftung
Australian Academy of Science
Continental AG
Dieter Schwarz Stiftung
Elite Network of Bavaria
German Academic Exchange Service (DAAD)
Helmholtz-Stiftung
Heraeus Stiftung
Human Frontier Science Program
Lockheed Martin Corporation
Max Planck Society
Mexican Academy of Sciences
Nobel Foundation
ORAU (Oak Ridge Associated Universities)

Dinner with the US delegation hosted by ORAU



Dinner hosted by the Australian Academy of Science

» Baden-Württemberg Boat Trip

hosted by the State of Baden-Württemberg

Welcome and Farewell Address

Simone Schwanitz, Deputy Minister of Science, Research and the Arts of Baden-Württemberg

Exhibition

Presentations by selected research institutions and projects of Baden-Württemberg

Announcement

Winners of the #LiNo16 Poster Session

Science Picnic

Nobel Laureate William Phillips at the science picnic



» Step to Stockholm: Baden-Württemberg



Simone Schwanitz

Nobel Laureate George Smoot in discussion with young scientists



Impressions

#LiNo16 participant Lola Fariñas with the Nobel medal of Klaus von Klitzing



Samuel Ting



Steven Chu and Vinton Cerf at the Bavarian Evening



Science Picnic on Mainau Island



Gerda Tschira, Theresia Bauer, Minister of Science, Research and the Arts of Baden-Württemberg, and Johanna Wanka, German Federal Minister of Education and Research

The Mediatheque

» New Content 2016

The mediatheque of the Lindau Meetings provides access to a unique archive: By now, more than half of the approximately 1,000 original lectures delivered by Nobel Laureates in Lindau are available online. In addition to all lectures held at #LiNo16, a lot of new educational content has been published in 2016. New mini lectures, topic clusters and Nobel Labs 360° have been added. Furthermore, most of the existing mini lectures are now also available with Spanish and French subtitles to reach an even wider audience.



MINI LECTURE & TOPIC CLUSTER ON NEUTRINOS

With reference to the Nobel Prize in Physics 2015, the mediatheque now offers both an animated learning video

and a topical dossier with relevant Nobel Laureate research on these versatile particles.



NOBEL LABS 360°: SERGE HAROCHE

Serge Haroche received the Nobel Prize in Physics 2012 together with David J. Wineland "for ground-breaking

experimental methods that enable measuring and manipulation of individual quantum systems". In this application, Serge Haroche takes you on a stunning, multi-media tour through his lab.



MINI LECTURE: GRAVITATIONAL WAVES

Gravitational waves are small distortions, or ripples, in the fabric of spacetime and were predicted by

Einstein a hundred years ago. This mini lecture explains one of this year's most spectacular science stories.



TOPIC CLUSTER: BIOSYNTHESIS & RIBOSOMES

This topic cluster gives an overview of the history of protein synthesis, the structure and function of ribosomes,

and of other major components of translation. Among others, it features the research of Nobel Laureate Ada Yonath.



NOBEL LABS 360°: ARTHUR MCDONALD

Descend two kilometres underground into a former mine with Nobel Laureate in Physics 2015 Art McDonald

and join him on a virtual tour to explore the awe-inspiring Sudbury Neutrino Observatory.



MINI LECTURE: GLOBAL WARMING

Global warming is primarily a problem of too much carbon dioxide (CO₂) in the atmosphere which acts as

a blanket, trapping the heat and warming the planet. Its effects have the potential to endanger the lives of millions of people around the globe.



TOPIC CLUSTER: IMAGING IN SCIENCE

In the past decades, images in science have allowed us to see and therefore discover fundamental processes

in diverse fields. The physical sciences are at the core of these breakthroughs, allowing astronomers, doctors, radiologists and biologists to see objects at closer range or to visualise the unseen or obscure.



mediatheque.lindau-nobel.org

» Life Paths

The Laureate Life Paths project, suggested by Nobel Laureate Arno Penzias a decade ago, has developed into an amazing tool for data visualisation over the past two years. Today, more than 320 biographies of Nobel Laureates are available. Not only as text, but with an interactive world map of all major life events and the places they happened at.

More biographies are added continuously. Furthermore, the next release shall offer more options for curated digital data storytelling.

Jewish Migration

The top right image shows the US east coast in the year 1930, while the image below shows the year 1945. The colored lines represent the life paths of 82 Jewish Nobel laureates. The online tool can animate the life paths and visualise the massive migration of Jewish laureates from Germany and Europe before and during World War II.

Global Science, Asia on the Rise

The left globe below shows all life paths between 1940 and 1950. It is easy to see a strong European-American dominance. But by 2005-2015, the picture has changed. Exchange with Asia has massively increased, and the same is true for Australia, Africa and South America, albeit on a smaller scale.



Educational Outreach

The educational outreach activities of the Lindau Nobel Laureate Meetings aim to spread the fascination with science and research to society at large, and to share the archived knowledge of the mediatheque with pupils, students and generally interested laypersons. Modern forms of communication and excellent content form the framework for the development of educational material which shall be made available to schools in German-speaking countries and eventually on an international level.

Large parts of the educational material is already available for free to a broad audience in the mediatheque. Much of the material is also well-suited for the use in schools. For this, a didactic approach and advanced contextualisation are paramount. The didactic quality of several core elements of the mediatheque shall be renewed and strengthened, particularly the content of the topic clusters, mini lectures and Nobel Labs 360°.

Cooperation with “Lehrer-Online”

In collaboration with lehrer-online.de, one of the best known and most successful providers of teaching materials in German-speaking countries, several learning units based on the content of the mediatheque’s mini lectures, topic clusters and Nobel Labs 360° will be developed and be made readily available for teachers. This will include the development of teaching guides, worksheets, experiments or exams. A didactic content consultation ensures the newly created learning units’ coherence with German school curriculums.

Similar collaborations are intended on an international level to increase the reach and educative impact of the mediatheque among students and teachers.

Cooperation with Educational Content Providers

Intending to impart and further disseminate scientific information by and about Nobel Laureates, the Council and the Foundation embarked on a strategy to collaborate with non-profit providers of digital educational content, mainly public providers of didactic material for teachers.

Partners

- AK Schulförderung des Verbandes der Chemischen Industrie (VCI)
- European Commission, Directorate-General Education and Culture
- Landesmedienzentrum Rheinland-Pfalz
- Lehramtsausbildung der FU Berlin
- Leibniz Institute for Science and Mathematics Education
- mebis – Landesmedienzentrum Bayern des Bayerischen Staatsministeriums für Unterricht und Kultus
- Schulmedienzentrum Vorarlberg
- SESAM – Landesmedienzentrum Baden-Württemberg
- TES, the world’s largest online network of teachers
- Tiroler Bildungsinstitut – Medienzentrum des Landes Tirol

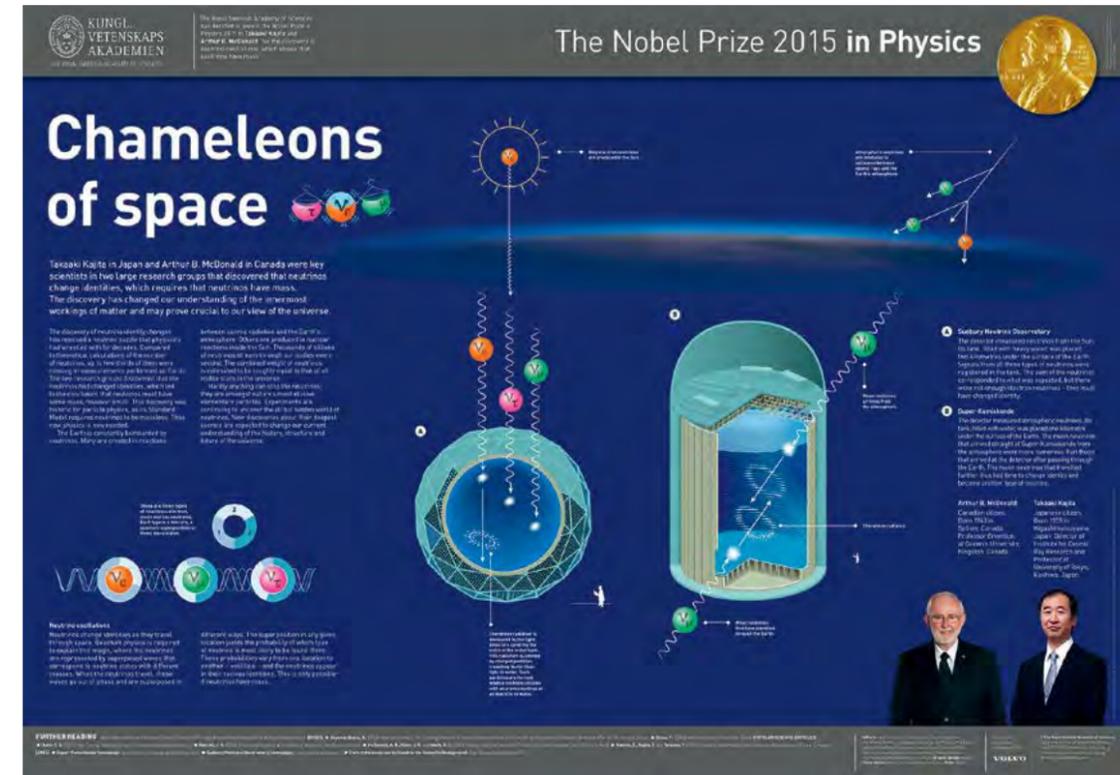
Nobel Posters

Every year, The Royal Swedish Academy of Sciences and the Karolinska Institute publish a poster series explaining the discoveries of the Nobel Prize. In the past, these posters have only been available in English and Swedish. With the support of the German Federal Ministry of Education and Research, the posters will now be translated into German and distributed among all secondary schools in Germany, and possibly Austria and Switzerland.

Schoolchildren from Lindau



The poster explains the Nobel Prize in Physics 2015. The two Nobel Laureates, Arthur McDonald and Takaaki Kajita, both attended #LiNo16.



© The Royal Swedish Academy of Sciences

Engaging Future Generations

» Teaching Spirit

In order to incite the next generation with a passion for science, society needs motivated and qualified teachers that are able to spark the youth. Every year, the Lindau Nobel Laureate Meetings invite a select number of teachers who excelled in this ability throughout their careers.

21 physics teachers from Austria, Germany and Switzerland were invited to take part in two days of #LiNo16. Their programme included lectures, a lunch with several Nobel Laureates, a workshop organised jointly with the Leibniz Institute for Science and Mathematics Education (IPN) as well as the Bavarian evening and the Baden-Württemberg Boat Trip.

The teachers were nominated by a variety of educational institutions and foundations:

- Deutsche Physikalische Gesellschaft (DPG)
- Deutsche Telekom Stiftung
- Dornier Stiftung
- Internationale Bodenseekonferenz (IBK)
- Leibniz Institute for Science and Mathematics Education (IPN)
- Ministerium für Bildung, Wissenschaft, Weiterbildung und Kultur Hessen
- Ministerium für Bildung, Wissenschaft und Kultur Mecklenburg Vorpommern
- MNU – Verband zur Förderung des MINT-Unterrichts
- Prof. Manfred Prenzel
- Stiftung Haus der kleinen Forscher
- Stiftung Jugend forscht e.V.

Teachers trying out new experiments



» School Visit

Children and young adults often times need role models that exemplify what can be achieved in life when one puts in the effort and shows perseverance. Therefore, the Lindau Meetings organise that one participating Nobel Laureate visits a local school every year.

During #LiNo16, Stefan Hell, Nobel Laureate in Chemistry 2014, gave an inspiring talk at Lindau's Bodensee-Gymnasium in front of local students. He told the story of how he set out to break the diffraction limit – a feat that was believed to be impossible until Hell managed it by basically inventing a new kind of microscopy.

Stefan Hell



Nature Video Lindau Collection 2016

From the tiniest known particles to the enormous Universe, Nobel Laureates tell tales of physics that will blow your mind. In this series of four animations, Nobel prize-winning scientists talk about their work on light, time, matter, and the Universe. Recorded at the 66th Lindau Nobel Laureate Meeting, the 2016 collection of videos is produced by Nature Video, with support of Mars, Incorporated, and in association with Scientific American.

Every year since 2008, Nature Video has produced a series of films that focus on select topics and participants of the Lindau Meetings. These educative and entertaining films showcase what “Lindau” is all about: sharing knowledge and ideas, seeking inspiration and motivation, finding companions and friends, and forging networks.

In an additional sponsor feature, Mars, Incorporated and IBM Research explain how they are transforming our approach to global food safety using big data.



“BIG BOX, SMALL BOX, LIGHT-FILLED BOX WITH SERGE HAROCHÉ”

Physicist Serge Haroche describes his work on the manipulation of

quantum systems, which won him a share of the 2012 Nobel Prize in physics.



“TICK-TOCK COLD COLD CLOCK WITH BILL PHILLIPS”

Lasers, atomic clocks, and the coolest stuff in the universe. William Phillips explains how laser cooling,

for which he shared the 1997 Nobel Prize in physics, led to a revolution in time-keeping.



“AIN'T NO STOPPING THEM NOW WITH ART MCDONALD”

Unstoppable by lead, undetectable above ground, undividable by modern physics; neutrinos are

messengers from the very centre of the sun. Arthur McDonald, co-recipient of the 2015 Nobel Prize in physics, describes the puzzle of detecting neutrinos and the discovery that they change “flavour” on their journey to earth.



“NO SUCH ANIMAL WITH DAN SHECHTMAN”

Nobel Laureate Dan Shechtman describes the structure of quasi-crystals, the discovery of which

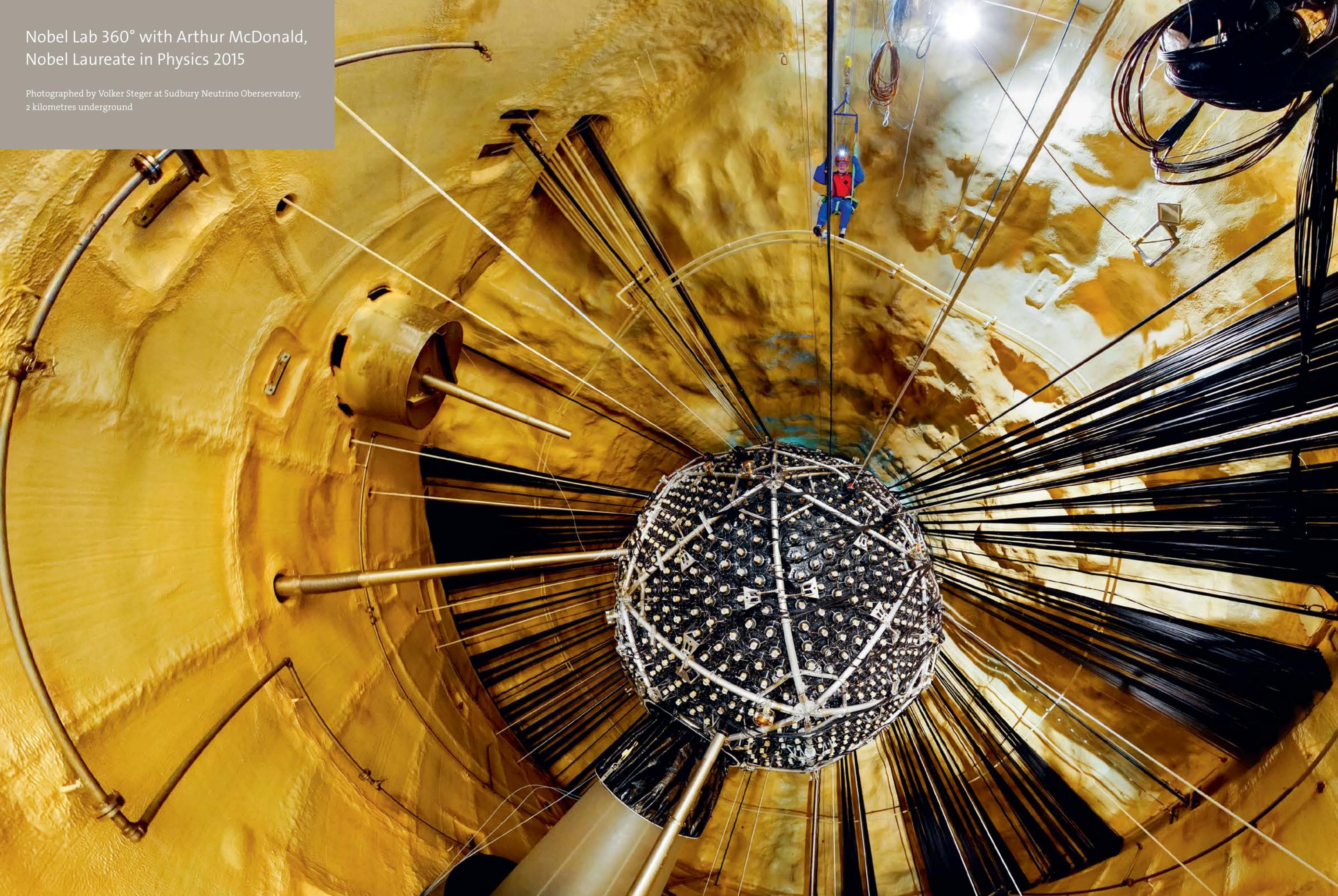
won him the scorn of colleagues in the 1980's and then the Nobel Prize in chemistry in 2011.



All animations and videos of the Nature Lindau Video Collection are available in the mediatheque as well as on YouTube.

Nobel Lab 360° with Arthur McDonald,
Nobel Laureate in Physics 2015

Photographed by Volker Steger at Sudbury Neutrino Observatory,
2 kilometres underground



Alumni of the Lindau Nobel Laureate Meetings

» Alumni Network

The participants of the Lindau Meetings share experiences and inspiration that last a lifetime. Now, with the launch of the alumni network, a global community of scientists spanning generations, cultures and disciplines will come together.

Imagine a pool of 30,000 brilliant scientists and an ongoing tradition of 66 years and think about the positive influence this collective could possibly exert, not only amongst themselves but also on society and the world at large.

Over the next two years, the alumni initiative of the Lindau Meetings will include a new social online platform as its connecting centrepiece, as well as regional events all over the world. In addition, it will encourage alumni of the Lindau Meetings to engage in science outreach projects and offer a host of member-exclusive opportunities ranging from career advice to continued education.

With this project, the Lindau Meetings will set course to significantly change their trajectory. Once billed as a “once-in-a-lifetime experience”, the Lindau spirit soon will transcend the boundaries of a weeklong conference and begin to manifest itself as a united, multicultural fellowship championing critical thinking, open-mindedness and the human aspiration for continued progress.

The Lindau Meetings express their sincere gratitude to the German Federal Ministry of Education and Research for supporting the project and invite all former and future participants to join this community and to enrich it with their own ideas and perspectives.

➤ Follow the Lindau Meetings on social media or write to alumni@lindau-nobel.org to get the latest news regarding the alumni network.

Participants of #LiNo16



Nobel Peace Laureate Albert Schweitzer surrounded by young scientists at the Lindau Meeting in 1954



» Recalling an Appeal by Harry Kroto

On the occasion of the 65th Lindau Nobel Laureate Meeting in 2015, Nobel Laureate in Chemistry Sir Harold Kroto evoked a sense of community among Lindau Meeting participants of the past, present and future. Sadly, these turned out to be Harry's last words at a Lindau Meeting as the widely beloved Nobel Laureate passed away in April 2016.

Kroto cited climate change as well as political and religious conflict as the most urgent problems of humanity today and stated that the achievements of enlightenment were under threat, incorporating many quotes from great intellectuals like Kant and Heine in his remarks.

Sir Harry asked the young scientists on-site to unite against the aforementioned threats and to get together with alumni of former meetings. He concluded: “I think you'll have a voice and you will infiltrate our society. Think a bit: humanity comes first, long before the money.”

➤ Kroto's full 15-minute appeal is available as a separate video in the mediatheque.

Sir Harry Kroto with young scientists in 2015



A Fellowship for European Innovation

Together with the European Forum Alpbach, Austria, and the Falling Walls Conference, Berlin, the Lindau Nobel Laureate Meetings intend to establish a joint and interdisciplinary fellowship programme for European innovation. The initial impulse for the project was provided by Helga Nowotny, former President of the European Research Council, Vice-President of the Council for the Lindau Meetings, Member of the Council of the European Forum Alpbach, and Member of the Steering Board of the Falling Walls Foundation.

Throughout 2016, representatives of the three institutions held meetings to frame the concept and organised a test run with selected fellows consisting of alumni from all three conferences. Regarding the target audience, the Lindau Meetings conceive the fellowship as an incentive programme for its former participants.

Preliminary Concept

The fellowship shall be designed to address particular innovation challenges identified by the European Union, i.e. the need for young, competent and motivated influencers from science, business and politics who are able to think and act beyond their individual fields. Enabling interdisciplinary exchange, encouraging peer-learning and providing access to relevant partners and mentors will form some of the key elements in a curriculum that has the goal to assist the international participants in becoming valuable contributors to public discourse. Participation in the programme also entails a personal commitment to be an agent for public good, social impact and international dialogue.

During the course of the curriculum, the participants shall gain new insights within the triad of science, policy and business by visiting the three main meetings in Lindau, Alpbach and Berlin.

The intersections between the individual fields will be highlighted by tailored workshops, e.g. on science communication, political discourse or entrepreneurial thinking. Some of the workshops will be embedded in the wider meeting agenda and will offer input from international experts and coaches. In an additional programme, participants will be able to meet with distinguished international leaders from science, business and policy in individual sessions during each of the three meetings.

2016 Pilot Run

The initial 2016 curriculum served as a trial for the final fellowship project. The test fellows participated in the 66th Lindau Meeting, the European Forum Alpbach in August and the Falling Walls Conference in November. During a series of moderated workshops and evaluation sessions, the six fellows provided the organisers with feedback and suggestions and gave valuable support in co-designing the concept.

The final implementation of the fellowship is still subject to funding.

2016 Fellows

- Ghada Bassioni, Associate Professor and Head of the Chemistry Department, Ain Shams University, Cairo, Egypt
- Tarek Richard Besold, Computational Creativity Research Fellow, Digital Media Lab, University of Bremen, Germany
- Josef Lentsch, Director, NEOS Lab, Vienna, Austria
- Carsten Mahrenholz, CEO, Coldplasmatech GmbH, Greifswald, Germany
- Philipp Marxgut, Secretary General, CSH Complexity Science Hub, Vienna, Austria
- Bettina Rausch, Head of Department, Organisational Development, NÖ Landeskliniken-Holding, St. Pölten, Austria

European Forum Alpbach (EFA)

The EFA is an interdisciplinary platform for science, politics, business and culture. Established in 1945, the annual European Forum Alpbach and its events throughout the year address the relevant socio-political questions of our time. More than 5,000 people from over 100 countries participate in the European Forum Alpbach each year.

Falling Walls Foundation

Falling Walls is a unique international platform for leaders from the worlds of science, business, politics, the arts and society. It was initiated on the occasion of the 20th anniversary of the fall of the Berlin Wall. Falling Walls fosters discussion on research and innovation and promotes the latest scientific findings among a broad audience from all parts of society.



Test fellows and representatives of the three organising institutions with Helga Nowotny at Lindau



Carsten Mahrenholz and Ghada Bassioni, both alumni of the Lindau Meetings

2016 Fellows: Philipp Marxgut, Tarek Richard Besold, Ghada Bassioni, Carsten Mahrenholz, Josef Lentsch (from left, Bettina Rausch not present)



Nobel Heroes

In 2000, German photographer Peter Badge embarked on a long-term project to photograph every living Nobel Laureate. A coffee-table book compiling all 400 portraits will be published by renowned German publisher Gerhard Steidl in February 2017. Filmmaker and director Wim Wenders wrote a dedication of which we print an excerpt.

Pretend you don't know what this book is about.
Just look at these pictures of men and women,
page after page...
Don't read, just see!
Immerse yourself in these faces.

Let them become like landscapes,
each one opening your eyes to a new view.
They all have their own topography, so to speak,
their very own history,
lines carved into them like rivers plowing their way
into the land... [...]

Going through these images of people
that Peter Badge shot [...],
you won't find that single-mindedness,
that need or desire to put his imprint on these photographs,
thereby making an impact on our perception.
Actually, to be honest, I sort of missed that at first
and thought of it as some lack of consistency.
After all, Peter Badge was a relatively young man...
(At least when he started this collection...)

I was so wrong!

You might use a different approach,
but when I first look at a portrait,
be it photographed or painted,
I don't want to know the name of that person in the picture.
I prefer to have no idea who he or she is,
where they're coming from
or what their profession is. (Or was.)

I want to have an uninformed first impression,
stand back and watch, without any opinion.
Who do I see there?
And then, afterwards, I want to be introduced...

Looking at an unknown, anonymous face
and at the figure of a stranger,
you'll soon find your gaze searching for clues:
You try to discover some details in the clothing
that might give away an indication.
Or you scan the room for a hint,
like the desk, the books in the background,
or any other detail you might discover. [...]
Do you recognise something?
Is there any aspect to the picture, even a small one,
that could help you understand, or guess, who that person is?
The light might also tell you something...

Whatever you look at,
you'll always find yourself coming back to the eyes.
They are the keys to it all,
the doors to the undisclosed identity.

These photographs by Peter Badge
give you ample opportunity
to let your eyes wander (and wonder).
He always offers you enough space and some surroundings.
But at the same time he puts you close enough
so that you can see the eyes well.
Sometimes you even feel like you're eye to eye,
you're actually about to meet that person! [...]

So now you can't help but look down
and read the name.
(Often enough, that isn't giving too much away,
except for a hint at the nationality maybe.)
But behind the name you read: "Nobel Prize for..."
...Physiology or Medicine
Peace, Physics, Literature
Chemistry, Economic Sciences
... and you remember the name of the book.
Of course!

And in fact, looking back at those faces,
you recognize (or at least you want to discover)
the field which these men and women are working in.
You grasp the years and years of experience,
the take in the scholarliness, the obsession,
the aim set so high,
the sacrifices that came with it,
the price that needed to be paid,
the solitude, the restraint,
but also the pride and the magnitude of the reward. [...]

I like these portraits more and more,
now that I lived with them for quite a while.
I actually miss them when I haven't seen them for a while,
which must mean I almost believe I know these people! [...]

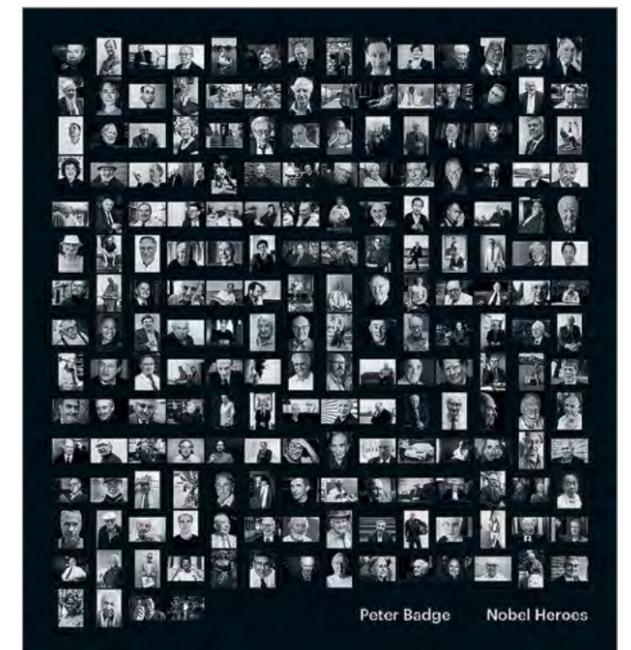
Wim Wenders

» The project "Nobel Laureates photographed by Peter Badge" is commissioned by the Lindau Nobel Laureate Meetings in cooperation with the Smithsonian Institution, the National Portrait Gallery in Washington, D.C., as well as the Deutsches Museum and co-funded by the Klaus Tschira Stiftung. Many of the photos were taken at the Lindau Meetings, but the project has also taken Badge all around the globe. Badge's black-and-white photos reveal the personality of the portrayed laureates and generate recognition for their scientific, literary or humanitarian achievements.

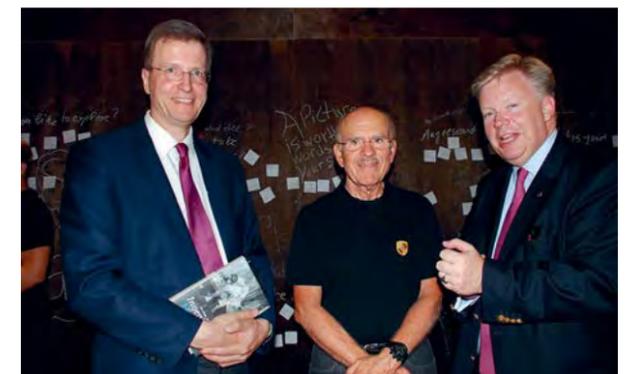
Matthias Steltzner, Lindau Alumnus 1981 and Professor at the University of California, Los Angeles, Nobel Laureate Louis Ignarro, and Nikolaus Turner at the "Brain" exhibition at the ESMoA, El Segundo, California on 5 November 2016

"Peter Badge shows us the wonderful gifts that make Nobel Laureates unique – and how they help us connect our interesting differences to our common humanity."

Bill Clinton, former President of the United States of America



Peter Badge, Nobel Heroes
400 black-and-white photographs
Quadrotone, Two clothbound hardcover books housed in a slipcase
€ 85.00 / £ 75.00 / US\$ 100.00, ISBN 978-3-95829-192-8



Sketches of Science

The concept of German photographer Volker Steger's series "Sketches of Science" is simple: ask Nobel Laureates to draw their research with crayons and photograph them with their sketch. The results, however, are as varied as the personalities of the laureates themselves. Sometimes reflective, but sometimes also quirky and a lot of fun.

In his photos, Volker Steger captures the spontaneity and creativity of Nobel Laureates; the pictures express the enthusiasm of scientists and researchers for their work. An exhibition of 50 photos of the series was launched at the Nobel Museum in Stockholm in June 2012, and has been on tour around the globe ever since.

The following countries have hosted „Sketches of Science“ so far: Germany, Japan, Malaysia, the Russian Federation, Singapore, South Korea, Sweden and the United States.

 An artbook with a wide selection of sketches is available for download in the mediatheque.

Exhibitions 2016
Stockholm, Sweden
Nobel Museum
16 March – 4 September 2016

Project Partner
Nobel Museum, Stockholm

Principal Funder
Klaus Tschira Stiftung

2016 Sketch: Hiroshi Amano, Nobel Laureate in Physics 2014, is one of the co-inventors of blue LED lights.



Nobel Museum, Stockholm



AAAS 2016 Annual Meeting

For the first time, the Lindau Nobel Laureate Meetings have been among the exhibitors at the Annual Meeting of the American Association for the Advancement of Science (AAAS), together with the Heidelberg Laureate Forum (supported by the Klaus Tschira Stiftung). The 2016 AAAS meeting took place from 11 to 15 February in Washington, DC.

The joint booth provided detailed information for young scientists interested in participating in either meeting as well as for potential academic partners and supporters.

The overarching theme of this year's AAAS meeting was "Global Science Engagement": Among the topics discussed in the meeting sessions were science in Africa, science communication and initiatives to raise interest for the natural sciences in primary schools.

John Mather, Nobel Laureate in Physics 2006, giving a presentation at the AAAS 2016 Annual Meeting



Vinton Cerf visiting the joint Lindau Meeting and HLF booth



LUNCHEON FOR NOBEL LAUREATES AND ALUMNI OF THE LINDAU MEETINGS
upon invitation of the German Ambassador to the United States Peter Wittig

"MEET WITH NOBEL LAUREATES"
hosted by the German Embassy, Washington, DC

Photo Exhibition
"NOBELS" and "Masters of Abstraction" by Peter Badge

Panel Discussion
– William Phillips, Nobel Laureate in Physics 1997
– Vinton Cerf, ACM A.M. Turing Award Winner 2004
– Yexica Aponte, alumna 2005, Lindau Nobel Laureate Meetings
– Kristina Mallory, alumna 2015, Heidelberg Laureate Forum
– Robin Mishra, Head of Science at the German Embassy (Moderator)

Reception at the German Embassy: (front row) Countess Bettina Bernadotte, Nobel Laureate Wally Gilbert, German Ambassador Peter Wittig, alumna Julia Nepper, Nobel Laureates Eric Maskin, Peter Agre and Ferid Murad



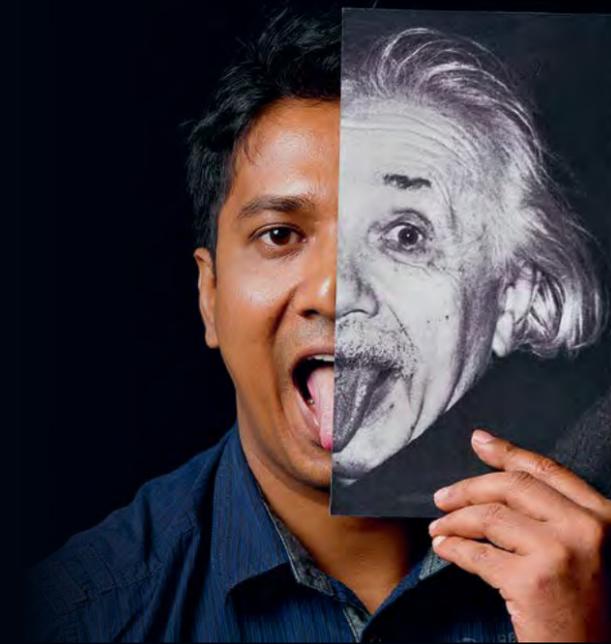
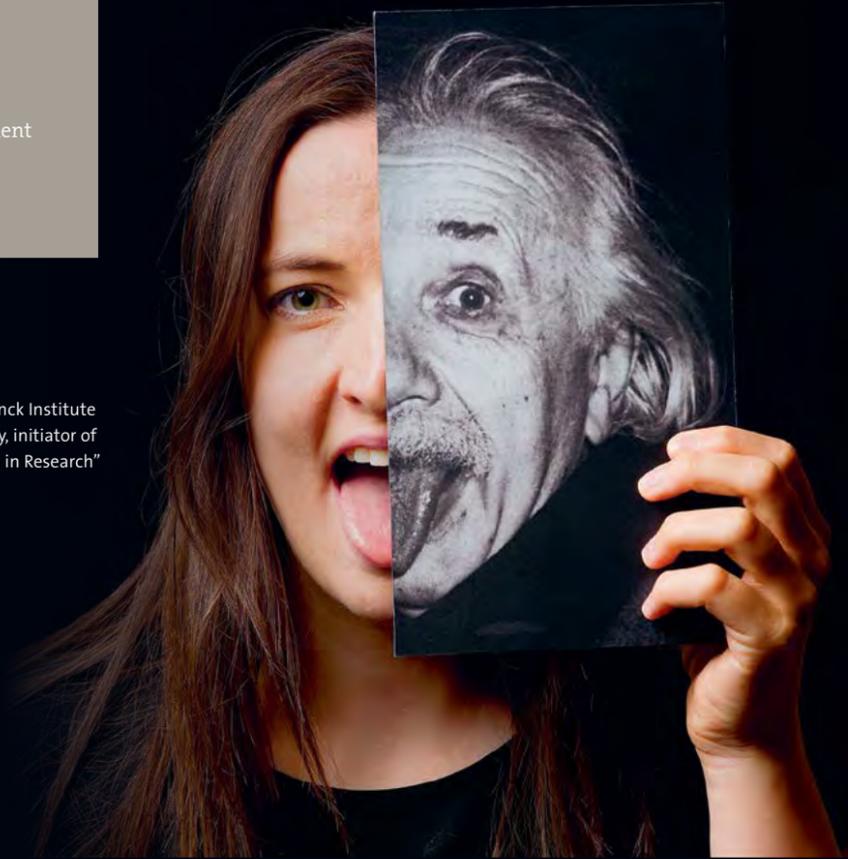
Peter Wittig and Countess Bettina Bernadotte



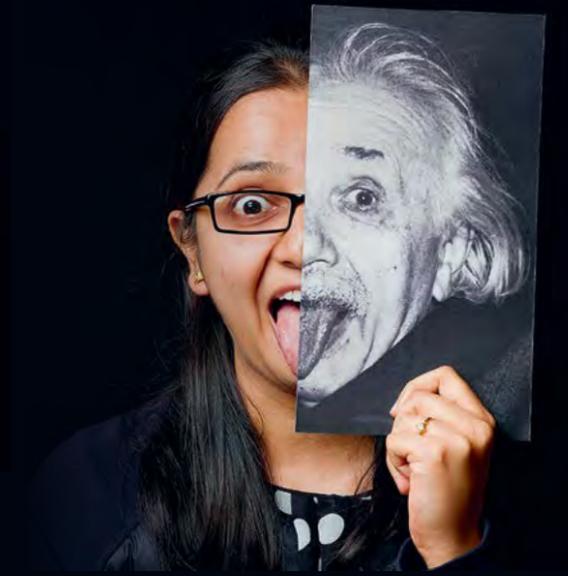
In Every Physicist There is a Bit of Einstein

Photo series by Frank Röth for "Zukunftslabor Lindau", a supplement of the German daily Frankfurter Allgemeine Zeitung

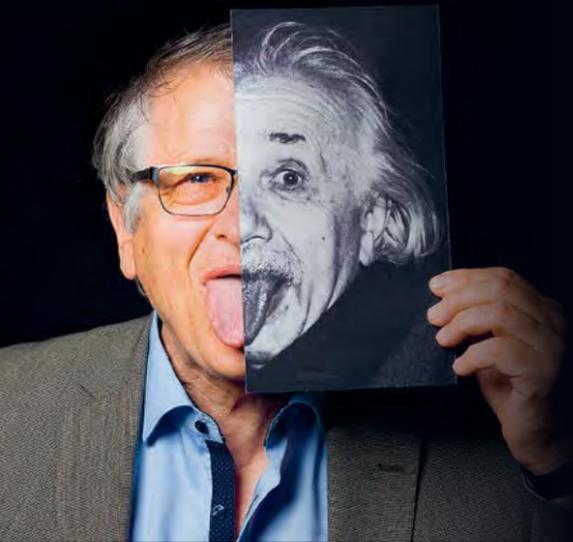
Ulrike Böhm, Max Planck Institute for Biophysical Chemistry, initiator of "Women in Research"



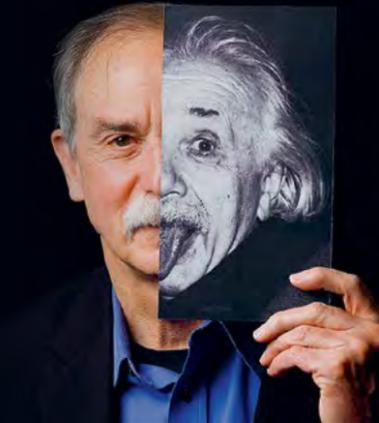
Anock Somadder, Shahjalal University of Science and Technology, Bangladesh



Smitha Narayanamurthy, Max Planck Institute for Solar System Research, Germany



Klaus von Klitzing, Nobel Laureate in Physics 1985, Max Planck Institute for Solid State Research, Germany



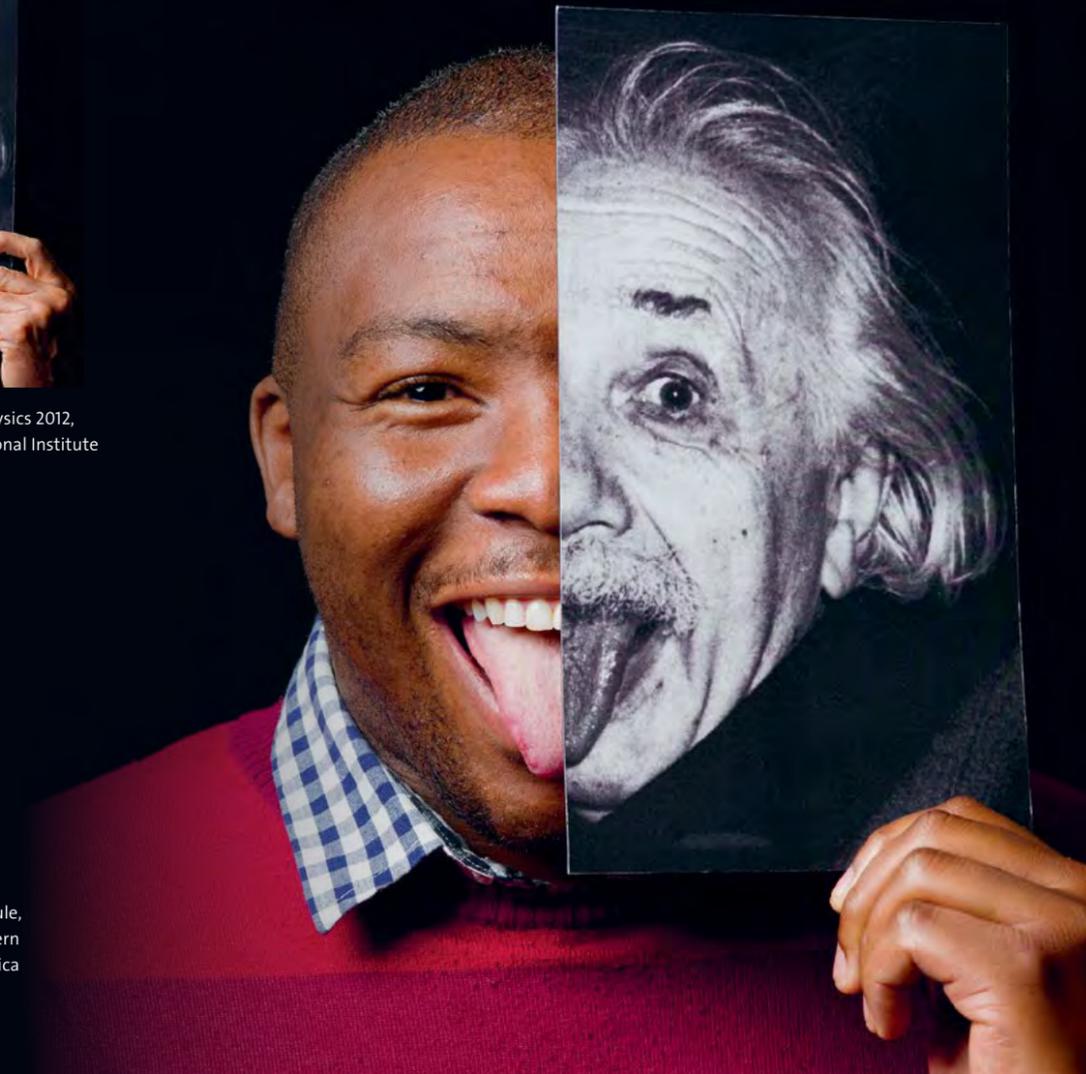
David J. Wineland, Nobel Laureate in Physics 2012, Physical Measurement Laboratory, National Institute of Standards and Technology, USA



Stefan Hell, Nobel Laureate in Chemistry 2014, Max Planck Institute for Biophysical Chemistry, Germany



Maria Diakaki, CEA-Saclay IRFU/SPhN, France



Siyambonga Matshawule, University of the Western Cape, South Africa

Communications

» Media Coverage & Partnerships

About 100 journalists and communications professionals from 20 countries attended the 66th Lindau Nobel Laureate Meeting. For them, the various lectures, panel discussions and special press events were an ideal opportunity to gather interesting topics from science and research and to get in touch with Nobel Laureates and young scientists.

The Lindau Meetings have been sustaining premier media partnerships for a long time. These partners played a key role in reporting on the meeting, its subjects and participants:

- Bayerischer Rundfunk & ARD-alpha
- Deutsche Welle
- Frankfurter Allgemeine Zeitung
- Nature Publishing Group
- Physics World
- Schwäbische Zeitung with Lindauer Zeitung

First pages of editorial supplements covering #LiNo16 in Germany's two most important dailies Frankfurter Allgemeine Zeitung (left) and Süddeutsche Zeitung (right)



» Science Journalist Networks

The continued cooperation with influential networks and associations of science journalists exemplifies the Lindau Meetings' beneficial media relationships and ensures broad coverage:

- Association des Journalistes Scientifiques de la Presse d'Information (AJSPI)
- European Union of Science Journalists (EUSJA)
- International Journalists' Programmes (IJP)
- National Association of Science Writers (NASW, USA)

TV talk „alpha-Forum extra“ featuring German Federal Minister of Education and Research Johanna Wanka (second from left)



Press talk on artificial intelligence presented by Frankfurter Allgemeine Zeitung

Nobel Laureate Dan Shechtman interviewed by science writer and comedian Brian Malow

» Press Talks

Three topical press talks jointly organised with media partners took place at #LiNo16.

“SCIENTISTS IN MOTION: HOW IMMIGRATION CONTINUES TO SHAPE THE SCIENTIFIC WORLD”
presented by Physics World

A recent study by Physics World showed that more than 25 % of physics Nobel Laureates are immigrants, a figure that reflects the importance of human migration in science. Scientists move country for many different reasons. Some are seeking better professional opportunities while others move for family reasons. And unfortunately, some scientists are forced to leave their home countries to escape political or religious persecution. This panel explored immigration through the personal experiences of Nobel Laureates and students and looked at the pros and cons of having a highly mobile scientific workforce.

- Panellists**
- Winifred Atiah, Kwame Nkrumah University of Science and Technology, Ghana
 - Martin Karplus, Nobel Laureate in Chemistry 2013, Harvard University, USA
 - Ana Maldonado, University of St Andrews, United Kingdom
 - Dan Shechtman, Nobel Laureate in Chemistry 2011, Technion, Israel

Moderator
Hamish Johnston, Physics World

Winifred Atiah sharing perspectives on intra-African migration at the Physics World press talk



“WOMEN IN SCIENCE”
presented by Deutsche Welle

From presidents to scientists: if ever it's a woman, she's the “first woman.” And how much longer will it be before societies around the world are normalised to the idea, the fact, of women holding top science jobs, earning equal pay (to their male counterparts), and that women push boundaries in research as hard, if not harder sometimes, than some men. We may have a growing awareness that there's an issue, but we still lack understanding and action.

- Panellists**
- Ulrike Böhm, biophysicist and initiator of “Women in Research”, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany
 - Takaaki Kajita, Nobel Laureate in Physics 2015, University of Tokyo, Japan
 - Helga Nowotny, Vice-President, Council for the Lindau Nobel Laureate Meetings

Moderator
Zulfikar Abbany, Deutsche Welle

“RESEARCH 4.0: CAN ARTIFICIAL INTELLIGENCE GET BETTER THAN SCIENTISTS IN CREATING EXPERIMENTS?”
presented by Frankfurter Allgemeine Zeitung

Robots and artificial intelligence are about to revolutionise the industrial and private sector – and scare the public, if they are envisaged for military purposes. Will research robots replace human researchers one day? During the FAZ press talk, the panellists discussed what kind of cooperation with deep learning AI systems was conceivable and how the scientific training for young academics might change. Is there a need to focus science education stringently on programming skills to keep control over this process?

- Panellists**
- Rainer Blatt, Scientific Co-Chairman of #LiNo16, University of Innsbruck, Austria
 - Vinton Cerf, ACM A.M. Turing Award Winner 2004, Google Chief Internet Evangelist
 - Mario Krenn, Vienna Center for Quantum Science and Technology, Austria
 - Arrykrishna Mootoovalo, University of Cape Town, South Africa
 - Yuan-sen Ting, Harvard University, USA

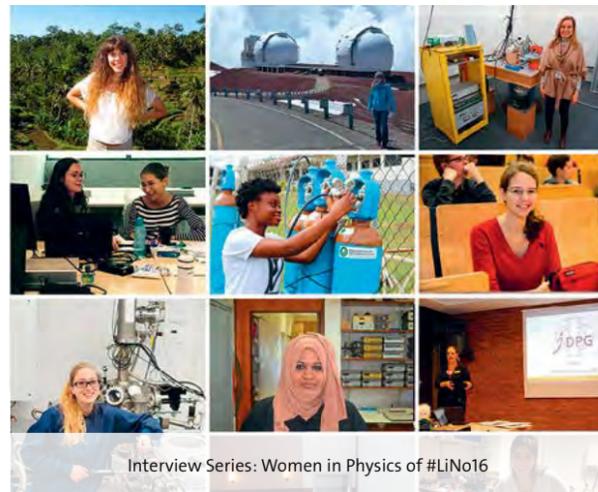
Moderator
Joachim Müller-Jung, Frankfurter Allgemeine Zeitung

The Lindau Meetings Online

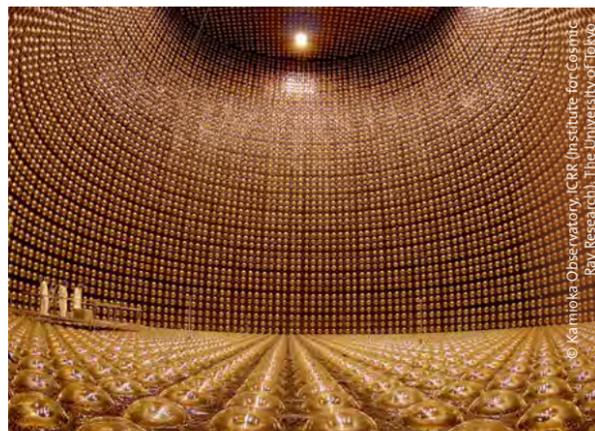
» Website and Blog

Over the years, the blog has become an integral component of lindau-nobel.org, not only during meeting season but all year round. With contributors so far ranging from professional science writers to young scientists and even Nobel Laureates, the blog will celebrate its 1,000th post sometime next year. It regularly features articles on research news and science history, background stories on the meetings as well as interviews with their participants, and thus shapes the face of the Lindau Meetings' digital identity.

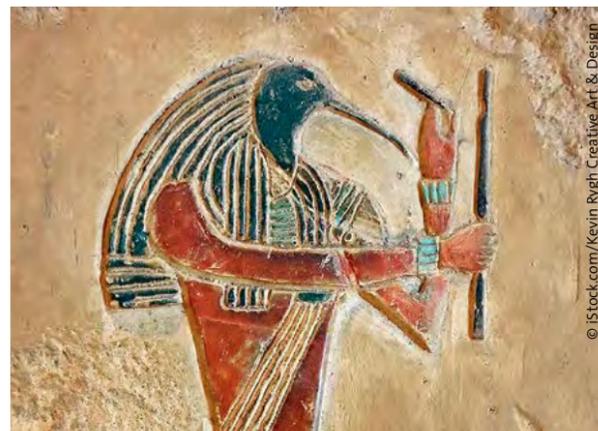
➤ This is just a small selection of the topics covered in 2016. For more please visit lindau-nobel.org/blog



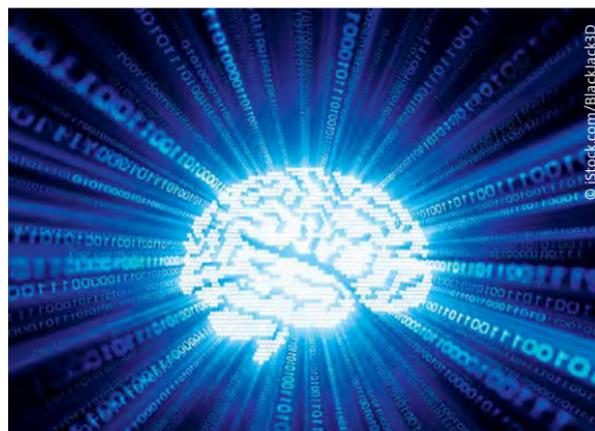
Interview Series: Women in Physics of #LiNo16



Takaaki Kajita & Art McDonald – The Neutrino Catchers



Science in Ancient Egypt & Today – Connecting Eras



Artificial Intelligence and Neurobotics



A Driving Force Towards Peace: Scientific Cooperation

» Social Media

The Lindau Meetings' leitmotif includes the word "Connect" for a reason – since the beginnings, it has always been one of the meetings' mission statements to bring people together to incite dialogue. Therefore, the incorporation of today's social media culture into the "Lindau spirit" comes only natural.

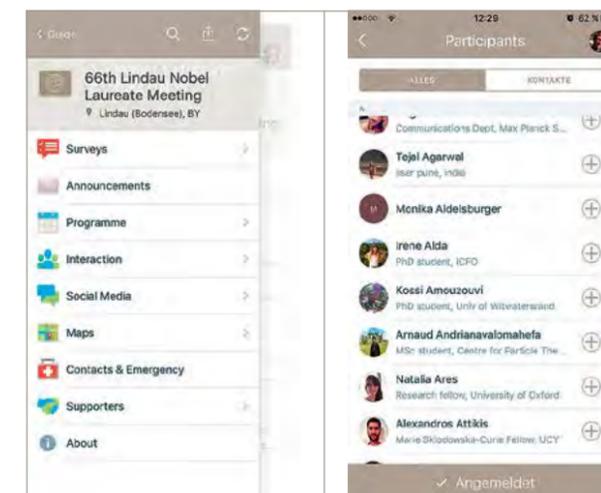
Meeting App

For the first time, the Lindau Meetings offered their own smart-phone application for all participants to download onto their Mac OS and Android devices. The app allowed for the creation of personal timetables, contained all relevant information on the programme sessions and also included extended networking opportunities. The amount of positive feedback received makes continued usage at future meetings highly probable.

Facebook

The official Facebook page of the Lindau Nobel Laureate Meetings just recently celebrated its 10,000th fan. Here, the Lindau Meetings post, share and like their own and their partners' content and vividly discuss science-related topics with the community. One of this year's highlights was science comedian Brian Malow using the relatively new Facebook Live feature while strolling through the city of Lindau meeting everyone from Nobel Laureates to young scientists and even local politicians in the process.

#LiNo16 meeting app



Twitter

Meeting participants seemingly love to engage in live communication. Where else could you think of finding poignant summaries of Nobel Prize-winning research in just 140 characters? In the past few years, Twitter usage at the Lindau Meetings has led to the respective meetings' hashtags trending in Germany many times throughout the meeting weeks.

FlickrR

Whether to relive some memories of the meeting participation or being in search of high quality pictures for reporting on the Lindau Meetings – the FlickrR photostream is home to hundreds of pictures. Editorial use is free but the copyrights must be indicated accordingly.

YouTube

A handpicked selection of the footage offered in the mediatheque is also available on the popular video platform as a means to increase awareness of the Lindau Meetings and to spread some of the educational content within a medium widely used by a younger audience.

#LiNo16 participant Lekhal Kaddour



 @ZaraBagdasarian

Extremely flattered to be accepted to participate in the Lindau Nobel Laureate Meeting!!! And so much nerdy excitement! #LiNo16
Zara Bagdasarian, Forschungszentrum Jülich, Germany

 @GhadaBassioni

#LiNo16 Educate, inspire, connect! It's your call, dear young scientists! Enjoy the Lindau spirit and make the best out of it!
Ghada Bassioni, Alumna 2012, Head of the Chemistry Department, Ain Shams University, Egypt

 @AstroJoeC

Klas Kärre of The Nobel Assembly says the Lindau Meetings play a vital role in Nobel's vision – inspiring the next generation #LiNo16
Joe Callingham, University of Sydney, Australia

 @AdrianaMarais

What a privilege to interact with some of the best minds of our time! So excited for #LiNo16
Adriana Marais, University of KwaZulu-Natal, South Africa

 @GermanyInCanada

5 young scientists from Canada (400 from 80 countries) currently @ #LiNo16/@lindaunobel in Germany ...Thanks @CIHR_IRSC
German Embassy Ottawa, Canada

 @sarahmileywild

"Most of our discoveries were found by having fun in the laboratory." – Theodor Hänsch #LiNo16
Sarah Wild, Science Writer, South Africa

 @MarsGlobal

We're at the forefront of science with @lindaunobel bringing together the world's best scientists #LiNo16
Mars, Incorporated

 @ScharingerH

Only by innovation we'll solve future energy problems and reach climate goals of COP-21. Follow #LiNo16
Konrad Max Scharinger, Former German UN-Ambassador in Vienna

 @KiraRadinsky

Great honor to speak about accelerating scientific breakthroughs using AI at the Lindau Nobel Laureate meeting! #LiNo16
Kira Radinsky, Technion, Israel

 @AIP_Potsdam

Jenny Sorce, cosmologist and Humboldt Fellow at AIP, has been selected to participate in the Lindau Nobel Laureate Meeting #LiNo16
Leibniz-Institute for Astrophysics Potsdam, Germany

 @Astriek

The Indian team for @lindaunobel Arrives at Lindau for an amazing week ahead! #LiNo16 #LiNo16
Nishchal Dwivedi, Bhabha Atomic Research Centre, India

 @MBastarrachea

Ready to participate in the 66th Lindau Nobel Meeting. Very excited. On behalf of Mexico. #LiNo16 @icnunam
Miguel Bastarrachea, Universidad Nacional Autónoma de México

 @UChicagoPSD

Congrats to Logan Clark, selected to attend the 66th @lindaunobel Laureate Mtg this summer! #LiNo16, a huge honor!
University of Chicago, Division of Physical Sciences

 @IrishResearch

Four young Irish researchers to meet their science heroes in #LiNo16 this week
Irish Research Council

 @RehakKatrin

Benefit to mankind, responsibility and science belong together. #LiNo16
Katrin Rehak, Head of the Department of Science, Robert Bosch Stiftung

 @SphumeNdlovu

Thanks to #LiNo16 for a wonderful experience.
Sphumelele Ndlovu, University of KwaZulu-Natal, South Africa

 @egwene_

We witnessed not one but two Nobel Laureate's birthdays. We even sang the happy birthday song! What a privilege #LiNo16
Gözde Tütüncüoğlu, École polytechnique fédérale de Lausanne, Switzerland

 @AlainaGlevine

#LiNo16 @lindaunobel @NobelPrize David Gross: #physics is a heroic journey #nerdheaven
Alaina Levine, Science Writer, USA

 @matt_bigscience

#LiNo16 @lindaunobel "Gravity of the short-term shortens our horizons" (Prof. Schürer) – think science, think big ideas, think long-term.
Matthias Evers, Senior Partner, McKinsey & Company

 @ASSAf_Official

ASSAf has been named as a new Academic/Nominating partner to the Lindau Nobel Laureate Meetings @dstgovza #LiNo16
Academy of Sciences, South Africa

 @mriblett

It's so great to hear the experiences of so many Laureates. Maybe one day I'll be on the stage with them... #LiNo16
Matthew Riblett, Virginia Commonwealth University, USA

 @j_jobst

It's incredible to hear Samuel Ting talk who knew #Heisenberg and #Dirac. #sciencehero at #LiNo16
Johannes Jobst, University of Leiden, Netherlands

 @FernandodeJuan

Steven Chu's clarity and breadth are absolutely impressive. A true role model for any scientist #LiNo16
Fernando de Juan, University of California, Berkeley, USA

 @syerolatsitis

Goodbye Lindau! It was an amazing week. Meeting the "giants" in person & talking with so many people from all over the world! Thnx! #LiNo16
Stephanos Yerolatsitis, University of Bath, United Kingdom

 @lolafarinas

#NobelLaureate Karplus tells #YoungScientists: u should stick to an idea even when nobody thinks it's useful #LiNo16
Lola Fariñas, Spanish National Research Council, Spain

 @swaforini

@lindaunobel thanks for a brilliant program, a generous invitation and a visionary endeavor. Will keep working together #LiNo16
Angela Posada-Swafford, Science Writer, Colombia

 @bregenzfestival

The blue carpet is prepared, we are happy to welcome @lindaunobel this evening at the lake stage in Bregenz. #LiNo16
Bregenzer Festspiele, Austria

 @Ulrike_Boehm

#WilliamPhillips talks briefly about Josephson junctions & interacts with #BrianJosephson. Only possible at #LiNo16
Ulrike Böhm, physicist, "Women in Research", Germany

 @wolfgang_huang

Let's all say a big thank you to the academic partner reps of #LiNo16. No one would be here without their work!
Wolfgang Huang, Director of the Executive Secretariat, Lindau Nobel Laureate Meetings

 @ARD_alpha

#LiNo16 we wish you all a pleasant journey home! Thank you for the great stories. Your ARD-alpha blog team
ARD-alpha, Germany's public educational TV channel

 @PhysicsBliss

"Ladies and gentlemen the state of the Universe is very good" – Brian Schmidt @cosmicpinot #LiNo16 #cosmology
Donald Lee-Brown, University of Kansas, USA

 @meeri_kim

At the beautiful Mainau Island for the closing day of #LiNo16. Had such a wonderful time! Thanks to @lindaunobel
Meeri Kim, Science Writer, USA

#LiNo16
Trending on Twitter

Lennart-Bernadotte-Haus

The Lennart-Bernadotte-Haus in Lindau has become the property of the Foundation Lindau Nobel Laureate Meetings, thanks to a significant donation to the Foundation's endowment from German foundation Klaus Tschira Stiftung (KTS). The building with the address Alfred-Nobel-Platz 1 serves as the seat of the executive secretariat of the Council as well as the office premises of the Foundation. The donation by the KTS in 2015 not only enabled the acquisition of the house but also its extensive renovation and the expansion of the offices. Income from rent and lease ensures lasting revenues for the Foundation.

In addition, the Swiss elevator manufacturer Schindler Group donated a lift to be attached to the Lennart-Bernadotte-Haus in order to provide barrier-free access to all three floors. With the installation of up-to-date lighting and new office furniture – donations from the companies Zumtobel Lighting and Lista Office – optimal working conditions for the 16 employees were created.

On the occasion of the opening of the 66th Lindau Meeting, a plaque in memory of the late Klaus Tschira was unveiled on the building front.

Gerda Tschira, the wife of late Klaus Tschira, stated in her address: "Even though my husband has renounced his participation in many other conferences – he has not missed the Lindau Nobel Laureate Meetings for many, many years. The conversations with the young scientists from all over the world and with the Nobel Laureates of various disciplines were extremely important to him and have always inspired and encouraged my husband Klaus to develop new projects with his foundation. In Heidelberg, he founded the 'Heidelberg Laureate Forum' (HLF) in 2013. His intention was to provide mathematicians and computer scientists with a similar networking meeting as the Lindau Nobel Laureate Meetings have been doing for the natural sciences for many decades. Thus, the support for the acquisition of the Lennart-Bernadotte-Haus for the Foundation Lindau Nobel Laureate Meetings was a matter close to his heart."

Klaus Tschira Stiftung

Klaus Tschira, one of the most dedicated supporters of the Lindau Meetings, died unexpectedly in 2015. A physicist and co-founder of the software company SAP, Tschira had established the foundation Klaus Tschira Stiftung (KTS) in 1995 to promote the natural sciences, mathematics and computer science. Tschira attended the Lindau Meetings regularly and became a dear friend and trusted advisor to the boards of the Council and the Foundation. He was inducted into the Honorary Senate of the Foundation in 2013. Today, the KTS is one of Europe's largest privately funded non-profit foundations and is jointly managed by Beate Spiegel, Harald Tschira and Udo Tschira.

Countess Bettina Bernadotte and Beate Spiegel, Managing Director, Klaus Tschira Stiftung



External lift provided by Schindler Group



Countess Bettina Bernadotte and Gerda Tschira in front of the commemorative plaque

Lennart-Bernadotte-Haus



Tour through the Lennart-Bernadotte-Haus: Astrid Gräslund, Member of the Council, Gabriele Kluge and Nobel Laureate Stefan Hell

Inspiring Lindau

» Explaining the Nobel Prizes

It has become a tradition at the beginning of a new year that the Council invites Lindau citizens for a lecture programme and an ensuing reception to celebrate the awarding of the latest Nobel Prizes. In January 2016, a Council member, two alumni and a guest lecturer gave comprehensible and entertaining presentations to explain the research findings of the laureates being awarded the Nobel Prize in 2015.

Presentations

“THE SVERIGES RIKSBANK PRIZE IN ECONOMIC SCIENCES IN MEMORY OF ALFRED NOBEL: ANGUS DEATON”

Caroline Chuard, participant in the 5th Lindau Meeting on Economic Sciences 2014, doctoral candidate in Economic Sciences, University of Zurich

“THE NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE: YOUYOU TU, WILLIAM C. CAMPBELL AND SATOSHI OMURA”

Heinz Drexel, head of the department of internal medicine and cardiology, State Hospital Feldkirch, Austria

Caroline Chuard and Christoph Plate



“THE NOBEL PRIZE IN CHEMISTRY: TOMAS LINDAHL, PAUL L. MODRICH AND AZIZ SANCAR”

Isabelle T. Holder, participant in the 63rd Lindau Meeting 2013, Life Science Consultant, Tuttlingen, Germany

“THE NOBEL PRIZE IN PHYSICS: TAKAAKI KAJITA AND ARTHUR B. MCDONALD”

Rainer Blatt, Member of the Council and scientific co-chairman of the 66th Lindau Meeting, Professor of Experimental Physics at the University of Innsbruck, Scientific Director of the Institute for Quantum Optics and Quantum Information (IQOQI) of the Austrian Academy of Science

Moderator

Christoph Plate, Deputy Editor-in-Chief, Schwäbische Zeitung

Partners

City of Lindau and Schwäbische Zeitung/Lindauer Zeitung

Isabelle T. Holder



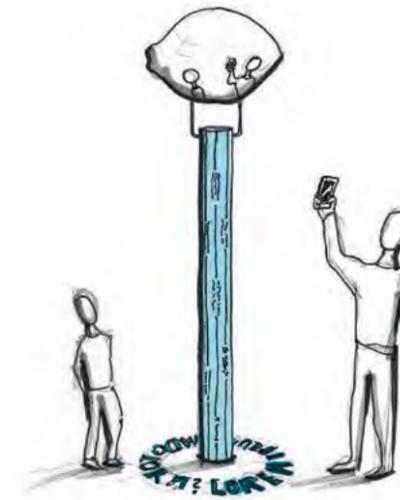
Heinz Drexel

» Science Trail

Science should not be something exclusive but an open resource available to everyone at all times. This guiding principle of the Lindau Nobel Laureate Meetings is inherent in the “Science Trail”, a project that will be accessible in Lindau by summer 2017.

The trail will comprise 21 locations: 15 so-called “knowledge pylons” – reflecting sculptures that will garner attention already from far away – are planned on the island of Lindau. In addition, three stations will be erected on the mainland of Lindau and on Mainau Island on the other side of Lake Constance.

The pylons pick up on findings in the natural and economic sciences. The respective topic is always directly connected to the site – thus, a station at the lighthouse at Lindau harbor will discuss the various findings on the subject of light. It also contains links to the respective Nobel Laureates who have been awarded in this particular field. In recognition of the nearly 430 Nobel Laureates who participated in the Lindau Meetings since 1951, the trail will include a central station directly at the conference venue Inselhalle.

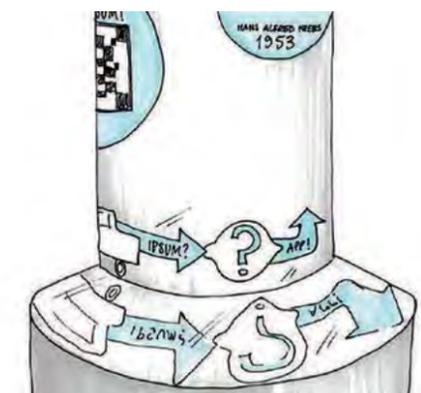
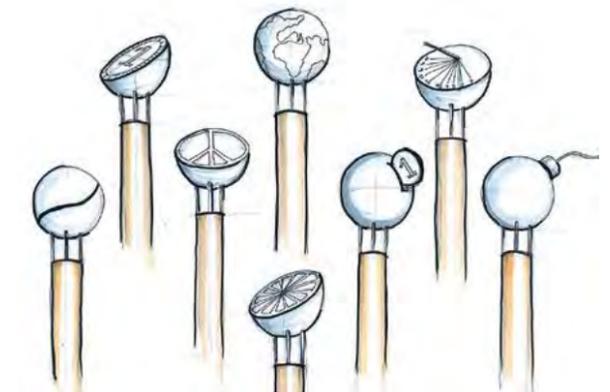


Draft of a “knowledge pylon” as part of the Science Trail

Detailed view of the bottom of a pylon with information specifically aimed at children

Particularly students and schools are to be actively involved through guided tours along the Science Trail. With a quiz for students and a smartphone app, the young generation can discover the exciting world of science. By means of augmented reality functions, the real world can merge with the virtual, and the visitor can take immediate reference to both worlds. In-depth information, e.g. audio interviews, videos, or references to the next stations of the trail becomes visible. Through cross-references and integration of the mediatheque, users can access the vast archive of the Lindau Meetings and deepen the learning experience.

The official inauguration of the Science Trail is planned as part of the 67th Lindau Nobel Laureate Meeting in 2017. The whole project can be realised thanks to a substantial funding of the Prof. Otto Beisheim-Stiftung.



The Council and the Foundation

» The Council

The Council for the Lindau Nobel Laureate Meetings was founded in 1954, three years after the first Lindau Meeting, to secure their existence and shape their future development. Count Lennart Bernadotte, one of the three founders of the meetings, became the first president of the Council.

The purpose of the Council is to organise the annual meetings on the basis of an elaborate scientific programme. This includes the establishment and maintenance of close relations with scientific partners worldwide.

The Council will ensure that eligible and qualified young scientists get the chance to participate in the Lindau Meetings. In this regard, the Council is also responsible for the acquisition of financial means for organising the meetings – in close collaboration with the Foundation. The Council maintains an executive secretariat at Lindau.

Honorary President

Count Lennart Bernadotte †

Board

Countess Bettina Bernadotte af Wisborg
President

Wolfgang Lubitz

Vice-President

Helga Nowotny

Vice-President

Nikolaus Turner

Treasurer

Members

Rainer Blatt

Thomas Ellerbeck (Spokesman)

Astrid Gräslund

Martin F. Hellwig

Klas Kärre

Stefan H. E. Kaufmann

Hartmut Michel

Torsten Persson

Reinhard Pöllath

Corresponding Members

Lars Bergström

Hans Jörnvall

Sten Orrenius

Klaus Schmidt (as of 10/2016)

Permanent Guests

Gabriela Dür (until 10/2016)

Gerhard Ecker

Thomas Gruber (as of 10/2016)

Urs Schwager (as of 10/2016)



Astrid Gräslund, Reinhard Pöllath, Wolfgang Lubitz, Wolfgang Schürer, Countess Bettina Bernadotte, Jürgen Kluge, Torsten Persson, Lars Bergström, Nikolaus Turner, Gabriela Dür, Klas Kärre, Rainer Blatt, Thomas Ellerbeck

» The Foundation

The Foundation Lindau Nobel Laureate Meetings was established in the year 2000 upon the initiative of fifty Nobel Laureates.

The Foundation's general objective is to promote science, research, and related societal activities. In particular, its main purpose is to ensure the continuance and further development of the Lindau Meetings. This includes the support of outreach projects and initiatives.

The Foundation is registered on Mainau Island. In the interest of a close collaboration with the Council, the office of the Foundation is also based in Lindau.

Honorary Presidents

Count Lennart Bernadotte †

Roman Herzog

Honorary Chairman

Wolfgang Schürer

Board of Directors

Jürgen Kluge

Chairman

Nikolaus Turner

Managing Director

Countess Bettina Bernadotte af Wisborg

Thomas Ellerbeck

Reinhard Pöllath

Thomas Ellerbeck, Reinhard Pöllath, Jürgen Kluge, Countess Bettina Bernadotte, Nikolaus Turner (from left)



Founders Assembly

The Foundation Lindau Nobel Laureate Meetings was established in 2000 by 50 Nobel Laureates, the Bernadotte family, and Council members. Through their membership in the Founders Assembly, Nobel Laureates demonstrate their strong support of the Lindau Meetings. By the end of 2016, 314 Nobel Laureates constitute the assembly.

Alexei Abrikosov	Yves Chauvin
Peter Agre	Steven Chu
Martti Ahtisaari	Aaron Ciechanover
Isamu Akasaki	Ronald H. Coase
George A. Akerlof	Stanley Cohen
Svetlana Alexievich	Claude Cohen-Tannoudji
Zhores Alferov	Leon Cooper
Maurice Allais	Elias J. Corey
Sidney Altman	John Warcup Cornforth
Hiroshi Amano	Mairead Corrigan Maguire
Philip W. Anderson	James W. Cronin
Werner Arber	Paul J. Crutzen
Kenneth J. Arrow	Robert F. Curl jr.
Robert J. Aumann	Angus Deaton
Richard Axel	Hans G. Dehmelt
Julius Axelrod	Johann Deisenhofer
David Baltimore	Peter A. Diamond
Francoise Barré-Sinoussi	Peter C. Doherty
Gary S. Becker	Renato Dulbecco
Johannes Georg Bednorz	Christian de Duve
Baruj Benacerraf	Gerald Edelman
Paul Berg	Manfred Eigen
Hans A. Bethe	Robert Engle
Eric Betzig	François Englert
Bruce A. Beutler	Richard R. Ernst
Gerd Binnig	Gerhard Ertl
J. Michael Bishop	Leo Esaki
Sir James Black	Martin Evans
Elizabeth H. Blackburn	Eugene F. Fama
Günter Blobel	John B. Fenn
Nicolaas Bloembergen	Albert Fert
Baruch S. Blumberg	Edmond Fischer
Paul D. Boyer	Ernst Otto Fischer
Sydney Brenner	Robert W. Fogel
James M. Buchanan	Jerome Friedman
Linda Buck	Milton Friedman
William Campbell	Robert F. Furchgott
Mario R. Capecchi	D. Caletan Gajdusek
Jimmy Carter	Andre Geim
Thomas R. Cech	Murray Gell-Mann
Martin Chalfie	Riccardo Giacconi
Georges Charpak	Ivar Giaever

Walter Gilbert
 Alfred G. Gilman
 Vitaly L. Ginzburg
 Donald Glaser
 Sheldon L. Glashow
 Roy J. Glauber
 Joseph L. Goldstein
 Mikhail Gorbachev
 Clive Granger
 Paul Greengard
 David J. Gross
 Robert H. Grubbs
 Peter Grünberg
 Roger Guillemin
 John B. Gurdon
 Theodor W. Hänsch
 John L. Hall
 Lars Peter Hansen
 Serge Haroche
 Lee Hartwell
 Herbert A. Hauptman
 Harald zur Hausen
 Richard F. Heck
 Alan C. Heeger
 Stefan Hell
 Dudley R. Herschbach
 Avram Hershko
 Antony Hewish
 Peter Higgs
 Jules A. Hoffmann
 Roald Hoffmann
 Gerardus 't Hooft
 H. Robert Horvitz
 David H. Hubel
 Robert Huber
 Russel Hulse
 John Hume
 Timothy Hunt
 Leonid Hurwicz
 Andrew F. Huxley
 Louis Ignarro
 Brian Josephson
 Daniel Kahneman
 Tahaaki Kajita
 Eric R. Kandel
 Charles K. Kao
 Jerome Karle
 Murray Karman
 Martin Karplus
 Imre Kertész

Wolfgang Ketterle
 Har Gobind Khorana
 Lawrence R. Klein
 Frederik Willem de Klerk
 Klaus von Klitzing
 Aaron Klug
 Makato Kobayashi
 Brian K. Kobilka
 Walter Kohn
 Arthur Kornberg
 Roger D. Kornberg
 Masatoshi Koshihara
 Edwin Krebs
 Herbert Kroemer
 Harold W. Kroto
 Finn Kydland
 Willis E. Lamb
 Robert Laughlin
 Paul C. Lauterbur
 Leon M. Lederman
 David M. Lee
 Tsung-Dao Lee
 Yuan Tseh Lee
 Robert J. Lefkowitz
 Jean-Marie Lehn
 Rita Levi-Montalcini
 Michael Levitt
 Edward B. Lewis
 Tomas Lindahl
 William N. Lipscomb
 Robert E. Lucas Jr.
 Alan G. MacDiarmid
 Roderick MacKinnon
 Peter Mansfield
 Rudolph A. Marcus
 Harry M. Markowitz
 Barry Marshall
 Toshihide Maskawa
 Eric S. Maskin
 John C. Mather
 Arthur B. McDonald
 Daniel L. McFadden
 Simon van der Meer
 Craig C. Mello
 Bruce Merrifield
 Robert C. Merton
 Hartmut Michel
 James A. Mirrlees
 Mo Yan
 Paul Modrich

William E. Moerner
 Rudolf Mößbauer
 Mario Molina
 Luc Montagnier
 Dale T. Mortensen
 Edvard Moser
 May-Britt Moser
 Karl Alexander Müller
 Kary B. Mullis
 Robert A. Mundell
 Ferid Murad
 Joseph E. Murray
 Roger B. Myerson
 Shuji Nakamura
 Yoichiro Nambu
 John F. Nash jr.
 Ei-ichi Negishi
 Erwin Neher
 Marshall Nirenberg
 Douglass C. North
 Konstantin Novoselov
 Ryoji Noyori
 Christiane Nüsslein-Volhard
 Paul M. Nurse
 John O'Keefe
 George A. Olah
 Satoshi Ōmura
 Douglas Osheroff
 Arno Allen Penzias
 Saul Perlmutter
 Edmund S. Phelps
 William D. Phillips
 Christopher A. Pissarides
 John Polanyi
 John Pople
 Lord George Porter
 Edward C. Prescott
 Ilja Prigogine
 Venkatraman Ramakrishnan
 José Ramos Horta
 Norman F. Ramsey
 Robert Richardson
 Burton Richter
 Richard J. Roberts
 Heinrich Rohrer
 Joseph Rotblat
 Alwin Roth
 James E. Rothman
 F. Sherwood Rowland
 Carlo Rubbia

Bert Sakmann
 Paul A. Samuelson
 Bengt Samuelsson
 Aziz Sançar
 Frederick Sanger
 Thomas J. Sargent
 Kailash Satyarthi
 Andrew V. Schally
 Philip A. Scharp
 Randy W. Schekman
 Thomas C. Schelling
 Brian Schmidt
 Myron S. Scholes
 Melvin Schwartz
 John Robert Schrieffer
 Richard R. Schrock
 Reinhard Selten
 Amartya Sen
 William F. Sharpe
 K. Barry Sharpless
 Lloyd S. Shapley
 Dan Shechtman
 Robert J. Shiller
 Osamu Shimomura
 Kai M. Siegbahn
 Christopher A. Sims
 Ellen Johnson Sirleaf
 Jens C. Skou
 Richard Smalley
 Hamilton O. Smith
 Michael Smith
 Vernon L. Smith
 Oliver Smithies
 George F. Smoot
 Wole Soyinka
 Robert M. Solow
 Jack Steinberger
 Ralph M. Steinmann
 Thomas A. Steitz
 Joseph E. Stiglitz
 Thomas C. Südhof
 John Sulston
 Akira Suzuki
 Jack W. Szostak
 Henry Taube
 Joseph Taylor
 Samuel C. C. Ting
 Jean Tirole
 Susumu Tonegawa
 Charles H. Townes

Tomas Tranströmer
 David Trimble
 Roger Y. Tsien
 Daniel C. Tsui
 Desmond Mpilo Tutu
 Mario Vargas Llosa
 Harold E. Varmus
 Martinus Veltman
 John E. Walker
 Robin Warren
 Ariel Warshel
 James D. Watson
 Thomas H. Weller
 Carl E. Wieman
 Eric F. Wieschaus
 Elie Wiesel
 Torsten N. Wiesel
 Frank Wilczek
 Maurice H.F. Wilkens
 Jody Williams
 Robert Wilson
 David J. Wineland
 Kurt Wüthrich
 Rosalyn Yalow
 Shinya Yamanaka
 Chen Ning Yang
 Ada Yonath
 Muhammad Yunus
 Ahmed Zewail
 Rolf Zinkernagel



Eugene Fama, Nobel Laureate in Economic Sciences 2013, joined the Founders Assembly in 2016. Portrait from the photo series "Nobel Laureates photographed by Peter Badge".

Honorary Senate

In appreciation of his philanthropic engagement and as a tribute to his support for the Lindau Nobel Laureate Meetings dating back to the formation of the Foundation, member of the board of directors of LafargeHolcim Ltd Thomas Schmidheiny was appointed a member of the Honorary Senate of the Foundation Lindau Nobel Laureate Meetings.

Science-promoting institutions, companies, foundations and private philanthropists have played a key role in enabling more than 30,000 young scientists from 90 different countries to meet, learn from and interact with Nobel Laureates in the 66 years long history of the Lindau Meetings. The induction into the Foundation's Honorary Senate is a symbol of outstanding merits and true dedication to the Lindau Meetings' "Mission Education".

"Making bricks and cement, Dr. Schmidheiny's family built up a global enterprise that, today, stands for innovative products and services and a commitment to sustainable construction. [...] Promoting innovation, generating ideas, and challenging the status quo, seeking opportunities to work across boundaries, accepting different opinions, and finding common ground – these have always been Thomas Schmidheiny's guiding principles. Under his leadership, Holcim placed great importance on ecological and social performance. Dr. Schmidheiny kept urging the company to seek ways to minimise its global footprint. Holcim's consistent performance in this area is underscored by Dr. Schmidheiny's belief that a company's overall goal should be to create value, and that the base of value creation is composed of the people involved."

Jürgen Kluge, Chairman of the Board of Directors of the Foundation

Thomas Schmidheiny and Jürgen Kluge



"Let me take this opportunity to highlight two aspects which seem important to me and which are common to academia as well as business. First, globalisation cannot work without strong roots in the region where you come from or you reside. It was this combination of being grounded and in the same time being global that made Holcim and myself successful. Respect for nature at large gave me the strength to realise one of the very early programmes of sustainability within Holcim. The very positive aspect was that we had rapid followers within our industry and also in other sectors. Today, they are standard contents of all strategies. The second aspect: learning. I created over time a culture of fast learning and sharing. We called it "faster learning organisation". Learning can only happen if you have an open mind, spirit and heart. After more than 20 years of CEO and Chairman, I am quite proud of this type of organisation. [...] My conviction which I would like to share with you at the end of my remarks is the following: You like technology, but you love people! Once again, my sincerest thanks for the recognition I have obtained today and you certainly can count on my ongoing support."

Thomas Schmidheiny



In Loving Memory



James W. Cronin
1931–2016

Nobel Laureate in Physics 1980
Lindau Meetings:
1991, 2010, 2012, 2015



Reinhard Selten
1930–2016

Nobel Laureate in Economic Sciences 1994
Lindau Meetings:
1997, 2004, 2006, 2008, 2011, 2014



Walter Kohn
1923–2016

Nobel Laureate in Chemistry 1998
Lindau Meetings:
2000, 2004, 2005, 2006, 2009, 2010, 2012, 2013, 2014



Roger Y. Tsien
1952–2016

Nobel Laureate in Chemistry 2008
Lindau Meetings:
2009, 2010, 2011, 2014, 2015



Sir Harold Kroto
1939–2016

Nobel Laureate in Chemistry 1996
Lindau Meetings:
1998, 2000, 2002, 2005, 2009, 2010, 2011, 2012, 2013, 2015



Ahmed Zewail
1946–2016

Nobel Laureate in Chemistry 1999
Lindau Meeting:
2002

Guardians of the Future

In his farewell speech, Wolfgang Schürer, former Chairman of the Board of Directors of the Foundation, stressed the importance of intergenerational dialogue. The present generations will have to confront the future and ensure that in decisions of today the consequences for future generations are taken into account.



As I stand here on this stage, the past is evoked. This theatre hosted the early Lindau Nobel Laureate Meetings. One can imagine Max Born sitting here uncomfortably across from Werner Heisenberg, respecting his science but not his values, a letter in his breast pocket from Albert Einstein chastising Born for his return to Germany. Great drama but terse dialogue for the young researchers attending the early meetings.

This milieu of awkwardness, uncertainty, and trepidation emulates my own path to intergenerational dialogue. I was born in Germany just after the Second World War, as an Iron Curtain was being hung across Europe. My generation inherited a divided country, not just by borders, but across ages. We could not look to our parents for guidance as they were responsible for this devastation.

We inherited shame without the tools or language to grapple with the scale of moral and physical desolation. We had no common ground. Only through the writings of philosophers and theologians such as Paul Tillich's *The Courage to Be* and Reinhold Niebuhr's *The Self and the Dramas of History* did we begin to have a language to commence a journey to discourse and a path to value our lives, question authority and appreciate the universal values of humanity.

Yet, there are different ways to engage our elders and their institutions. In Paris, in 1968, students responded by protesting for change in a confrontational manner. But bridges had to be rebuilt: bridges spanning different nations, ethnicities, religions and ages. At the Hochschule in St. Gallen – just across the lake in Switzerland – where I studied, I believed students should not protest violently to overthrow institutions but rather address issues and engage for change. We created the International Students Symposium in 1969 to start a dialogue with politicians, scientists and captains of industry so they would understand the values of a younger generation, and so that we could understand the context and rationale of their decision-making. This urge to understand continued through my work and studies, though, as I grew older, I had to remind myself: no longer did I

represent the voice of youth, but indeed had become an elder endeavouring to be a sounding board...

Through my experiences I learned about mentorship. Being a mentor, or being mentored, is not an active-passive relationship. It is one that evolves through 'to and fro', short chats, conversations, frustrations, differences of opinions, arguments and laughter and shared moments of both failure and success. Time builds trust and the path to genuine communication, a bond, a friendship, and affection for the interlocutor. Listening to voices tuned to a different time allows one's perceptions to slowly shift and move from a perspective of self, a selfishness, to a more inclusive thinking.

Stimulating concern is imperative as we enter the Anthropocene where human actions influence the ecosystem and health of our planet. No longer just inhabitants of the planet, we are now its keepers. This brings upon us a responsibility of a magnitude we have never faced before for the well-being of the future. The paradox of modernity is that we have greater knowledge than ever before, yet the incentives for focusing on the immediate future are so strong: expediency, opinion polls, social media pressures, status, profits; we act in what we perceive as our short term interest. The gravity of the short-term lowers our time horizons.

Standing here on the stage the future provokes. The plot has not been written. The characters are yet to be. No great lines are delivered to inspire. How can we invest ourselves in this future?

Science shows us how we can converse with the future. Curiosity is the driving force, the aspiration to look beyond the boundaries of what we know. Scientists embark on a voyage into the unknown, pushing the frontiers ever further. They are covering new ground, widening our understanding of the world. In this endeavour, the scientific method serves as a compass to stay on course. An exemplar is Charles Keeling.

🐦 @j_jobst

What a glorious and inspiring speech!

Thank you Wolfgang Schürer! #LiNo16 #guardiansofthefuture
Johannes Jobst, University of Leiden, Netherlands

🐦 @matt_bigscience

#LiNo16 "Gravity of the short-term shortens our horizons"
(Prof. Schürer) – think science, think big ideas, think long-term.
Matthias Evers, Senior Partner, McKinsey & Company



Monika and Wolfgang Schürer

Dr. Keeling started measuring carbon dioxide levels in the atmosphere at Mauna Loa, Hawaii in 1957, and over the course of a life's work he changed our perception of humanity's connection with our planet. The integrity of his scientific method meant doubters were quietened. Keeling's science created the fierce urgency of the "now" to act upon Climate Change. Moreover, his science proved a catalyst for inventions in lower carbon emission products, technology, and IT. Knowledge and know-how combined in sectors such as renewable energy, energy storage, building, and transport.

The Nobel Prize is an instrument which allows us to recalibrate our (time) horizons. As you know the prize is awarded to those who "shall have conferred the greatest benefit to mankind." How do we calibrate the point-in-time when to measure the "greatest benefit"? Which generation is entitled to be the recipient of this benefit?

Applying this broader clause today within the context of the Anthropocene, shifts the beneficiaries as responsibilities to mankind become entwined with the planet; and in this process, extends the timeframe by which we measure the benefit. Responsibilities to human kind become entwined with the planet.

The Lindau Meetings have a rich tradition of intergenerational dialogue and inspiring care. Discussions with Albert Schweitzer in 1954 led Heisenberg to launch the Mainau Declaration "to rethink the humanitarian side of science." At Lindau, in 1993 Rita Levi-Montalcini presented her pledge for a "Magna Charta of Duties." Last year, a group of Nobel Laureates led by Brian Schmidt followed suit with their Mainau Declaration on Climate Change. I should add the Mainau Declaration highlights the virtuous circle of scientific process. The confidence arising from the validation of science such as Dr. Keelings findings, allows authority to be challenged, and policies changed, as stakeholders know they deal with facts rather than misattributed faith.

The main characteristics of the Lindau Meetings of today were forged by Count Lennart Bernadotte. Count Lennart understood science can serve as a vehicle for understanding. He believed scientific dialogue could benefit human kind. His vision, though, was broader. He wanted Lindau participants to be trustees for principles of science beyond meetings. This idea of trusteeship is the rationale of the Lindau Meetings. It is the principle of accepting and sharing responsibilities over generations for the benefit of a noble cause: inspiring care for generations yet-to-be.

Now standing here on this stage I say farewell. If the first bookend of my life's journey was the Hochschule in St Gallen, the second bookend has been this community, here in Lindau.

"If you spot a vacant chair, don't think it is empty. Imagine the chair is occupied by a member of a generation yet-to-come and think what he or she would like to be discussed."

Wolfgang Schürer, Honorary Chairman of the Board of Directors of the Foundation

You have inspired me, and together, ensured we have transcended what we thought we could achieve. I have been humbled by the responsibility to continue Count Lennart's legacy these past 15 years. I took pride in broadening our dialogue by strengthening links with the international scientific community. The Lindau Meetings have evolved from a German and European forum to a global hub for exchange. Learning to understand different approaches reminds us of our own limitations, and broadens our view.

We have been conscious that only a few can exchange thoughts face-to-face for it to be meaningful. To enhance outreach we developed the Mission Education programme. I hope this educational material inspires scientists of tomorrow. Lindau alumni are now encouraged to be more active.

In particular, I am grateful to Countess Bettina, who having grown up with the Lindau Meetings as a backdrop to her childhood, is the personification of intergenerational dialogue. You are the guardian spirit of the Lindau Meetings! I am also grateful to Professors Helga Nowotny, Jürgen Kluge and Reinhard Pöllath and all other colleagues for assuming as well as carrying on responsibility for the Lindau Meetings. Special thanks to Thomas Ellerbeck and Nikolaus Turner as colleagues of the first hour. I wish you all well on the new leg of the journey.

Indeed, Professor Nowotny encourages us to "embrace uncertainty" and "thrive on its cusp". This is the zest of life. And she has written a book about this very topic. [...]

However, all efforts would be in vain without the dedication of the Nobel Laureates. You are investing your precious time, intellect and personality for the benefit of young researchers. Having already gifted science that has benefited us, you are now educating us. All of us are deeply indebted to you for this second helping!

My last words are for young researchers. Actively partake in the laureates' invitations to dialogue and exchange of ideas. Their achievements, and their character, serve as an inspiration, but engaging with them reminds us that laureates are human, too! The gatherings should also be catalysts for internal dialogue. You might learn to think about an issue afresh; or ponder how to apply science to build a better society. When you return to your laboratories, digest, absorb, reflect, and ruminate on the discussions and begin to determine new actions or directions in your lives.

"Educate – inspire – connect" is not a claim – it is the vision, mission and purpose of these meetings!

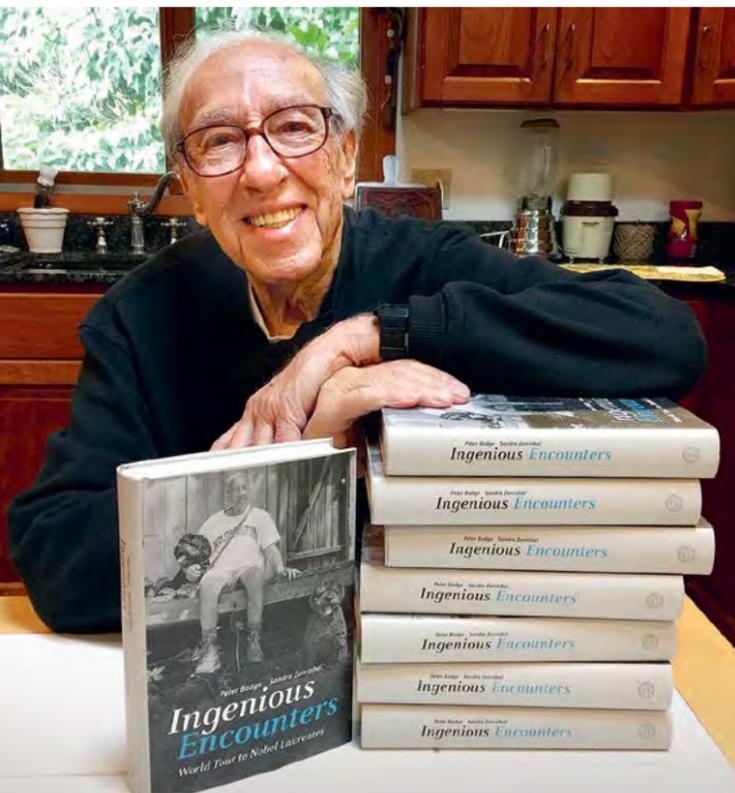
I leave you with one suggestion. During the discussions, if you spot a vacant chair, don't think it is empty. Imagine the chair is occupied by a member of a generation yet-to-come and think what he or she would like to be discussed.

For we are guardians of the future!

» Professor Wolfgang Schürer held office as Chairman of the Board of Directors of the Foundation Lindau Nobel Laureate Meetings from 2000 until the end of 2015. In his role, he had been crucial for the evolution of the meetings and instrumental in ensuring their continued existence. The official leave-taking ceremony took place at the opening ceremony of the 66th Lindau Meeting. The Board of Directors appointed him as Honorary Chairman of the Foundation, and published a special edition of Peter Badge's "Ingenious Encounters" in his honour. On behalf of the Council, Countess Bettina Bernadotte awarded him the Lennart-Bernadotte-Medal in Gold, named after her father Count Lennart Bernadotte af Wisborg, the first President of the Council, co-founder of the meetings and long-time spiritus rector.

Impressions

Nobel Laureate Edmond Fischer with copies of Ingenious Encounters by Peter Badge



Signing a 10-year support agreement between Mars, Incorporated and the Lindau Meetings: Jürgen Kluge, Countess Bettina Bernadotte, Harold Schmitz, Nikolaus Turner



Brian Schmidt giving the Lindau Lecture at the 4th Heidelberg Laureate Forum



Wolfgang Lubitz, Vice-President of the Council, with young scientists

Johann Deisenhofer talking to a teacher, participant of the programme Teaching Spirit



Grill & Chill 2016

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» Preliminary Account 2016: Expenditures

	(in Euro)
TRAVEL	
Nobel Laureates	139,060.61
Young Scientists	18,645.37
Media	10,713.76
Others	42,337.72
LODGING	
Nobel Laureates	49,252.30
Young Scientists	163,079.99
Media	8,917.10
Others	62,999.98
BOARDING	
Nobel Laureates	14,392.47
Young Scientists	111,358.04
Media	10,312.78
Others	36,155.81
MEETING ORGANISATION	
Scientific Programme & Selection of Young Scientists	22,175.53
Rental Fees of Locations incl. Tents	86,861.05
Technical Equipment	327,369.69
Utilities & Services	42,267.02
On-Site Staff	79,355.49
Transfers	15,401.51
Social Programme	40,582.96
Printed Matters	54,437.45
Expendable Items	396.05
Audio, Video & Web Productions	65,806.81
Science & Media Consulting	17,337.97
Website	7,099.00
Telecommunications, Postage	21,069.15
IT Services, Hardware, Software	89,994.16
Accounting, Legal Advice, Insurances, Brand	54,080.15
EXECUTIVE SECRETARIAT	
Staff	708,989.39
Office Operating Costs	83,170.49
Office Supplies & Equipment	11,959.54
ASSOCIATED PROJECTS	362,039.27
Including Mediatheque, Sketches of Science, Nobel Labs 360°, Nobel Portraits, Innovation Forum, Teaching Spirit, publications, alumni activities, as well as further Foundation activities.	
EXPECTED TOTAL EXPENDITURES	2,757,618.61

Lindau harbour



The budget contains 563,625.39 € of estimated costs for Oct–Dec 2016.

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TOTAL REVENUES	2,757,618.61 €
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Note:

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Countess Bettina Bernadotte with Pamela Mars, Member of the Foundation's Honorary Senate, Chair, Technology Committee, and Richard L. Ware, Vice President, Supply, Research & Development and Procurement, Mars, Incorporated

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Young scientists with the mascots of Baden-Württemberg: the federal state hosted the Boat Trip to Mainau Island.



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