BREAKTHROUGH PRIZE AWARDED $22 MILLION IN SCIENCE PRIZES

The Prizes were Presented at Live Ceremony on Sunday, Nov. 8, at 10/9c on National Geographic Channel

The 2016 Breakthrough Prize in Mathematics Awarded to Ian Agol; The 2016 Breakthrough Prize in Life Sciences Awarded to Five Individual Recipients: Edward S. Boyden, Karl Deisseroth, John Hardy, Helen Hobbs, and Svante Pääbo; The 2016 Breakthrough Prize in Fundamental Physics Awarded to Seven Leaders and 1370 Members of Five Experiments Investigating Neutrino Oscillation: Daya Bay (China); KamLAND (Japan); K2K / T2K (Japan); Sudbury Neutrino Observatory (Canada); and Super-Kamiokande (Japan)

Three 2016 New Horizons in Physics Prizes Presented to B. Andrei Bernevig, Liang Fu, Xiao-Liang Qi; Raphael Flauger, Leonardo Senatore; and Yuji Tachikawa Two 2016 New Horizons in Mathematics Prizes Awarded to Larry Guth and André Arroja Neves Inaugural Breakthrough Junior Challenge Winner is Ryan Chester

Laureates honored at glittering awards gala hosted by Seth MacFarlane, with live performance by Pharrell Williams, and presenters Russell Crowe, Hilary Swank, Lily Collins, and Kumail Nanjiani & Martin Starr of HBO's Silicon Valley

(San Francisco - November 8, 2015) – The Breakthrough Prize and its founders Sergey Brin and Anne Wojcicki, Jack Ma and Cathy Zhang, Yuri and Julia Milner, and Mark Zuckerberg and Priscilla Chan, tonight announced the recipients of the *2016 Breakthrough Prize in Life Sciences, Fundamental Physics* and *Mathematics*. A combined total of $21.9 million was awarded at the 3rd Annual Breakthrough Prize Awards Ceremony in Silicon Valley.

"By challenging conventional thinking and expanding knowledge over the long term, scientists can solve the biggest problems of our time," said Mark Zuckerberg. "The Breakthrough Prize honors achievements in science and math so we can encourage more pioneering research and celebrate scientists as the heroes they truly are."

The 2016 Breakthrough Prize in Life Sciences (five prizes, $3 million each) was presented to: Edward S. Boyden (MIT); Karl Deisseroth (Stanford University and Howard Hughes Medical Institute); John Hardy (University College London); Helen Hobbs (University of Texas Southwestern Medical Center and Howard Hughes Medical Institute); and Svante Pääbo (Max Planck Institute for Evolutionary Anthropology).

The 2016 Breakthrough Prize in Fundamental Physics ($3 million) was awarded to five experiments investigating neutrino oscillation and will be shared equally among all five. The teams include Daya Bay (China); KamLAND (Japan); K2K / T2K (Japan); Sudbury Neutrino Observatory (Canada); and Super-Kamiokande (Japan). The award was accepted by team leaders Yifang Wang and Kam-Biu Luk (Daya Bay); Atsuto Suzuki (KamLAND); Koichiro Nishikawa (K2K / T2K); Arthur B. McDonald (Sudbury Neutrino Observatory); and Takaaki Kajita and Yoichiro Suzuki (Super-Kamiokande). In total, the five teams are comprised of more than 1,300 individual physicists, and all members will share in the recognition for their work. Additional information and the full list of the prize-winning members of the experiments are available at www.BreakthroughPrize.org.

The 2016 Breakthrough Prize in Mathematics ($3 million) was presented to Ian Agol (University of California at Berkeley and Institute for Advanced Study).

"Breakthrough Prize laureates are making fundamental discoveries about the universe, life and the mind," Yuri Milner said. "These fields of investigation are advancing at an exponential pace, yet the biggest questions remain to be answered."

Laureates took to the stage at the 3rd Annual Breakthrough Prize Ceremony, an exclusive gala co-hosted by founders Sergey Brin and Anne Wojcicki, Jack Ma and Cathy Zhang, Yuri and Julia Milner, Mark Zuckerberg and Priscilla Chan and *Vanity Fair* editor Graydon Carter. Seth MacFarlane hosted the show, which featured a performance by Pharrell Williams, and appearances by celebrity presenters Russell Crowe, Hilary Swank, Lily Collins, and Kumail Nanjiani and Martin Starr of HBO's *Silicon Valley*. The theme of the evening was *Life in the Universe*, and the highlights included a video link-up to astronaut Scott Kelly aboard the International Space Station.

"This year's laureates have all opened up ways of understanding ourselves," said Anne Wojcicki. "In the life sciences, they have pushed forward new ideas about Alzheimer's, cholesterol, neurological imaging and the origins of our species. And for that we celebrate them."

New this year, Priscilla Chan and Sal Khan announced the winner of the inaugural Breakthrough Junior Challenge, 18-year-old Ryan Chester, of North Royalton, Ohio. Priscilla Chan and Salman Khan presented Ryan with a $250,000 educational scholarship for his winning video depiction of Einstein's theory of special relativity. His teacher, Richard Nestoff, was presented an award of $50,000. Ryan's school, North Royalton High School, received a state-of-the art science lab valued at $100,000. The lab will be designed by and in partnership with the school and Cold Spring Harbor Laboratory, which has shaped contemporary biomedical research and education, and is home to more than 600 researchers and technicians. Ryan's winning video can be viewed at www.breakthroughjuniorchallenge.org/finalists, and more information on the Breakthrough Junior Challenge can be found at www.breakthroughjuniorchallenge.org.

The *Breakthrough Junior Challenge* – funded by a grant from Mark Zuckerberg's fund at the Silicon Valley Community Foundation and a grant from Milner Global Foundation, and presented in partnership with the Khan Academy – invited young people, ages 13-to-18, to create short videos that communicated big ideas in the life sciences, physics and math. The contest received more than 2,000 applications from 86 countries.

"Mark and I are incredibly committed to investing in science," said Dr. Priscilla Chan. "With the Breakthrough Prize and Junior Challenge, we want to inspire more young people to study science and math, and pursue careers that change all our lives."

In addition, five *New Horizons* prizes – a $100,000 award that recognizes the achievements of young scientists – were given to eight early-career physicists and

mathematicians.

Three New Horizons in Physics Prizes were awarded to B. Andrei Bernevig (Princeton University), Liang Fu (MIT), and Xiao-Liang Qi (Stanford University) as one prize; Raphael Flauger (University of Texas at Austin) and Leonardo Senatore (Stanford University) as a second prize; and Yuji Tachikawa (University of Tokyo) as a third prize.

Two New Horizons in Mathematics Prizes were awarded to Larry Guth (MIT); and André Arroja Neves (Imperial College London). A third New Horizons in Mathematics Prize, recognizing Peter Scholze of Bonn University, was declined.

"Science is racing forward to meet the demands of the world's most critical issues," Jack Ma said. "And we have a duty to support it."

The ceremony was produced and directed by Emmy Award-winning Don Mischer Productions and broadcast live on *National Geographic Channel*. There will be an additional airing on *FOX* Sunday, November 29 at 7-8 p.m. ET/PT.

In continuation of the celebration, a number of select Breakthrough Prize laureates will present at the *Breakthrough Prize Symposium*, which will be held on Monday, November 9, on the campus of the University of California, Berkeley, and co-sponsored by Stanford University and the University of California, San Francisco. In addition to academic symposia by leading scientists and Breakthrough Prize laureates, there will be a public program of panel discussions for general audiences, featuring Breakthrough Prize laureates past and present. Breakthrough Prize founder Yuri Milner will host three panels that explore the theme of the symposium, "Big Questions." More details can be found at breakthroughprize.berkeley.edu/symposium.

2016 Breakthrough Prize Laureates

2016 Breakthrough Prize in Life Sciences

The *Breakthrough Prize in Life Sciences* honors transformative advances toward understanding living systems and extending human life, with one prize dedicated to work that contributes to the understanding of Parkinson's disease and neurodegenerative disorders.

Edward S. Boyden, Massachusetts Institute of Technology: for the development and implementation of optogenetics – the programming of neurons to express light-activated ion channels and pumps, so that their electrical activity can be controlled by light.

Karl Deisseroth, Stanford University and Howard Hughes Medical Institute: for the development and implementation of optogenetics – the programming of neurons to express light-activated ion channels and pumps, so that their electrical activity can be controlled by light.

John Hardy, University College London: for discovering mutations in the Amyloid Precursor Protein gene (APP) that cause early onset Alzheimer's disease, linking accumulation of APP-derived beta-amyloid peptide to Alzheimer's pathogenesis and inspiring new strategies for disease prevention.

Helen Hobbs, University of Texas Southwestern Medical Center and Howard Hughes Medical Institute: for the discovery of human genetic variants that alter the levels and distribution of cholesterol and other lipids, inspiring new approaches to the prevention of cardiovascular and liver disease.

Svante Pääbo, Max Planck Institute for Evolutionary Anthropology: for pioneering the sequencing of ancient DNA and ancient genomes, thereby illuminating the origins of modern humans, our relationships to extinct relatives such as Neanderthals, and the evolution of human populations and traits.

2016 Breakthrough Prize in Fundamental Physics

The *Breakthrough Prize in Fundamental Physics* recognizes major insights into the deepest questions of the Universe.

To the five teams below and their combined 1,377 team leaders and members the award is presented for the fundamental discovery and exploration of neutrino oscillations, revealing a new frontier beyond, and possibly far beyond, the standard model of particle physics.

Daya Bay Reactor Neutrino Experiment, led by Yifang Wang, Institute of High Energy Physics, Chinese Academy of Sciences; and by Kam-Biu Luk, University of California, Berkeley and Lawrence Berkeley National Laboratory.

KamLAND Collaboration, led by Atsuto Suzuki, Iwate Prefectural University, Japan.

K2K (KEK to Kamioka) and T2K (Tokai to Kamioka) Long Baseline Neutrino Oscillation Experiments, led by Koichiro Nishikawa, KEK: High Energy Accelerator Research Organization, Japan.

Sudbury Neutrino Observatory, led by Arthur B. McDonald, Queen's University, Canada.

Super-Kamiokande Collaboration, led by Takaaki Kajita, Institute for Cosmic Ray Research and Kavli Institute for the Physics and Mathematics of the Universe, University of Tokyo; and by Yoichiro Suzuki, Kavli Institute for the Physics and Mathematics of the Universe, University of Tokyo, Japan.

2016 Breakthrough Prize in Mathematics

The *Breakthrough Prize in Mathematics* honors the world's best mathematicians who have contributed to major advances in the field.

Ian Agol, University of California at Berkeley and Institute for Advanced Study: for spectacular contributions to low dimensional topology and geometric group theory, including work on the solutions of the tameness, virtual Haken and virtual fibering conjectures.

2016 New Horizons in Physics Prize

The *New Horizons in Physics Prize* is awarded to promising junior researchers who have already produced important work in fundamental physics.

B. Andrei Bernevig, Princeton University, Liang Fu, MIT, Xiao-Liang Qi, Stanford University, for outstanding contributions to condensed matter physics, especially involving the use of topology to understand new states of matter.

Raphael Flauger, University of Texas at Austin, and Leonardo Senatore, Stanford University, for outstanding contributions to theoretical cosmology.

Yuji Tachikawa, University of Tokyo, for penetrating and incisive studies of supersymmetric quantum field theories.

2016 New Horizons in Mathematics Prize

The *New Horizons in Mathematics Prize* is awarded to promising junior researchers who have already produced important work in mathematics.

Larry Guth, MIT: for ingenious and surprising solutions to long standing open problems in symplectic geometry, Riemannian geometry, harmonic analysis, and combinatorial geometry.

André Arroja Neves, Imperial College London: for outstanding contributions to several areas of differential geometry, including work on scalar curvature, geometric flows, and his solution with Codá Marques of the 50-year-old Willmore Conjecture.

The third *New Horizons in Mathematics Prize*, recognizing Peter Scholze of Bonn University, was declined.

2016 Breakthrough Junior Challenge

The inaugural *Breakthrough Junior Challenge* winner is Ryan Chester, North Royalton High School, Ohio, for his science video, "Some ways to understand the special theory of relativity, and what it means about time."

About the Breakthrough Prize: Founded by Sergey Brin and Anne Wojcicki, Jack Ma and Cathy Zhang, Yuri and Julia Milner, and Mark Zuckerberg and Priscilla Chan, the Breakthrough Prize aims to celebrate science and scientists and generate excitement about the pursuit of science as a career. The prizes are funded by the Brin Wojcicki Foundation; Mark Zuckerberg's fund at the Silicon Valley Community Foundation; the Jack Ma Foundation; and the Milner Global Foundation. Breakthrough Prize laureates in Fundamental Physics, the Life Sciences and Mathematics are awarded a $3 million prize. New Horizons Prize winners in Mathematics and Physics – acknowledging early-career achievement – receive awards of $100,000. Winners are chosen by Selection Committees, comprised of prior Breakthrough Prize laureates.

For more information on the Breakthrough Prize: breakthroughprize.org.

Video and images from the ceremony can be downloaded at: www.image.net/BreakthroughPrizeCeremony2016

Press Contacts

Rubenstein Communications, Inc.
Janet Wootten
JWootten@Rubenstein.com
212.843.8024 dir. / 202.506.0606 cell.

Kristen Bothwell
kbothwell@rubenstein.com
212.843.9227 dir. / 917.613.5434 cell.