

## These Amazing Scientists Shared This Year's \$22M Breakthrough Prizes



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The Breakthrough Prize Foundation, funded by Silicon Valley giants like Mark Zuckerberg and Sergey Brin, last night announced the recipients of its \$22 million prize pot at its third annual awards ceremony. Here's the amazing research that just got a shot in the arm.

The Breakthrough Prizes are designed to raise awareness of cutting-edge math and science and encourage world-changing research. But unlike many awards that are more about simply acknowledging

impressive work that's done and dusted, the Breakthrough Prizes inject funds into research, too. The awards, which are now in their third year, are over handed out over three main categories of Life Sciences, Fundamental Physics and Mathematics, though there isn't necessarily just one winner for each. In total, a \$22 million prize pot was shared out amongst the winners.

The awards were handed out at a star-studded events ceremony hosted by Seth MacFarlane. It's sound like an event where the Nobel Prizes got a sprinkling of rock'n'roll, with performance by Pharrell Williams, and awards presented by the likes of expected presenters Russell Crowe and Hilary Swank.

Anyway, enough of the spectacle. Here's a brief rundown of each of the winning research projects.

## **Fundamental Physics**

The prize for physics went to what seems to be this year's fashionable research area—neutrinos. These ultralight subatomic particles were also at the center of the research which snagged this year's Nobel Prize in Physics. The Breakthrough prize is actually split between five separate, international teams that together confirmed the theory that neutrinos oscillate, turning into each other and back again as they travel across the universe. In total, 1,377 researchers from Daya Bay Reactor Neutrino Experiment, KamLAND Collaboration, K2K (KEK to Kamioka) and T2K (Tokai to Kamioka) Long Baseline Neutrino Oscillation Experiments, Sudbury Neutrino Observatory and Super-Kamiokande Collaboration were acknowledged for their efforts.

## **Life Sciences**

There were five separate prizes handed out for Life Sciences.

**Edward S. Boyden from the Massachusetts Institute of Technology** and **Karl Deisseroth from Stanford University** were both awarded prizes for the development and implementation of optogenetics. The research is focussed on understanding how the light-activated ion channels and pumps of neurons can be stimulated using photons, with the long-term goals of using light to control the electrical activity of brain cells.

**John Hardy from University College London** won for discovering mutations in the Amyloid Precursor Protein gene (APP). This gene has been recognised as a cause of early onset Alzheimer's disease—its presence drives the build-up of the amyloid peptides that build up to form the plaques in the brain that cause Alzheimer's. It's hoped that knowing that will help scientists develop new ways to stop their build-up.

**Helen Hobbs of the University of Texas Southwestern Medical Center** grabbed a prize for discovering the human genetic variants that give rise to the variation in the levels and distribution of cholesterol and other lipids. Her findings look set to change the way medics think about preventing health issues such as cardiovascular and liver disease.

**Svante Pääbo, from the Max Planck Institute for Evolutionary Anthropology**, has been recognised for leading the charge in sequencing ancient DNA and ancient genomes. By developing methods that allow us reconstruct the genetic profiles of our ancient, he's helping other researchers understand the origins of modern humans better than ever.

## **Mathematics**

Finally, there was a single Mathematics prize, which saw **Ian Agol from the University of California at Berkeley** announced as winner for his work on 'low dimensional topology and geometric group theory.'

The implications of his solutions of tameness, virtual Haken and virtual fibering conjectures are, Agol admits, as yet unseen. Which means you shouldn't feel too bad about finding it confusing.

In addition to the three main categories, the Breakthrough Awards also acknowledge a series of eight early-career physicists and mathematicians, each of whom received \$100,000 prizes for their work.