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These brilliant scientists each won $3 million for discovering a way to turn brain cells on or off using light

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The Breakthrough Prizes might be considered the scientific equivalent of the oscars, if the oscars were held in Silicon Valley.

Two of the scientists honored at this year's awards were Ed Boyden of MIT and Karl Deisseroth of Stanford, who pioneered a technique for turning brain cells on or off using pulses of light.

A total of $22 million was awarded during a gala on Sunday night hosted by TV producer Seth MacFarlane, with a performance by musician Pharrell Williams. Prize presenters included actors Russell Crowe, Hilary Swank, and Lily Collins, as well as Kumail Nanjiani and Martin Starr of the HBO show "Silicon Valley."

The prizes, which are worth $3 million each, are awarded each year to scientists in math, physics, and the life sciences.

The life sciences prizes are given to scientists working on "understanding living systems and extending human life." At least one prize is reserved for research on Parkinson's disease and neurodegenerative disorders.

Boyden and Deisseroth were among five life scientists to win the prize, which they won for developing a technique known as optogenetics. Optogenetics lets scientists, for the first time, not only measure brain activity, but actually change it.

Steve Jennings

The technique involves programming the brain cells of animals (such as mice) to express a protein found in

jellyfish, called channel rhodopsin, which is activated when a light is shone on it. Scientists can then turn specific brain cells on or off in the animal's brain, controlling its thoughts or behavior.

The remaining life sciences prizes went to:

- John Hardy of University College London, who discovered tweaks in the gene for a protein that gives rise to early-onset Alzheimer's disease
- Helen Hobbs of the University of Texas Southwestern Medical Center and Howard Hughes Medical Institute, who discovered human genes that control the amount of cholesterol and other fats that can cause heart or liver disease
- Svante Pääbo of the Max Planck Institute for Evolutionary Anthropology, in Germany, who made it possible to read the DNA of our human ancestors.

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Karl Deisseroth with his prize.

Groups of scientists won as well for various categories.

The prize in fundamental physics was awarded to more than 1,300 scientists investigating a quantum mechanical property of so-called "ghost particles," known as neutrino oscillation.

The math prize went to Ian Agol of the University of California Berkeley and the Institute for Advanced Study, for studies of low-dimensional topology and geometric group theory.

Young breakthrough winners

Plus, a new prize was introduced this year for "junior researchers." It was awarded to 18-year-old Ryan Chester of North Royalton High School, Ohio, for a science video about Einstein's Theory of special relativity. Chester got a $250,000 scholarship, his teacher received $50,000, and his school received a new $100,000 science lab.

The Breakthrough Prizes were founded by Google co-founder Sergey Brin and 23andMe co-founder Anne Wojcicki, Alibaba co-founder Jack Ma and his wife Cathy Zhang, Russian entrepreneur Yuri Milner and his wife Julia Milner, Facebook co-founder Mark Zuckerberg and his wife Priscilla Chan, and Vanity Fair editor Graydon Carter.