

Physicists Reaching Out

Today's physical theories are difficult to understand, even to specialists. Farzad Nekoogar's *Multiversal Journeys* takes a stab at explaining them to laypeople.



by TRUDY E. BELL

FQXi Awardee: Farzad Nekoogar, *Multiversal Journeys*

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Today it might be said that cosmologists and theoretical physicists suffer from “Goldilock’s Syndrome”: Although they work hard to understand the universe and its constituents, from the exceptionally large – such as the structure, origin, and fate of the entire universe – to the exceptionally small – like the subatomic structure of matter – something is missing in that people-sized zone where it should be ‘just right.’

“Only a handful of physicists are also really good at explaining their work and theories to the public in simple language, in a way that makes it exciting,” observes Farzad Nekoogar, head of an Encino, California non-profit research and science communications firm called *Multiversal Journeys*.

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- *Farzad Nekoogar*

“Many interested lay people, after watching an episode of NOVA on astrophysics or cosmology or finishing a popular article or book, are left wanting to know much more and to keep up with recent results,” Nekoogar explained. “Yet they may not understand the higher mathematics necessary to read Ph.D.-level textbooks—and also textbooks tend to be very dry.”

Nekoogar wants to reach across the gulf between popular books, magazines, and TV shows, and graduate-level coursework, to the regular people waiting in between.

Beginning The Journey

Nekoogar has been passionate about explaining theoretical physics to laypeople since 1990, when he lectured on electrical engineering at the University of California Extension at Berkeley and the Department of Applied Science at UC Davis.

“I got the idea to give a public lecture at the University Extension on string theory, which was then very new,” he recounted. “I was astounded when about 200 people showed up. The lecture lasted from 9 AM to 4 PM and went into the Big Bang theory, quantum cosmology, and the consequences of string theory if it were true. But the audience stayed with me the whole seven hours, eager to hear this theory explained at a lay level.”

That was before Internet search engines allow anyone to learn anything about a subject. “But even today, many people still want to hear about complex theories from a live person, especially if it’s a famous professor,” Nekoogar says.

Convinced that there was an underserved audience thirsting for information about cutting-edge physics, Nekoogar started *Multiversal Journeys* in 2005 with \$160,000 of his own money, hard-earned from a day job managing and directing chip design at several corporations in Silicon Valley, and from writing several graduate texts on electrical engineering.

Multiversal Journeys rented lecture halls, invited articulate physicists to speak, and tried to break even on expenses by selling tickets at prices (initially) comparable to live theatre. Although the lectures were enthusiastically received by small crowds of dedicated and inquisitive listeners, Nekoogar knew that many more people might want to hear the talks but simply could not afford the high price of admission.



REACHING OUT TO A LAYMAN
Farzad Nekoogar

To solve this problem, last year, *Multiversal Journeys* became a non-profit entity, applied for, and received an FQXi grant worth \$77,000 for the project “Theoretical Physics Made Easy for the Public.” Today, Nekoogar is able to lower the ticket price to \$5, to encourage drop-in attendance and give lay audiences a truly innovative experience.

Taking A New Path

Multiversal Journeys programs are not just the same old 45-minute lectures with a few minutes allotted at the end for questions and answers. Instead, they are half-day symposiums with two or three physicists speaking in turn, taking point-counterpoint views for a variety of perspectives. Further, after talks are completed, the physicists engage in a lively panel discussion and debate of ideas, with plenty of time allowed for interacting with one another and with the audience.

“That way the public can see how scientists question and learn from each another,” said John Terning, professor of physics at UC Davis, who started speaking at Multiversal Journeys events before the FQXi grant was awarded. “We often hear that people don’t care about science. But that’s not true. They actually care a lot about science, but popular books and TV shows at the most simplistic popular level have not satisfied their curiosity.”

“I was a little skeptical at first,” admitted Lawrence Krauss, former chairman of the physics department at Case Western Reserve University, and now director of the Center on Education and Research in Cosmology and Astrophysics (CERCA) – and a public lecturer so popular that he makes weekly radio, TV, or personal appearances around the country. “But I was also intrigued that Nekoogar’s venues are not at universities,” Krauss continued. “For me, it’s important to reach people who may never set foot on a college campus.”

Multiversal Journeys symposiums are scheduled at popular locations such as the Skirball Cultural Center in Los Angeles and the Lawrence Hall of Science museum in Berkeley. Audience members range in age from 12 to 70, and hail from

all walks of life. This diverse audience appeals to Krauss, who has done other innovative science-for-laypeople performances, such as narrating “The Planets” by composer Gustav Holst played by the Cleveland Orchestra in Severance Hall.

A Long And Winding Road

For Nekoogar, public understanding of science is also vital to public support of pioneering research.

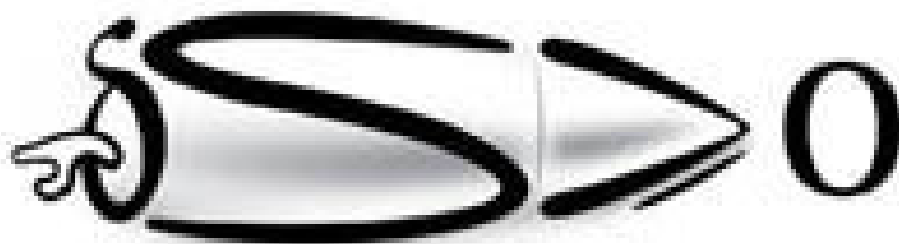
“We all know what happened with the superconducting supercollider in Texas,” he says, referring to a large physics research project begun in the 1990s. Halfway into construction, the project was cancelled. “If physicists had gone out and talked to the public about the excitement of their theories and the importance of the machines they build, matters might have turned out differently.”

What do the speakers themselves hope audiences will get from their Multiversal Journeys experience? “I hope people will be entertained and informed, and motivated to look up at the heavens, and provoked to think about things with a realistic and honest perspective,” Krauss says. “Honesty is important, because most lay people will tend to believe anything a scientist says to them in such a venue.”

“I subscribe to the view, often attributed to Schrödinger, that if you can’t explain what you’re doing to an intelligent 14-year-old, you’re a fraud,” says Terning, referring to the Nobel Prize-winning Austrian quantum physicist Erwin Schrödinger. Through his experience with Multiversal Journeys, Terning has taken up the challenge of explaining technical concepts to laypeople – without equations. This has given him incentive to develop computer animations to help the audience visualize “quarks moving around, strings connecting to things, and the behavior of magnetic field lines—graphics done for a purpose, not just to decorate a background.”

As Goldilock’s might say, “That’s just right.”

Science journalist Trudy E. Bell has a master’s degree in the history of science from New York University; she has written or coauthored a dozen books and more than 400 articles, 21 of which have won top journalism prizes, including the American Astronomical Society’s 2006 David N. Schramm Award for reporting on high-energy astrophysics (for two articles on gravitational waves).



Multiversal Journeys

A 501(c) (3) non-profit organization

MULTIVERSAL JOURNEYS The logo is based on the second law of thermodynamics (delta S is greater than or equal to zero, where S is entropy of a system.) This simple equation deals with the expansion of the universe, and the current flow of time. The image looks like a rocket. One can also find a closed string in the image.