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Viewpoint

Diablo Canyon is ideal for neutrino study

Lawrence M. Krauss
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Amidst the hoopla of the Republican National Convention, it is easy for other news items, even those of local interest, to be overlooked. One item which might otherwise go unnoticed, but which could have important implications for science in this country, is the changing fortune of a proposed new experiment to measure the properties of fundamental particles called neutrinos at Pacific Gas and Electric Co.'s Diablo Canyon nuclear reactor facility.

The possibility that this experiment could take place on the Diablo Canyon site has had a roller-coaster ride. At one point it looked as if U.S. scientists would have to go to China to perform an experiment that would be best carried out right in our own back yard, and which could leave a scientific legacy that would last for generations.

I was privileged to spend a delightful long weekend in San Luis Obispo earlier this year, when I gave a public lecture at Cal Poly entitled "The Origin of Everything: Life, Neutrinos, and Star Trek." There are very few places in the world where it might have been appropriate to present this eclectic combination, but Cal Poly was one of them, in large part because of the exciting possibility that Diablo might house an experiment that could affect the future of our understanding of a host of fundamental issues in physics and cosmology, including questions as fundamental as: What is the origin of all matter in the universe? and How will the universe end?

The Diablo Canyon reactor is tailor-made for the proposed experiment. All nuclear reactors produce neutrinos, exotic and largely innocuous elementary particles that are so weakly interacting that most of them can go right through the Earth without being stopped. Yet in spite of their weak interactions, they play a very important role in nature, and four Nobel Prizes have been awarded for progress in understanding the nature of neutrinos and their astrophysical impacts. In order to detect these particles, large detectors must often be built, usually underground in order to shield out the ever-present background of cosmic ray particles from space.

What makes the Diablo Canyon reactor so special is that it is located right next to a neighboring mountainside into which a tunnel, about the size of a normal railway tunnel, could be dug. Ultimately the site would resemble a mile-long wine cave, with detectors located on railway cars so that they could be positioned at various locations within the tunnel, leaving no other visible impact upon the environment.

Originally PG&E was concerned about the environmental impact of the project and possible worries in the community about a construction project at Diablo Canyon. Happily, it now appears as if much of the community is supportive of this project, so PG&E is willing to take another look at it.

If the experiment goes off as planned, Diablo Canyon will be placed alongside the other locations where, throughout history, fundamental progress in our understanding of nature took place. To paraphrase the words of Robert Wilson, the first director of the Fermi National Accelerator Laboratory, who was asked whether it would contribute to the defense of the nation. He said: "No, but it will help keep the nation worth defending!"

One often hears horror stories regarding the level of scientific literacy in this country, and it is often difficult to explain the importance of doing fundamental physics experiments on subjects that seem far removed from daily life. It is heartening to see an instance where an educated and interested public can rally behind a fundamental science project that has essentially no down-side for the community. It demonstrates yet one more reason why your area is such an attractive place to live.

Lawrence M. Krauss is chair of the physics department at Case Western Reserve University and an internationally recognized cosmologist, as well as an author, columnist and commentator.

His books include "The Physics of Star Trek," "Atom" and his newest book, "Hiding in the Mirror," to be released in 2005.