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Fermilab finds elusive subatomic particle

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BY ART GOLAB SUBURBAN REPORTER

An international team of physicists working at Fermilab has finally detected the elusive tau neutrino, the only one of the 12 basic subatomic particles that had never been directly observed.

The discovery will provide more clues about the structure of matter and the fundamental way the universe is put together, scientists said.

Physicists first predicted the existence of the tau neutrino in 1975 and have been looking for it ever since.

"We had a pretty good idea it was there, but no one had really caught it in the act," said Judy Jackson, a spokeswoman at the national lab near Batavia.

Neutrinos, along with neutrons, electrons and quarks, are considered the basic building blocks of matter.

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Pathfinder

Neutrinos are hard to catch because even though they are everywhere, they rarely interact with matter. A neutrino could shoot through a lead wall a million miles thick without hitting anything.

"All neutrinos are extremely antisocial, and the tau neutrino is the most antisocial of all," Jackson said.

To find them, scientists used Fermilab's accelerator. "We took high energy protons and slammed them into a big block of tungsten," said Byron Lundberg, a physicist who is spokesman for the project.

The experimenters believed the resulting stream of neutrinos would contain some tau neutrinos. The stream was directed into a 3-foot-long target consisting of 240 thin iron plates sandwiched with layers of filmlike emulsion.

The film recorded the track of a tau lepton, which scientists said is the signature of a tau neutrino.

Though the initial experiment was conducted in 1997, it took scientists three years to analyze data from the film. New equipment was invented to scan the film into computers, which digested 6 million possible three-dimensional neutrino tracks and narrowed them down to four that were produced by tau neutrinos.

The next step will be a \$135 million experiment to determine how much neutrinos weigh.

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