Award honors thesis work

Aggie student given award for thesis on particle physics, neutralinos

By: Hunter Lockhart

Posted: 10/20/08

Particle physics is not common knowledge to most students at Texas A&M, but this isn't the case for Peter Wagner, who had a doctorate in physics from Texas A&M.

Wagner accepted the Universities Research Association (URA) Thesis Award June 4 for his doctoral dissertation on particle physics. The prize, which includes a certificate of achievement as well as a $3,500 award, is given each year to the most outstanding doctoral thesis written on research conducted at the Fermi National Accelerator Laboratory near Chicago, the largest working particle accelerator in the world.

"It felt great to receive this award and I was pleased to be the first Aggie to win it," said Wagner, who is now involved in postdoctoral research in the Department of Physics and Astronomy at the University of Pennsylvania. "Especially an award that usually goes to people from institutions like MIT, Princeton and the University of Chicago. It was six years of hard work and it was Dr. Toback's support that brought me there."

Wagner's thesis, supervised by David Toback, was titled "The Search for Heavy, Long-Lived Particles that Decay to Photons at CDF." Wagner made use of a new, custom-built device designed to observe light (or photons) as it arrives in the Collider Detector at Fermilab (CDF).

Since all photons travel at the speed of light, Wagner used this device to compare when photons should have arrived from collision to when they actually did arrive. Any photons arriving only a few nanoseconds late into the CDF would indicate that the photons were possibly created from minute "neutralinos," which could be produced in the particle accelerator, live for a while and then decay. If these particles were discovered, it could help explain dark matter, which makes up about 22 percent of the universe and actually unites gravity with other forces.

"This was a powerful new search, the first of its kind at the high-energy frontier," Toback said. "Peter did an amazing job working on the theory, building the new equipment needed to do this search and then performing the world's most sensitive search in record time."

No evidence of neutralinos was found, but the work that Wagner did helps to constrain the understanding of the origin of the universe nearly 13.7 billion years ago and how it has evolved.