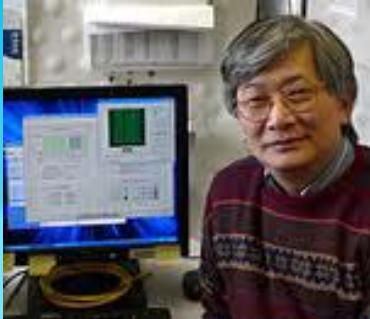


# Physics Colloquium

Michigan Technological University

Thursday, September 1, 2011 at 4:00 pm

Room 139 Fisher Hall



## Radar Detection of Ultra High Energy Cosmic Rays

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**Abstract:** At a rate of 1 per square kilometer per century, earth is bombarded by ultra high energy cosmic rays. They are atomic nuclei of unknown origin with macroscopic energies, larger than  $10^{18}$  eV, the equivalent of a 100 mph fastball. To study them very large detector arrays such as the Telescope Array in Utah and the Auger Observatory in Argentina have been built. They cover an area of  $800 \text{ km}^2$  and  $3000 \text{ km}^2$  respectively. To build even larger detectors new techniques need to be developed. The presence of a large ionization cloud produced by their interaction with the earth's atmosphere is a target that could be detected via radar. Forward scattering radar, in particular, is an ideal technique for the detection of large ionization clouds near the ground level. I will discuss the on going effort to implement a forward scattering radar for the detection of ultra high energy cosmic rays. The project started on Long Island, NY by a group formed by scientists, physics teachers, and students (undergraduates and high school) and has evolved into the implementation of a dedicated radar at the Telescope Array site in Delta, Utah. Both educational and scientific aspects of this project will be discussed.

**Bio:** Helio Takai is a particle physicist from Brookhaven National Laboratory. He works in the ATLAS experiment at the LHC for as long as he can remember. His physics interests include the physics of heavy ion collisions at high energies, particle physics and astro particle physics. He is involved in educational and outreach programs being a QuarkNet mentor for over 10 years. He was born in Brazil where he completed his education before moving to the United States. He enjoys photography, fishing and traveling.