

Detection of Cosmic Rays in East Tennessee

Submitted by the Society of Physics Students
University of Tennessee Chapter

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The interaction of the Earth's atmosphere with highly energetic particles ($E > 10^{10}$ eV) that originate outside our solar system creates what are known as cosmic ray showers. The study of these showers has recently become a prominent research topic in high-energy physics, as evidenced by large international collaborations such as the KamLAND experiment in Japan. To promote university student involvement in research, as well as outreach efforts with local high schools, the University of Tennessee Department of Physics and Astronomy has launched TECOP, the Tennessee Cosmic ray Observatory Project. A collaborative effort involving Oak Ridge National Laboratory and the UT Society of Physics Students, TECOP's goal is to build a university community partnership by placing cosmic ray detectors in area high schools. High school students will assemble the detectors and analyze the collected data with assistance from UT's undergraduate physics students. The UT Physics Department will compile and further analyze the collected data.

The higher the initial energy of an incident proton (cosmic ray) the larger the surface area of its cosmic ray shower. Observation of high-energy cosmic rays, therefore, requires detectors that cover large surface areas. Although it is impossible for a single detector to cover multiple square miles, it is feasible to network numerous detectors and place them in coincidence with one another, thereby expanding the observable territory and allowing for the detection of large cosmic ray showers. The purpose of TECOP is to place these detectors in area high schools and actively engage high school students and teachers in contemporary physics research by having them build and maintain their detectors. SPS members have worked closely with physics faculty members at the university to build the prototype detectors. Using what they've learned, these UT students

have in turn given personal attention to the project's high school students, serving as mentors during workshops and offering assistance in all aspects of detector construction and testing. Once the detectors are assembled, the SPS chapter will assist with on/site installation and maintenance. The chapter has helped host multiple workshops and discussion meetings for high school teachers and students, with plans to host more workshops in the future.

The UT SPS members have brought enthusiastic support to TECOP. Their volunteer efforts have allowed the project to encompass multiple high schools and expand the university's outreach efforts by building a rapport with the wider Knoxville community.