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A Simple Detector of Cosmic Particles

On May 6, 2008 in a town called Lafayette, IN, a small group of students in an advanced physics class were blessed by the presence of an expert researcher and his high-tech equipment. He was from Purdue and associated with a group called QuarkNet. They are attempting to educate high school students on modern particle physics and stimulate interest in simple cosmic ray detectors.

He began with a simple slide show illustrating the history of particle physics. It began with the discovery of the atom and went all the way through the discovery of quarks and other sub-nuclear particles. Men like Einstein, Rutherford, Bohr, Thomson, and Becquerel were mentioned. The primary “new” information consisted of descriptions of sub-nuclear particles. The up and down quarks, pions, gluons, and neutrinos were described. The speaker’s primary focus, however, was on the muon.

The muons we observe are created when high energy protons hit atoms in the atmosphere. “Showers” of particles are created which rapidly decay into muons. Muons are similar to electrons, only heavier. They generally decay within 3 microseconds, but the time dilation described by Einstein’s Theory of Relativity allows them to exist long enough for us to observe them as they are traveling at nearly the speed of light. Muons can be detected by a simple setup consisting of plastic plates covered in aluminum foil and paper. The muons cause light flashes as they hit the plastic. These flashes are magnified via a photomultiplier and interpreted as electric current.

The demonstration was very interesting, I believe. I would enjoy learning more about sub-nuclear physics. It is the “cutting edge” of modern physics, the smallest frontier researched to date.