Fantastic Cosmic-Rays and How to Find Them with the IceCube Neutrino Observatory

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ABSTRACT

The Earth is constantly hit by subatomic particles called cosmic rays. Many originate from our own Sun, but some come from far more distant and mysterious origins with very high energies. The particle energies are several magnitudes higher than any man-made particle accelerator can reach and we still don’t know how these particles are accelerated, where are they are produced, of what they consist. High energy cosmic rays are very rare and cannot be studied directly with balloon or satellite experiments, but when they hit the atmosphere a cascade of secondary particles is produced in so-called extensive air showers. Those air showers can only be measured with large ground based observatories, like the IceCube Neutrino Observatory at the South Pole.

The IceCube Neutrino Observatory is a high energy astroparticle detector consisting of two complementary, unique detector components. The IceTop surface array, measuring the low energy electromagnetic and muonic shower component, and the deep in-ice IceCube detector, measuring high energy muons and neutrinos.

An overview about cosmic rays, an introduction to the detectors at the South Pole, and the most recent cosmic ray results will be presented. An outlook on the future of the observatory IceCube-Gen2 will also be discussed.

February 23, 2022
4:00 pm
Zoom Meeting
Everyone Welcome!