

Joshua Spitz – HEP Seminar – January 30, 2024
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Using Ancient Rocks to Look for Atmospheric Neutrinos

Earth is constantly being bombarded by cosmic rays, energetic particles from the cosmos. These particles provide a window on both the nature of their astrophysical sources and into multiple aspects of particle physics and cosmology. Recently, it has been pointed out that the history of the cosmic ray rate over the past ~ 1 billion years can be measured using atmospheric neutrino (produced readily in cosmic ray interactions with the Earth's atmosphere) induced imprints in minerals, or "paleo-detectors", buried deep beneath the Earth's surface. The time evolution of cosmic rays provides a unique window into the history of the Earth, including aspects of the geo- and helio-magnetic fields, the atmosphere, and the trajectory of our planet through the Milky Way galaxy, noting that the Earth goes around the galaxy once every 230 million years. In this talk, I will discuss the overarching paleo-detector concept in the context of a number of physics studies, and our group's pursuit of measuring atmospheric neutrinos in these ancient rocks.