

Mehr Nisa – HEP Seminar – 10/1/2019
MSU

Constraining the Foregrounds for New Physics Searches in TeV Cosmic rays and Gamma rays

The High Altitude Water Cherenkov (HAWC) Observatory is a wide field-of-view array of detectors capable of making high-statistics measurements of cosmic rays and gamma rays at multi-TeV energies. I will talk about using data from HAWC to constrain two unique fluxes at the TeV scale: antiprotons in Galactic cosmic rays, and gamma rays from the quiescent Sun — both relevant for astrophysical searches for physics beyond the Standard Model. Cosmic rays in the inner solar system are subject to deflection by the magnetic fields of the Earth and the Sun, affecting the observed deficit or “shadow” of the Moon/Sun. Cosmic rays also interact with the Sun’s atmosphere to produce a steady emission of gamma rays up to at least 200 GeV, though the exact underlying mechanism remains a puzzle. I will present the strongest constraints on the \bar{p}/p ratio using the Moon shadow as a momentum/charge discriminant. I will also discuss our search for excess gamma rays from the Sun above 1 TeV, and the resulting implications for models of dark matter capture and annihilation in the Sun.