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Investigating Atmospheric Neutrino Fluxes Resulting from Various Cosmic-Ray Spectra RACHEL SCRANDIS, DEVEN BOWMAN, EUN-SUK SEO, University of Maryland, College Park — Atmospheric neutrinos are produced when cosmic rays interact with Earths atmosphere. The shape of the atmospheric neutrino spectrum is dependent on cosmic-ray spectra, especially at around knee energies. These cosmic-ray energies correspond to the energy regime in which astrophysical neutrinos begin to dominate the neutrino flux, so accurate modeling of the cosmic-ray spectrum around the knee can be used to help separate background from signal. Currently, direct measurements of cosmic rays reach their upper energy limit just below the all particle knee, requiring extrapolation in order to probe the transitional neutrino source energy regime. In this work, the cosmic ray knee is modeled as a transition between acceleration sources, each with a rigidity dependent acceleration limit. Cosmic ray particles reach the limit at Z * E_{max} where Z is the particle charge and E_{max} is the protons limit. Utilizing the Matrix Cascade Equations code, the cosmic-ray elemental spectra were used to calculate resulting atmospheric neutrino fluxes. The effects of individual spectra on the neutrino fluxes are investigated, and various knee models are explored. The neutrino results are also compared to experimental data.

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