



Contribution ID: 6

Type: **not specified**

## Improving the neutrino detection at Pierre Auger Observatory

*Tuesday 28 January 2025 15:06 (12 minutes)*

The search for ultra-high-energy (UHE) neutrinos has garnered significant attention. These neutrinos are not only expected if the composition of UHE cosmic rays includes protons at the highest energies, but they are also anticipated if hadronic processes occur during the acceleration of these particles. UHE neutrinos are expected to be produced, escape from their astrophysical accelerators without deflection, and reach Earth.

To date, no UHE neutrinos have been observed. The best limits at these energies come from the Pierre Auger Observatory, which distinguishes highly inclined events from the cosmic ray background to search for neutrinos. The observatory has recently undergone a major detector upgrade, adding scintillators and radio antennas to each water Cherenkov detector. This upgrade enhances the ability to scrutinize shower development features, enabling the identification of neutrino-induced showers regardless of their arrival direction.

The student will use state-of-the-art simulations to evaluate these shower features and combine them to develop data analyses that will significantly improve Auger's sensitivity to UHE neutrinos.

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