

Searches for ultra-high energy photons and neutrinos with the Pierre Auger Observatory

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The Pierre Auger Observatory is the largest astroparticle experiment in operation. Complementing to the measurements of the charged ultra-high energy (UHE) cosmic rays, it has a very good sensitivity to the detection of photons and neutrinos. Since the UHE photon and neutrino fluxes are correlated to the acceleration mechanisms of charged particles, searches for these neutral particles enhance the multi-messenger understanding of UHE cosmic-ray sources and of transient astrophysical phenomena. In addition, searches for diffuse fluxes may bring information about exotic scenarios such as the decay of hypothetical super-heavy dark matter in the Galactic halo. The search for photon and neutrino primaries with Auger data is driven by the measurements of extensive air-showers with hexagonal grids with more than 1600 water-Cherenkov detectors covering 3000 km². This surface array is overlooked by 27 fluorescence telescopes. In this contribution, we present an overview of the current UHE photon and neutrino searches at the Observatory and discuss the most recent results. We report on stringent limits to the UHE photon and neutrino diffuse and point-like fluxes above 10¹⁷ eV, which lead to strong constraints on theoretical models describing the nature of dark matter candidates and the sources of the most energetic particles in the Universe.

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