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The upgrade of the Pierre Auger Observatory and its impact on gamma-ray searches

The Pierre Auger Observatory successfully measures cosmic-ray air-showers at the highest energies and sets the best limits for the photon flux in the EeV range. Currently, the Pierre Auger Observatory is a hybrid detector consisting of 1660 water-Cherenkov detectors deployed over an area of 3000 km^2 and four fluorescence detector sites where the atmosphere above the surface detector is observed. Despite its good performance, an upgrade is planned to allow for a measurement of the muon-to-electron ratio not only on a statistical base but for each shower individually. This will largely improve the ability of identifying the types of the primary particle.
For the upgrade, a scintillator detector will be deployed on top of each water-Cherenkov detector. The different response to the muonic and electromagnetic shower contributions of the two detector components allows for an event-by-event determination of the type of the primary particle. An improvement of current gamma-ray searches at the highest energies can thus be expected.

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