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The Surface Array planned for IceCube-Gen2

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IceCube-Gen2, the extension of the IceCube Neutrino Observatory, will feature three main components: a 10 km^3 optical array in the deep ice, a large-scale radio array in the shallow ice and firn, and a surface detector above the optical array. Thus, IceCube-Gen2 will not only be an excellent detector for PeV neutrinos, but also constitutes a unique setup for the measurement of cosmic-ray air showers, where the electromagnetic component and low-energy muons are measured at the surface and high-energy muons are measured in the ice. As for ongoing enhancement of IceCube's current surface array, IceTop, we foresee a combination of elevated scintillation and radio detectors for the Gen2 surface array, aiming at high measurement accuracy for air showers. The science goals are manifold: The in-situ measurement of the cosmic-ray flux and mass composition, as well as more thorough tests of hadronic interaction models, will improve the understanding of muons and atmospheric neutrinos detected in the ice. Moreover, the surface array provides a cosmic-ray veto for the in-ice detector and contributes to the calibration of the optical and radio arrays. Last but not least, the surface array will make major contributions to cosmic-ray science in the energy range of the transition from Galactic to extragalactic sources. The increased sensitivities for photons and for cosmic-ray anisotropies at multi-PeV energies provide a chance to solve the puzzle of the origin of the most energetic Galactic cosmic rays and will serve IceCube's multimessenger mission.

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