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The Scintillation Detectors and its DAQ of the IceCube Surface Array Enhancement

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The IceCube Collaboration plans to upgrade IceTop, the surface array located on the South Pole ice sheet, with scintillation detectors augmented by radio antennas. This IceCube Surface Array Enhancement will measure and mitigate the effects of snow accumulation on the operating 162 IceTop Cherenkov tanks, as well as improve the measurements of high-energy cosmic rays by lowering the energy threshold. The enhancements also provide R&D experience for the next generation (IceCube-Gen2) surface instrumentation.

A full prototype station was installed near the center of IceTop in January 2020. The station features custom-designed DAQ electronics and consists of three radio antennas and eight scintillation detectors read out by silicon photomultipliers (SiPM).

This contribution will focus on the scintillation detectors developed for the Surface Array Enhancement and its DAQ, calibration methods, deployment and operation experience, as well as first results of the reconstruction of extensive air showers coincidently measured by the prototype station and IceTop. Future plans for instrumenting the entire IceTop array as well as the surface of IceCube-Gen2 with hybrid stations will be presented as well.

Collaboration

IceCube Collaboration

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