Contribution ID: **35** Type: **not specified**

Update on the IceCube Upgrade Project

Thursday, 9 September 2021 11:15 (15 minutes)

The IceCube Neutrino Observatory at the South Pole is the leading facility worldwide for scientific exploration in the field of neutrino astrophysics. A more densely instrumented infill array, IceCube DeepCore, was added during construction to lower IceCube's energy threshold where it could exploit the massive volume of exceptionally clear ice at the bottom of IceCube to enable competetive measurements of neutrino oscillation parameters. More than ten years after the last IceCube string was deployed, the IceCube Collaboration has embarked on a further Upgrade to the detector consisting of seven more strings of advanced photodetectors to infill DeepCore, with sensitivity greater than current and near future experiments to detect hints of new physics beyond the best model of elementary particles that has stood for over a half a century. Exploiting the opportunity provided by a restart of deep-ice drilling at the site, new calibration devices will accompany this instrumentation and will provide data for better modeling of the optics of the deep glacial ice. Incomplete current knowledge of the ice introduces systematics in IceCube that limit its precision for neutrino astrophysics. Improved ice models can be fed back into reprocessing more than a decade and a half of archived data to provide neutrino skymaps and other data products with significantly improved resolution.

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Session Classification: Science