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The ANNIE Experiment at Fermilab: Updates from the Physics Phase EMRAH TIRAS, Iowa State University, ANNIE COLLABORATION — ANNIE is a 26-ton gadolinium loaded water Cherenkov detector located on the Booster Neutrino Beam (BNB) at Fermilab. The primary physics goals of ANNIE are to study the multiplicity of final state neutrons from neutrino-nucleus interactions and charged current quasi-elastic (CCQE) cross-section measurements in water. ANNIE provides a unique opportunity to study this physics in a controlled beam experiment in an energy range of 700MeV, which is relevant to both atmospheric neutrinos and long-baseline experiments. ANNIE is aiming to serve as a detector R&D testbed for future neutrino experiments by leveraging Large Area Picosecond Photo-Detectors (LAPPDs) and neutron tagging in Gadolinium-loaded water to make detailed neutrino measurements. The full implementation of the ANNIE physics phase detector was completed in 2019 and is now taking beam data. In this talk, I will present the updates from the physics phase and discuss about the new technologies.

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