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P1.022 Prototype detection unit for the CHIPS experiment

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CHIPS (CHerenkov detectors In mine PitS) is an R&D project aiming to develop novel cost-effective neutrino detectors, focused on measuring the CP-violating neutrino mixing phase (δ_{CP}). A single detector module, containing an enclosed volume of purified water, would be submerged in an existing lake, located in a neutrino beam. A staged approach is proposed with first detectors deployed in a flooded mine pit in Northern Minnesota, 7 mrad off-axis from the existing NuMI beam. A small proof-of-principle model (CHIPS-M) has already been tested and the first stage of a fully functional 10 kton module (CHIPS-10) is planned for 2018. One of the instruments submerged on board of CHIPS-M in autumn 2015 was a prototype detection unit, constructed at Nikhef. The unit contains hardware borrowed from the KM3NeT experiment, including 16 3" photomultiplier tubes and readout electronics. In addition to testing the mechanical design and data acquisition, the detector was used to record a large sample of cosmic ray muon events. The collected data is valuable for characterising the cosmic muon background and validating a Monte Carlo simulation used to optimise future designs. This poster introduces the CHIPS project, describes the design of the prototype unit, and presents the results of a preliminary data analysis.