Abstract Submitted
for the APR21 Meeting of
The American Physical Society

An Apparatus for Light Attenuation and Scattering Measurements in Highly Transparent Media JAKE HECLA, University of California, Berkeley, STEVEN DAZELEY, OLUWATOMI AKINDELE, ADAM BERNSTEIN, Lawrence Livermore National Lab — This paper presents a design for a horizontal, adjustable path-length attenuation and scattering measurement device that has successfully observed attenuation lengths in excess of 130m in deionized (DI) water. Absolute measurements of attenuation and scattering in water have proven challenging, and values reported in literature show high variance. This system bypasses limitations on prior designs by using an optical path which remains purely in the liquid medium. Path-length adjustment is performed using a hydraulic system to move an optical element (sensor or retroreflector) within the 5m fluid-filled cell. Scattering measurements are performed at multiple ports along the beam axis, where a system of adjustable polarizers and attenuators allows separation of Rayleigh and Mie scattering components. Attenuation measurements have been performed with DI water which show excellent agreement with past experimental results across the visible spectrum. Scattering measurements in optically pure water are ongoing. Subsequently, the system will be used to characterize the optical properties of water-based liquid scintillator, a medium under consideration as a fill for large scale neutrino detectors.

Jake Hecla
University of California, Berkeley

Date submitted: 08 Jan 2021 Electronic form version 1.4