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Measurement of proton quenching factors in p-terphenyl[1]
MIRIAM MATNEY, Rice University, CODY PARKER, SHUYA OTA, Cyclotron Institute, Texas A&M University, GREGORY CHRISTIAN, DUSTIN SCRIVEN, STEFANIA DEDE, MICHAEL ROOSA, Cyclotron Institute and Department of Physics and Astronomy, Texas A&M University — The organic scintillator p-terphenyl ($C_{18}H_{14}$) is fast, bright, and provides excellent pulse-shape discrimination (PSD). These properties make p-terphenyl a versatile scintillator for use in neutron detectors. In order to characterize the scintillation efficiency of p-terphenyl for more accurate data collection, it is important to understand the amount of quenching as a function of particle energy. Quenching accounts for molecular de-excitation that does not result in the production of light in the scintillator. In this work, quenching factors were measured via a monoenergetic proton beam from the K150 cyclotron at the Texas A&M University Cyclotron Institute at several energies from 3 MeV to 15 MeV. A 15-mm x 15-mm x 25-mm crystal of p-terphenyl was coupled to a photomultiplier tube and irradiated with a proton beam under vacuum. The quenching factor was determined by the relationship between the incident proton energy and the measured proton energy.

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Mike Youngs
Blinn College

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