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12.30 Fast neutron diagnostics on MTF compression experiments

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Measurement of DD fusion neutrons is a key diagnostic for magnetized target fusion (MTF) experiments being conducted at General Fusion. When combined with other available diagnostics, the detection of DD fusion neutrons can provide strong constraints on a model of plasma evolution during compression, in particular ion temperature and density. General Fusion plasma compression experiments have been monitored for high-energy particle emission using hydrocarbon liquid scintillator systems of a variety of designs. Scintillator output is digitized at high resolution over the course of the compression shot (3 ms record length). This is followed by offline digital analysis of pulse height and shape of particle detection events. Pulse shape discrimination methods with sufficient accuracy and energy resolution enable separation of neutron detection events from high-energy photon detection events. Inferred DD fusion rates are found to be consistent with other diagnostics and simulations. Scintillator hardware, data analysis and modeling methods will be discussed, as well as experimental results.

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