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Distribution of Ions in Laser-Driven Fusion Reactions[1] MACKENZIE WARRENS, MATTEO BARBARINO, ALDO BONASERA, DARIO LATTUADA, Texas AM University Cyclotron Institute, GROUP BONASERA TEAM — Experiments of laser-driven fusion reactions are important for many aspects, such as measuring the cross section of plasma. In the experiments at University of Texas using the Texas Petawatt laser, deuterium clusters of various sizes suspended in ^{3}He gas absorb the laser's energy and are irradiated. The clusters undergo a Coulomb explosion, forming a hot plasma which initiates the reactions. This analysis studies two possible fusions: D(d, ^{3}He)n and ^{3}He(d,p)^{4}He. Signals are recorded using a Faraday cup detector, then transformed and analyzed in energy space. In this work, we investigate if the log-normal distribution is an appropriate description of the energy distribution of the ions. If the log-normal distribution is a good fit, the energy distribution can be thought of as chaotic enough to appear thermalized. The chaos may be due to many-body interactions over long distances, as well as the different charges and masses of the particles involved. Using the well-known S-factor for the two reactions and the extrapolated fits, the number of fusions is calculated and compared with experimental data.

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