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Measuring Cluster Fusion Plasma Temperature and Density from ^{3}He(D,p)^{4}He and D(D,p)T Reactions MARINA BARBUI, A. BONASERA, K. HAGEL, J.B. NATOWITZ, K. SCHMIDT, H. ZHENG, M. BARBARINO, W. BANG, T. DITMIRE, G. DYER, H. QUEVEDO, A. BERNSTEIN — The interaction of intense ultrafast laser pulses with molecular clusters produces the explosion of the clusters with enough kinetic energy to drive nuclear reactions. If we assume the thermalization of the plasma, the ratio of the yields from two different nuclear reactions occurring simultaneously will allow the determination of the ion temperature at the time when the reaction occurred. We performed two experiments: one using pure deuterium to drive the D(D,p)T and D(D,n)^{3}He reactions, another mixing D_2 and ^{3}He into the gas jet target to allow us to measure simultaneously yields from the ^{3}He(D,p)^{4}He and the D-D reactions. We detected both the 2.45 MeV neutrons and 3.02 MeV protons from the D-D reactions and the 14.7 MeV protons from the ^{3}He(D,p)^{4}He reaction. Preliminary results will be shown.

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