

Inelastic deexcitation of the Hoyle state

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A recent experiment has resolved the 55-year old question of the cross section for nucleon induced inelastic deexcitation of the Hoyle state, a path parallel to EM decay. The experiment deployed the TAMU active target time-projection chamber and used quasi mono-energetic neutrons from the Edwards Accelerator Laboratory (EAL) at Ohio University. The experimental logic uses detailed balance, the replacement of (n,n') with $(n, \text{''Y''})$ where the detection of "Y" means the decay of the Hoyle state to three alphas through ^8Be , and a multichannel R-matrix analysis. Because the inelastic deexcitation cross section increases slowly above threshold, for this mechanism to be relevant for the production of stable ^{12}C , the astrophysical site must have $T > 10^9$ K as well as have high alpha and neutron densities.

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