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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,"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 12C, the astrophysical site must have T > 109 K as well as have high alpha and neutron densities.

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