Electron screening factors and stellar rates of the ^{3}He (^{3}He, 2p) ^{4}He and ^{3}He (d, p) ^{4}He fusion reactions

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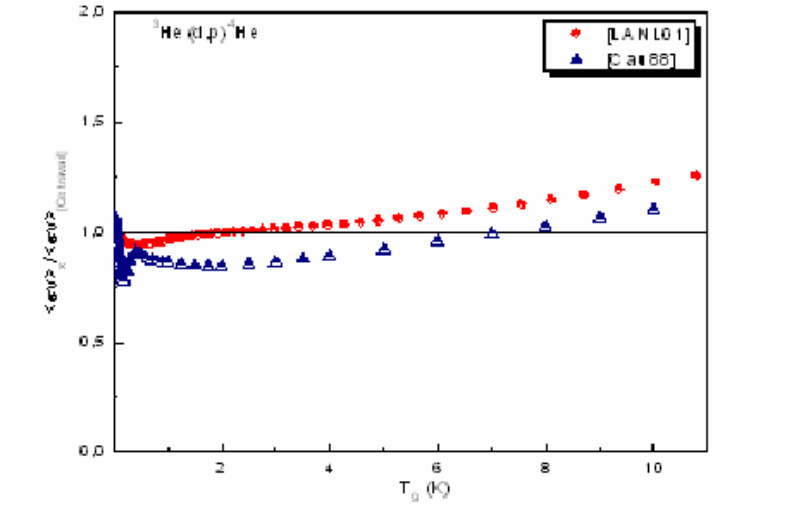
The astrophysical S (E) factor data reported in the literature [1-7] for the ^{3}He (^{3}He, 2p) ^{4}He and ^{3}He (d, p) ^{4}He fusion reactions have been re-analyzed over the ^{3}He projectile (c.m.) energy region below 1.0 MeV. Polynomial expansions in powers of energy *E* and the R-Matrix formalism [8] were used to generate calculated best fit curves to experimental data for the two reactions, respectively. The corresponding electron screening enhancement factor and reaction rate values for bare nuclei at stellar temperatures have been extracted in the two cases, and are discussed. In particular, given the large uncertainties on the U_e electron screening potential values reported in the previous evaluations, the most precise determination of this parameter for each reaction was aimed at in the present study which puts out inconsistencies in previous analyses.The enclosed figure below reports the ratios of the ^{3}He (d, p) ^{4}He reaction rate from the current study to the CAU 88 [9] and LANL 01 [10] rates at stellar temperatures. Level parameters for the ^{5}Li compound nucleus are also deduced from the R-Matrix analysis of experimental data for the latter reaction.



Ratios of the ^{3}He (d, p) ^{4}He reaction rate from the current study to the CAU 88 [9] and LANL 01 [10] rates at stellar temperatures .

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