

Low energy underground study of $^{14}\text{N}(p,\gamma)^{15}\text{O}$ differential and total cross section at LUNA

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The astrophysical $S(E)$ factor of $^{14}\text{N}(p,\gamma)^{15}\text{O}$ has been measured for centre of mass energies down to 70 keV. R-matrix analysis reveals that due to the complex level structure of ^{15}O the extrapolated $S(0)$ value is model dependent. While extrapolation of the differential data requires a detailed knowledge of the energy dependence of the various contributions to the total S-factor, the total S-factor measurement down to 70 keV gives experimental certainty of the reaction rate better than 15% for $T_6 > 90$ without any extrapolation procedure.