Measurement of the 10 keV resonance in the $^{10}\text{B}(p, \alpha_0)^7\text{Be}$ reaction via the Trojan Horse method


The $^{10}\text{B}(p, \alpha_0)^7\text{Be}$ bare nucleus astrophysical $S(E)$ factor has been measured for the first time at energies from about 100 keV down to about 5 keV by means of the Trojan Horse method (THM). In this energy region, the $S(E)$ factor is strongly dominated by the 8.699 MeV $^{11}\text{C}$ level ($J^\pi = 5/2^+$), producing an s-wave resonance centered at about 10 keV in the entrance channel. Up to now, only the high-energy tail of this resonance has been measured, while the low-energy trend is extrapolated from the available direct data. The THM has been applied to the quasifree $^2\text{H}(^{10}\text{B}, \alpha_0^7\text{Be})n$ reaction induced at a boron-beam energy of 24.5 MeV. An accurate analysis leads to the determination of the $^{10}\text{B}(p, \alpha_0)^7\text{Be}$ $S(E)$ factor and of the corresponding electron screening potential $U_e$, thus giving for the first time an independent evaluation of it.

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