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Measurements of the 10B(p,α0) 7Be cross section at astrophysical energies using the Trojan Horse Method

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For nucleosynthesis calculations precise reaction rates should be known at energies close to the Gamow peak. Accurate measurements of nuclear reactions performed at these energies [1-5] shows an unexpected enhancement of the cross section at the lowest measurable energies that is attributed to the presence of atomic electrons in the target. In order to observe the bare nuclear cross section, it is possible to perform experiments where the cross section is measured indirectly, as for example with the Trojan Horse Method (THM). In this method the electron screening effect is neglected since the measurements take place at much higher energies [6].
The THM has been applied to the quasifree 2H(10B,α_0,7Be)n reaction induced at a boron-beam energy of 28 MeV. The astrophysical S-factor of the 10B(p,α_0)7Be reaction was measured in a wide energy range, from 5 keV to 2.5 MeV. In this experiment has been achieved a much better energy resolution as compared to the previous one [7] allowing the significantly better separation of the 8.654 MeV and 8.699 MeV 11C levels. Since the 8.699 MeV resonance lies at the Gamow peak energy for the 10B(p,α)7Be reaction, the proper subtraction of events belonging to the subthreshold level at the 8.654 MeV is necessary for accurate determination of the astrophysical S-factor and so, electron screening potential.
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