

How sensitive is the determination of an S-factor from experimental data to the nuclear theory used?

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An R-matrix analysis of experimental total and differential nuclear cross-section data on the reactions $^{10}\text{B}(p, \alpha_0)^7\text{Be}$ and $p^{10}\text{B}$ elastic scattering is presented. This is the most comprehensive R-matrix analysis of these reactions to date. 1845 data points from 10 experimental references for laboratory proton energies from 0.02-3 MeV are entered. The reactions fit with a reasonable $\chi^2/(\text{point})$ of 2.2 using approximately 25 R-matrix parameters. The evaluated $^{10}\text{B}(p, \alpha_0)^7\text{Be}$ cross-section is presented from which the S-factor is determined. The value is 6 times smaller than the value previously extracted by Angulo *et al.* By relaxing first the multichannel nature of the fit, and secondly, the multiresonance nature of the fit, we show that the S-factor is very sensitive to the details of the nuclear theory used.

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