

Systematic analysis of astrophysical S-factors and thermonuclear reaction rates *

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Thermonuclear reactions are crucial for the Big-Bang nucleosynthesis and for stellar evolution and concomitant nucleosynthesis. After the pioneering compilations of thermonuclear reaction rates by W.A. Fowler and his collaborators [1], a similar kind of compilations has been constructed, based on the current experimental efforts at astrophysical energies. The so-called NACRE (Nuclear Astrophysics Compilation of REaction rates) [2] of charged-particle induced reactions has been an important step forward in the compilation effort, and it is being updated and extended into a new version of NACRE. In a previous work [3], we have demonstrated the applicability of our potential model and distorted-waves Born approximation (DWBA) to the low-energy nuclear reactions relevant to nuclear astrophysics. In this contribution, we perform a systematic analysis of the low-energy nuclear reactions by using these two models. The derived reaction rates are compared with the NACRE ones.

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[3] M. Katsuma, *Proc. Tours 2006, AIP Conference Proceedings* 891 (2007) 355.