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Matching of experimental and statistical-model thermonuclear reaction rates at high temperatures JOSEPH NEWTON, University of North Carolina at Chapel Hill, RICHARD LONGLAND, CHRISTIAN ILIADIS — Reliable reaction rates at high stellar temperatures are necessary for the study of advanced stellar burning stages, supernovae and x-ray bursts. We suggest a new procedure for extrapolating experimental thermonuclear reaction rates to these higher temperatures (T > 1 GK) using statistical model (Hauser-Feshbach) results. Current, generally accepted, procedures involve the use of the Gamow peak, which has been shown to be unreliable for narrow resonances at high stellar temperatures [1]. Our new approach defines the effective thermonuclear energy range (ETER) by using the 8^{th}, 50^{th} and 92^{nd} percentiles of the cumulative distribution of fractional resonant reaction contributions. The ETER is then used to define a reliable temperature for matching experimental rates to Hauser-Feshbach rates. The resulting matching temperature is often well above the previous result using the Gamow peak concept. Our new method should provide more accurate extrapolated rates since Hauser-Feshbach rates are more reliable at higher temperatures. These ideas are applied to 21 (p,γ), (p,α) and (α,γ) reactions on a range of A = 20-40 target nuclei and results will be presented.
[1] J. R. Newton, C. Iliadis, A. E. Champagne, A. Coc, Y. Parpottas and R. Ugalde, Phys. Rev. C 75, 045801 (2007).

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