A precision measurement of the $^{3}$He($\alpha,\gamma$)$^{7}$Be astrophysical S-factor

T.A.D. BROWN, K.A. SNOVER, D.W. STORM, C. BORDEANU, D. MELCONIAN, A.L. SALLASKA, S.K.L. SJUE, S. TRIAMBAK, A.M. CRISP, J.D. LOWREY, K. MICHNICKI, P. PEPLOWSKI, J. SIBILLE, University of Washington — The $^{3}$He($\alpha,\gamma$)$^{7}$Be reaction is the gateway to the ppII and ppIII branches, providing the principle route to energetic neutrino production in the Sun. The uncertainty on the accepted value of $S(0)$ for this reaction is currently the largest important nuclear physics uncertainty (+/- 10%) in the Solar Model [1]. A more precise value of $S_{34}(0)$ would bring an improvement in solar neutrino flux calculations, and in predictions of $^{7}$Li production in Big-Bang Nucleosynthesis which are currently significantly higher than observed $^{7}$Li abundances [2]. Precision measurements of $S_{34}(E)$ have been made at eight different energies between $E_{CM} = 329$ and 1235 keV, using the terminal ion source on the Van-de-Graaff accelerator at the University of Washington. The prompt gamma-ray yield and the $^{7}$Be activity have been measured at each energy in the same irradiation, permitting two different methods for determining $S_{34}(E)$. This presentation discusses the experimental details of these measurements, the analysis of the data and our results for $S_{34}(0)$.


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Date submitted: 29 Jun 2007

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