THE COULOMB DISSOCIATION OF ^8B; A NEW TOOL FOR NUCLEAR ASTROPHYSICS *

Moshe Gai

Laboratory for Nuclear Science at Avery Point, University of Connecticut, Groton, CT 06340
and
Department of Physics, Yale University, New Haven, CT 06520, USA
Contact e-mail: <moshe.gai@yale.edu>

The Coulomb Dissociation (CD) method was developed over the last twenty years and reached the level of confidence where the very method and its application to the CD of ^8B can be tested with high accuracy. We observe that both the GSI1 [1] and GSI2 [2] measurements of the CD of ^8B are in excellent agreement with the most recent Direct Capture (DC) $^7Be(p,\gamma)^8B$ reaction measurement performed at Weizmann [3] and in agreement with the Seattle result [4]. We also show [5, 6] that the statements on "fundamental differences" between CD and DC data arise from a misunderstanding (as well as misrepresentation) of CD experiments.

However, in spite of the general good agreement between DC and CD data the slope of the astrophysical cross section factor $[S_{17}(E)]$ can not be extracted with high accuracy due to discrepancies of the slope measured by Weizmann [3] and Seattle [4] as well as a discrepancy between the slope measured by GSI1 [1] and GSI2 [2]. This discrepancies of the measured slopes (among DC data themselves and among CD data themselves) lead to an additional uncertainty of the extrapolated zero energy cross section factor $[S_{17}(0)]$ and must be alleviated by future experiments in order to achieve a high precision determination of the extrapolated $S_{17}(0)$ and the predicted ^8B solar neutrino flux.

* Work Supported by USDOE grant No DE-FG02-94ER40870.

1. N. Iwasa *et al.*; Phys. Rev. Lett. **83**, 2910(1999).
2. F. Schumann *et al.*; Phys. Rev. Let. **90**,232501(2003), ibid Phys. Rev. **C73**, 15806(2006).
3. L.T. Baby *et al.*; Phys. Rev. Lett. **90**, 022501(2003), ibid Phys. Rev. **C67**, 065805(2003), **ER C69**, 019902(E)(2004).
4. A.R. Junghans *et al.*; Phys. Rev. Lett. **88**, 041101(2002), ibid Phys. Rev. **C68**, 065803(2003).
5. M. Gai; Comment on Esbensen, Bertsch and Snover on Reconciling Coulomb Dissociation and Radiative Capture Measurements; Phys. Rev. Lett. **96**(2006)159201.
6. M. Gai; Critical Assessment of the Claim of a Significant Difference Between the Results of Measurements of the Coulomb Dissociation of ^8B and the $^7Be(p,\gamma)^8B$ Direct Capture Reaction. Phys. Rev. **C74**(2006)025810.