

**B.1.5. Electron Capture Cross Sections in Selected Collision Systems—*H.C. Tseng,\**  
*H.C. Lee,\* Emil Sidky, W. Fritsch,\*\* and C D. Lin***

In the last grant period we continued to employ the semiclassical close-coupling approximation to calculate electron capture cross sections for a number of collision systems. These calculations were performed mostly by our collaborators. The calculations were carried out because new experiments had been performed and the results were in clear disagreement with other existing calculations. The collision systems that we have examined and the major conclusions are:

- (1)  $C^{4+}+H$ , see Publication #22. We questioned the small dip in the experimental cross section near 0.5 keV/u in the new data of Bliet *et al.*, Phys. Rev. A 56, 526 (1997).
- (2)  $N^{4+}+H$ , see Publication #77 where a two-electron model calculation was performed, and Publication #94 where a one-electron model calculation was performed. The conclusion is that experimental errors are still too large to discriminate the different theoretical results.
- (3)  $B^{4+}+H$ , see Publication #115. The conclusion is that our results agree with the new experimental data of Pieksma *et al.*, [Phys. Rev. A 57, 1892 (1998)] and with the molecular orbital close-coupling calculations of Shimakura *et al.*, [Phys. Rev. A 47, 3930 (1993)], but not with the similar calculations of Fraija *et al.*, [Phys. Rev. A 49, 272 (1994)].

We have also collaborated with two experimental groups, one at the Tata Institute in India, to provide theoretical calculations on the inner-shell vacancy production cross sections that were measured there, and with Dr. R. Bruch's group at Reno to provide theoretical predictions for the polarization fraction of the emitted radiations of He after impact by protons. We also collaborated with a group in Mexico to assist theorists there to calculate charge transfer cross sections of Ar by protons where such experiments are being performed. Reports of these works are under preparation.

\*Department of Physics, Chung Yuan Christian University, Chung Li, Taiwan 32023.

\*\*Hahn-Meitner-Institut, Berlin, Germany.