Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

B-spline R-matrix with pseudo-states calculation for electron-impact ionization of helium[1] OLEG ZATSARINNY, KLAUS BARTSCHAT, Drake University — We have extended the B-spline R-matrix (BSR) method [1] to include a large number of pseudo-states. These pseudo-states are not only important for the accurate treatment of electron-impact excitation processes at intermediate energies, but they also allow for the calculation of ionization processes, using the same basic ideas as in the convergent close-coupling and standard R-matrix with pseudo-states (RMPS) approaches [2,3]. The generality and flexibility of our BSRMPS extension makes it possible to use multiple cores of the residual He^+ ion as well as specially optimized short-range correlation orbitals to achieve an accurate description of the initial bound state, the important part of the single-electron excitation spectrum, auto-ionizing states, and finally the ionization and ionization-excitation continua. We obtain excellent agreement with the most recent experimental data [4,5]. [1] O. Zatsarinny, Comp. Phys. Commun. **174** (2006) 273. [2] D. V. Fursa and I. Bray, Phys. Rev. A **52** (1995) 1279. [3] K. Bartschat and I. Bray, J. Phys. B **29** (1996) L577. [4] R. Rejoub, B. G. Lindsay, and R. F. Stebbings, Phys. Rev. A **65** (2002) 042713. [5] A. A. Sorokin, I. L. Beigman, S. V. Bobashev, M. Richter, and L. A. Vainshtein, J. Phys. B **37** (2004) 3215.

[1]Work supported by the NSF under PHY-0903818 and PHY-0757755.

Klaus Bartschat
Drake University

Date submitted: 31 Jan 2011 Electronic form version 1.4