

Abstract Submitted  
for the DAMOP17 Meeting of  
The American Physical Society

**Benchmark calculations for electron-impact excitation of  $\text{Mg}^{4+}$ .**<sup>1</sup>

KEDONG WANG, Henan Normal University, LUIS FERNÁNDEZ-MENCHERO, OLEG ZATSARINNY, KLAUS BARTSCHAT, Drake University — There are major discrepancies between recent B-spline R-matrix (BSR) [1] and Dirac Atomic R-matrix Code (DARC) [2] calculations regarding electron-impact excitation rates for transitions in  $\text{Mg}^{4+}$ . To identify possible reasons for these discrepancies and to estimate the accuracy of the various results, we carried out independent BSR calculations with the same 86 target states as in the previous calculations, but with a more accurate representation of the target structure. We find close agreement with the results given in [2] for the majority of transitions. The remaining discrepancies in the collision strengths are mostly due to the different structure description, specifically the inclusion of correlation effects, and the likely occurrence of pseudoresonances in the DARC calculations. To further check the convergence of the predictions, we carried out even more extensive calculations by coupling 316 states of  $\text{Mg}^{4+}$ . Extending the close-coupling expansion results in major corrections for transitions involving the high-lying states and allows us to assess the likely uncertainties in the existing datasets. [1] K. M. Aggarwal and F. P. Keenan, *Can. J. Phys.* **95** (2017) 9. [2] S. S. Tayal and A. M. Sossah, *Astron. Astroph.* **574** (2015) A87.

<sup>1</sup>Work supported by the NSF under PHY-1403245 and XSEDE-090031.

Klaus Bartschat  
Drake University

Date submitted: 24 Jan 2017

Electronic form version 1.4