

Abstract Submitted
for the DAMOP06 Meeting of
The American Physical Society

Simultaneous (e,2e) Ionization-Excitation of Helium.¹ SUSAN BELLM, JULIAN LOWER, Australian National University, KLAUS BARTSCHAT, Drake University — Although it is the simplest example of a process, in which an atom or molecule is ionized and a second electron in the target is excited to a higher level, simultaneous ionization-excitation of helium poses significant challenges to both experimentalists and theorists. We present recent experimental and theoretical results for this process, leaving the He⁺ ion in the $n = 2, 3$, and 4 excited states. These (e,2e) experiments were performed for scattering geometries involving both asymmetric and symmetric energy sharing between the two final-state electrons. For the asymmetric geometry, the scattered and ejected electron energies were 200 eV and 44 eV, respectively, while both final-state electrons had 44 eV in the equal-energy sharing case. Comparison of the measurements to theoretical predictions obtained with a hybrid approach, employing a perturbative treatment for the projectile and a convergent R -matrix with pseudo-states (close-coupling) description for the initial bound state and the ejected-electron–residual-ion interaction, shows that accounting for second-order effects in the projectile–target interaction is critical for the theoretical description of the process.

¹Work supported by the Australian Research Council under grant DP0452553 and the United States National Science Foundation under grant PHY-0244470.

Klaus Bartschat
Drake University

Date submitted: 25 Jan 2006

Electronic form version 1.4