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.

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