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**Neutron impact ionization of helium** JOHANNES FEIST, ITAMP, Harvard-Smithsonian Center for Astrophysics, MATTHIAS LIERTZER, STEFAN NAGELE, RENATE PAZOUREK, JOACHIM BURGDÖRFER, Institute for Theoretical Physics, Vienna University of Technology, BARRY I. SCHNEIDER, Office of Cyberinfrastructure, National Science Foundation, LEE A. COLLINS, Theoretical Division, Los Alamos National Laboratory — Low-energy (∼keV) collisions of neutrons with atoms result in a momentum transfer to the atomic nuclei while the direct interaction with the electronic degrees of freedom is negligible. In the frame of a target nucleus, this represents a simultaneous *kick* of all electrons, i.e., a sudden boost of the $N$-electron wave function in momentum space giving rise to excitation and ionization with a broad distribution of final states. As the kick operator is a true many-electron operator, multiply-excited and correlated final states can be readily accessed that are precluded by selection rules in the case of photoabsorption. We study neutron impact ionization of helium for kinetic energies of the neutrons up to a few tens of keV, corresponding to a momentum transfer of up to half an atomic unit for the electrons. We will present single and double ionization yields as a function of neutron energy, as well as ionization spectra which clearly show Fano resonance lines for many doubly excited states that are strongly suppressed in photoionization or electron-impact ionization.

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