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Measurements of Total Cross Sections of the n=2 Excitation of Helium from the Impact of 10-25 keV Protons[1] G.S. HODGES, J. KANG, J.D. THOMAS, T.J. KVALE, University of Toledo, Toledo, OH 43606, D.G. SEELY, Albion College, Albion, MI 49224 — Absolute, total cross sections of the n=2 excitation of helium by intermediate-energy proton impact are measured using the energy-loss experimental technique. The incident proton beam is accelerated to kinetic energies of 10-25 keV, and is focused into a target cell containing helium gas at room temperature. A hemispherical energy analyzer is used to measure the energy-loss spectra of the incident and scattered proton beams. The excitation cross sections are determined by measuring the amplitudes of the energy-loss peaks corresponding to excitation of the n=2 states of helium. These measurements are compared to theoretical results, including the First Born, Distortion, Glauber, VPS, and Multi-State Impact Parameter Approximation methods. The calculations that incorporate many-state calculation methods such as the Multi-State Impact Parameter Approximation are in reasonable agreement with the present data, suggesting that strong coupling between states must be considered in intermediate-energy, multi-electron ion-target collision systems.

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Thomas Kvale
University of Toledo, Toledo, OH 43606

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