

Abstract Submitted  
for the DAMOP06 Meeting of  
The American Physical Society

**Measurements of Total Cross Sections of the  $n = 2$  Excitation of Helium from the Impact of 10-25 keV Protons**<sup>1</sup> T.J. KVALE, G.S. HODGES, J. KANG, J.D. THOMAS, University of Toledo, D.G. SEELY, Albion College — Absolute, total cross sections for the  $n = 2$  excitation of helium by intermediate-energy proton impact were measured using the energy-loss experimental technique. The incident proton beam was accelerated to kinetic energies of 10-25 keV and directed through a target cell containing helium gas at room temperature. The scattered proton beam was then energy analyzed to obtain energy-loss spectra. The excitation cross sections were calculated by comparing the amplitudes of the energy-loss peaks corresponding to excitation of the  $n=2$  states of helium with the zero-energy-loss peak. As such, the cross sections have been determined on an absolute scale, without the need to normalize the results to any other experiments or theories. The cross sections are compared to theoretical results, including the First Born, Distortion Glauber, VPS, and Multi-State Approximation methods. The theories that incorporate many-state calculation methods such as the Multi-State 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.

<sup>1</sup>JDT acknowledges support from the NSF-REU grant: PHY-0353899.

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Date submitted: 27 Jan 2006

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