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### **Laser-assisted electron impact autoionization of Helium<sup>1</sup>**

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We have begun to perform the first electron impact autoionization experiments in the presence of a laser field. Laser assisted electron collisions are a poorly understood process. A theoretical discussion of electron impact ionization in the presence of a laser field was published as long ago as 1988,<sup>2</sup> but the first experimental results were only published in 2005.<sup>3</sup> Distinct differences in the ionization process between the field free (laser off) and field assisted (laser on) cases were found. The results were in poor agreement with quantum calculations but could (oddly enough) be explained with a simple classical model. Our experiments have the advantage that autoionizing levels provides energy markers: the absorption or emission of a photon is expected to shift the resonance position in the ejected electron spectrum by the photon energy. It is easier to detect the presence of such sideband peaks than it is to observe quantitative shifts in the energy onset of traditional simultaneous electron-photon excitation (SEPE) experiments. We will provide details of our experimental apparatus, and provide a progress report on these experiments.

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<sup>2</sup>C. J. Joachain et al., Phys. Rev. Lett. 61, 165 (1988)

<sup>3</sup>C. Höhr *et al.* Phys. Rev. Lett. 94, 153201 (2005)