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Super-elastic scattering from atoms using visible and UV lasers ANDREW MURRAY, SARAH JHUMKA, ALEX KNIGHT-PERCIVAL, MARTYN HUSSEY, University of Manchester — Studying excitation of atoms by electron impact to produce a full description of the collision process either requires coincidence studies between the scattered electron and photons emitted from the excited state, or uses super-elastic scattering of electrons from atoms prepared using coherent laser radiation. The latter technique adopts time reversal arguments to ascertain Atomic Collision Parameters at a rate thousands of times faster than coincidence methods. This allows measurements to be made over the complete scattering geometry with high precision. A severe limitations of the super-elastic technique is the restricted number of targets that can be excited by present lasers. These include the alkalis, and some alkali earths. This limitation arises due to a lack of UV power, where most targets have their first excited state transition. Here we discuss a new method to enhance the laser power using a resonant cavity in the apparatus. In this way we expect intensities $\sim$200mW/mm^2 at the interaction region for wavelengths as low as 215nm, allowing many new targets to be studied. We will also present low energy data from calcium at 12eV and below, showing the power of this technique for accurate measurements.

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