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Super-elastic electron excitation of atoms in magnetic & optical fields ANDREW MURRAY, University of Manchester, WILLIAM MACGILLIVRAY, Southern Cross University, MARTYN HUSSEY, University of Manchester — Understanding electron impact excitation of atoms usually requires coincidence techniques to fully ascertain the interactions that occur, & to allow detailed comparison to collision theories. These experiments are slow, but have advantages since many targets can be studied. By contrast, the 'time reversed' super-elastic scattering experiment produces equivalent information thousands of times faster with higher precision, but is limited to only a few targets that can be excited by tunable lasers. Here two new techniques invented in Manchester are discussed. The first allows the cross sections to be determined over all angles using a Magnetic Angle Changer to steer electrons to & from the target [1-3]. The second adopts a resonant optical cavity around the interaction region to efficiently excite a much wider range of targets. We can then for the first time study targets of relevance to industry, including Zn (which may provide an alternative to Hg in low energy lighting), through to Au & Ag.

[1] M Hussey et al Phys Rev Lett 99 133202 (2007)
[2] A J Murray et al Phys Rev A 77 013409 (2008)
[3] M Hussey et al J Phys B 41 055202 (2008)

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