

Abstract Submitted
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Electron Spectroscopy of Tenuously and Weakly Bound Negative Ions A.Z. MSEZANE, Z. FELFLI, Clark Atlanta University, D. SOKOLOVSKI, Queen's University of Belfast, UK — We propose using very slow electron elastic collisions with atoms to identify their presence through observation of tenuously bound (impact energy, $E < 0.1$ eV) and weakly bound ($E < 0.2$ eV) negative ions, formed during the collisions. This could be important in identifying the presence of atoms in various environments. In an appropriate representation the characteristic very sharp resonances in electron-atom elastic total cross sections (TCSs) are enhanced significantly. Their positions yield the binding energies of the negative ions formed as Regge resonances, identified through the careful scrutiny of the complex angular momentum L . Two limiting curves determine the behavior as $E \rightarrow 0$. The TCSs for example Tm, Sr and Mn in the region of formation of their tenuously bound negative ions with Re $L=2$ electron attachment follow a Wigner threshold law determined by the lowest Regge trajectory. Resonances in TCSs for the group exemplified by Cd, Eu and Tc atoms forming weakly bound negative ions with Re $L=3$ electron attachment rest on a trajectory that approaches that for e-Ca scattering, with Re $L=1$ electron attachment. The calculations used the Regge-pole methodology with a Thomas-Fermi type potential [1, 2]. [1] D. Sokolovski *et al*, Phys. Rev. A **76**, 012705 (2007). [2] Z. Felfli *et al*, Phys. Rev. A **78**, 030703 (R) (2008). Supported by US DOE Office of Basic Energy Sciences.

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