Shell Effects on Electron Capture to the Continuum in MeV/u Collisions of Deuteron Ions with Multielectron Targets

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The capture of a target electron into the projectile continuum (ECC) in collisions of 1.25-6.0 MeV deuteron ions with multielectron gas targets is studied both experimentally and theoretically. The double differential cross sections (DDCS), $d^2\sigma/d\Omega dE$, of the cusp shape electron peak for the gas targets of He, Ne and Ar were measured at zero degrees with respect to the ion beam, using the electron spectroscopy setup operating at the 5.5 MV Tandem Van der Graaff accelerator of NCSR "Demokritos" [1]. Theoretical DDCSs were obtained using continuum distorted wave-eikonal initial state (CDW-EIS) and CDW model calculations [2] and compared to the measurements. Multielectron targets provide stringent tests for theories exposing shell effects owed to the role of the inner shell electrons. Such an effect is the DDCS crossing for Ne and Ar targets observed around the energy of 0.8 MeV/u [3] as seen in Fig. 1.
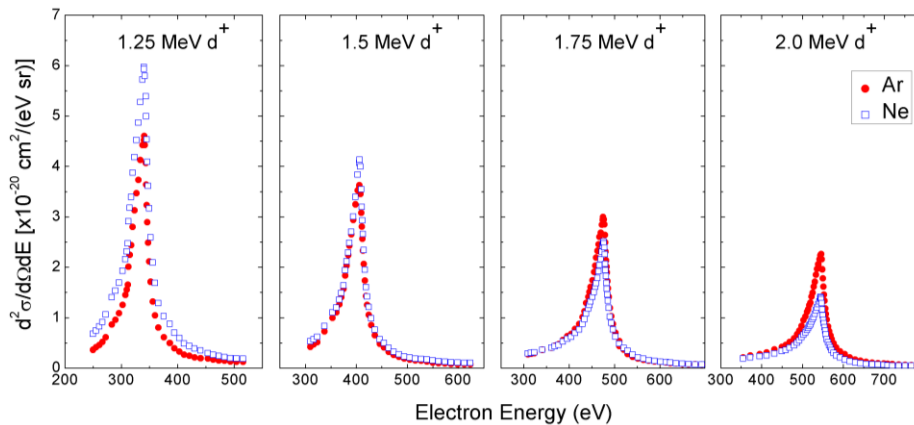
Figure 1: ECC cusp peak measurements for Ne and Ar targets showing the crossing in the DDCSs.

References

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