Electron impact *L* and *M*-subshell ionization cross sections for atoms ($14 \leq Z \leq 92$) including the relativistic effects

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Synopsis Electron impact inner-subshell (*L* and *M*) ionization cross sections for various atoms ($14 \leq Z \leq 92$) are calculated and compared with experimental and other theoretical results.

The electron impact ionization cross sections (EIICS) are needed in various fields ranging from biological to chemical, plasma to astrophysics, and laser to medical physics. At energies above the breakup threshold the scattering in a three-body system remains a most challenging quantum mechanical problem. For simpler targets, like H and He, there are few accurate calculations available but for many electron targets it is rather disappointing. Experimental data for the *K*-shell ionization are rife; they are, however, limited for both the *L*-shell and *M*-shell but their subshell data [1] are practically zero. On the other hand the huge demands for EIICS in applications cannot be fulfilled easily by generating a database either by experimental or by quantal studies. So resorts are made to fulfill this void by using *simple–to-use* models that must yield accurate results. In this study we report few such models that are capable of describing reasonably the experimental data for a wide range of atomic targets over a wider energy domain. Two easy-to-implement models, namely XMCN [1,2] and XMUIBED [1], are presented here; the former modifies the DM relativistic factor of the MCN model with a *Z*-dependent factor, while the latter replaces the Bethe part of the BED model by a simple two-parameter Born term. Both the XMCN and XMUIBED models, however, generate reliable EIICS quickly. Our results in Fig. 1 are compared with the experimental data and found good agreements for *L*- and *M*-subshell.

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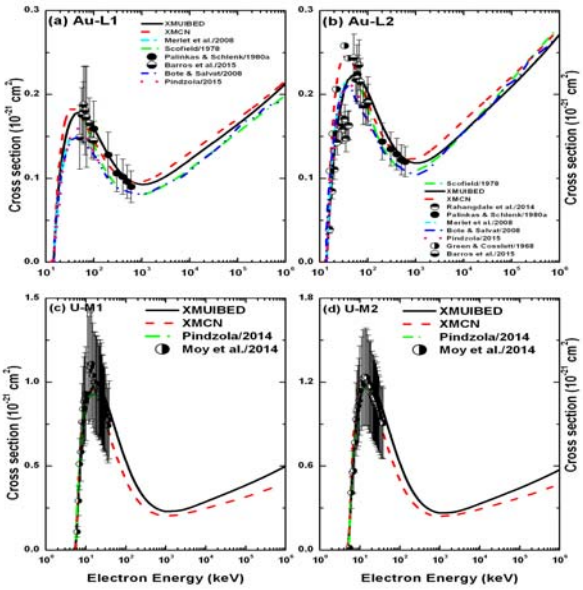

Figure 1. EIICS for Au and U atoms. Upper panel represents L1 and L2 subshells of Au and the lower panel for M1 and M2 subshells of U. Symbols denote experimental data and the lines predicted cross section from various sources including XMUIBED and XMCN.

References

[1] A. K. F. Haque *et al.* 2017 *AQC, in press, Vol.77*
[2] A. K. F. Haque *et al. 2017 J. Phys. B: At. Mol. Opt. Phys. 50, 055005*

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