ELECTRON-IMPACT IONIZATION FOR U^{91+} IN THE QED THEORYHsiao-Ling Sun^a, Tien-Yow Kuo^b, and Keh-Ning Huang^{a,c}^aDepartment of Physics, National Taiwan University, Taipei, Taiwan 106, ROC^bInstitute of Optoelectronic Sciences, National Taiwan Ocean University
Taipei, Taiwan 106, ROC^cInstitute of Atomic and Molecular Sciences, Academia Sinica
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slsun@mccrpa.iam.s.sinica.edu.tw**Abstract**

Electron-impact ionization of highly charged ions is studied in the QED theory. Our calculation will include the transverse-photon interaction as well as the vacuum-polarization potential between charges. We apply the two-potential distorted wave approximation to compute the ionization cross sections. Both direct and exchange effects are considered. The calculated results are compared with those from other theories and with experiment.

Text

The nonrelativistic, Dirac, and QED cross sections for U^{91+} are calculated and compared with other theories [2-5] and experiments [6,7]. As a matter of fact, the transverse-photon interaction is the appropriate form to use as noted by Huang [1], and we include the covariant-photon results only for comparison purpose. Our QED cross section with the transverse-photon interaction agrees reasonably well with the experimental data of Marrs *et al.* [7]. The theoretical results of Pindzola *et al.* [3,4] and Moores *et al.* [5] contain without and with the exchange matrix elements of the covariant-photon interaction, which is actually the wrong form to use. On the other hand, the results of Fontes *et al.* [2] are obtained by using a parametrized transverse-photon interaction. Our transverse data almost coincides with those theoretical data including exchange effects. The QED effects give rise to a substantial contribution at high incident energies.

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