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Photo-Double Ionization: Threshold Law and Low-Energy Behavior A. TEMKIN, A.K. BHATIA, NASA/Goddard Space Flight Center — The threshold law for photoejection of two electrons from atoms (PDI) is derived from a modification of the Coulomb-dipole (C-D) theory. The C-D theory applies to two-electron ejection from negative ions (photo-double detachment:PDD).The modification consists of correctly accounting for the fact that in PDI that the two escaping electrons see a Coulomb field, asymptotically no matter what their relative distances from the residual ion are. We find the analytic threshold law $\mathcal{Q}(E)$ i.e. the yield of residual ions to be $\mathcal{Q}_f(E) \propto E + C_W E^{\gamma_W} + C E^{5/4} \sin[\frac{1}{2}\ln E + \phi]/\ln(E)$. The first and third terms are beyond the Wannier law. The Wannier exponent for neutral targets is γ_W=1.056. The first and third terms are beyond the Wannier law. Our threshold law can only be rigorously justified for residual energies $\leq 10^{-3}$eV. Nevertheless in the present experimental range (0.1 - 4 eV), our form, without the second (Wannier) term, can be well fit to the experimental results for He, Li, and Be, as compared to the Wannier law alone, which has a larger error for Li and Be, and for both of which the data also show indications of modulation. which are also well fit by our formula.

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