

# Negative-continuum contribution to excitation and charge-transfer probabilities in collisions of H-like ions with bare nuclei

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Collision of the H-like uranium (as a target) with the bare uranium nucleus (as a projectile) is studied at the projectile energy 6 MeV/u. The relativistic calculations of the charge-transfer probabilities for such a collision were presented in our previous paper [1], where the coupled-channel two-center finite basis method was used. In the present work, this method is employed to solve the time-dependent Dirac equation for both positive and negative energy states. The Dirac-Sturm orbitals of the positive and negative energy spectra are obtained by solving the Dirac-Sturm stationary equations. The many-electron wavefunction is constructed as a Slater determinant using the Dirac-see model for the negative-energy continuum in the approximation of independent electrons. We calculate the influence of the many-electron effects on the values of the 1s target population, target excitation and charge-transfer probabilities. We also evaluate the electron-positron pair creation probabilities for different values of the impact parameter. The calculations are performed in the one-center monopole, one-center multipole and two-center approximations. It is found that a noticeable effect can be observed for the impact parameters less than 40 Fm.

References:

[1] I.I. Tupitsyn, Y.S. Kozhedub, V.M. Shabaev, G.B. Deyneka, S. Hagmann, C. Kozhuharov, G.Plunien, and Th. Stoeckler, Phys. Rev. A **82**, 042701 (2010).