

THE RELATIVISTIC TWO-COULOMB-CENTER  
PROBLEM AT SMALL AND LARGE  
INTERCENTER SEPARATIONS

*O. Reity, V. Lazur*

Uzhgorod National University  
(32, Voloshyn Str., Uzhgorod 88000, Ukraine;  
e-mail: [reiti@univ.uzhgorod.ua](mailto:reiti@univ.uzhgorod.ua), [lazur@univ.uzhgorod.ua](mailto:lazur@univ.uzhgorod.ua))

By perturbation theory, the asymptotic behaviours of the adiabatic energy terms of the relativistic two-Coulomb-center problem are constructed in the limiting cases of small and large inter-nuclear distances  $R$ . On the basis of the boundary-layer method of Fock–Leontovich, the relativistic version of the quasiclassical approximation is elaborated for the Dirac equation with an arbitrary axially symmetric potential, unpermitting the complete separation of variables. The quasiclassical asymptotics of the two-Coulomb-center wave function of a Dirac electron is found in a classically forbidden region. The first two terms of the asymptotic (at large inter-nuclear distance) expansion of the exchange interaction potential of an ion with an atom are calculated.