DESCRIPTION OF ELECTROMAGNETIC AND STRONG INTERACTIONS IN ROTATING FRAMES AT COLLISIONS OF HIGH ENERGY NUCLEI

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Peripheral collisions of high energy nuclei can be characterized by large angular momenta. Such collisions are planned to be studied at the NICA accelerator complex at JINR. When nuclei rotate with a very large angular velocity [1,2], a description of physical phenomena in a rotating frame is rather helpful. For such a description, we use the initial covariant Dirac equation defining electromagnetic and gravitational (or inertial) interactions of a spin-1/2 fermion. To provide a phenomenological description for strong interactions, we add conventional vector and scalar confining potentials (Coulomb plus linear ones) to this equation. We perform the Foldy-Wouthuysen (FW) transformation by the method [3] applicable for a relativistic particle in strong external fields. The derivation of the relativistic FW Hamiltonian makes it possible to give a detailed quantum-mechanical analysis of the problem and to obtain a unambiguous classical limit of the initial equation. The obtained results show a strong influence of the rotation on the motion of quarks and the dynamics of their spins.

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