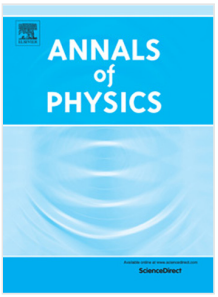

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On a relativistic particle and a relativistic position-dependent mass particle subject to the Klein-Gordon oscillator and the Coulomb potential

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Abstract

The relativistic quantum dynamics of an electrically charged particle subject to the Klein-Gordon oscillator and the Coulomb potential is investigated. By searching for relativistic bound states, a particular quantum effect can be observed: a dependence of the angular frequency of the Klein-Gordon oscillator on the quantum numbers of the system. The meaning of this behaviour of the angular frequency is that only some specific values of the angular frequency of the Klein-Gordon oscillator are permitted in order to obtain bound state solutions. As an example, we obtain both the angular frequency and the energy level associated with the ground state of the relativistic system. Further, we analyse the behaviour of a relativistic position-dependent mass particle subject to the Klein-Gordon oscillator and the Coulomb potential.

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Keywords: Klein-Gordon oscillator, Coulomb-type potential, position-dependent mass, linear scalar potential, biconfluent Heun equation, relativistic bound states

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