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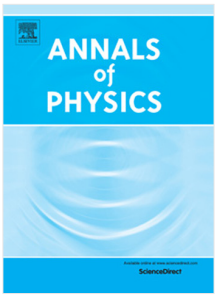

Singular inverse square potential in coordinate space with a minimal length

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Singular inverse square potential in coordinate space with a minimal length

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Abstract

The problem of a particle of mass m in the field of the inverse-square potential α/r^2 is studied in quantum mechanics with a generalized uncertainty principle, characterized by the existence of a minimal length. Using the coordinate representation, for a specific form of the generalized uncertainty relation, we solve the deformed Schrödinger equation analytically in terms of confluent Heun functions. We explicitly show the regularizing effect of the minimal length on the singularity of the potential. We discuss the problem of bound states in detail and we derive an expression for the energy spectrum in a natural way from the square integrability condition; the results are in complete agreement with the literature.

Keywords: generalized uncertainty principle, minimal length, inverse square potential, singular potentials.