

# The Casimir operator of the group $SO(3,2)$ for parabolic coordinates and related Hamiltonian system

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**Abstract:** The generators of the quasi-regular representation of the group  $SO(3,2)$  are obtained for parabolic coordinates. By the generators, the expression of the quadratic Casimir operator is presented. From the relation between the Casimir operator and Hamiltonian, the corresponding physical system is expressed, and its exact solution is given.

**Keywords:** Lie group and algebra, Casimir operator, representation, wave function

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