

QUASI-EXACT SOLVABILITY OF THE D -DIMENSIONAL SEXTIC POTENTIAL IN TERMS OF TRUNCATED BI-CONFLUENT HEUN FUNCTIONS*

Radu Budaca[†]

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Dedicated to Dr. Vasile Drăgan on the occasion of his 70th anniversary

Abstract

The D -dimensional Schrödinger equation for an isotropic sextic potential is brought to a form compatible with the canonical bi-confluent Heun differential equation. The quasi-exactly solvable properties of the model are recovered by considering polynomial solutions for the bi-confluent Heun equation which constrains the potential parameters in terms of rotation quantum number, space dimension and order of the exact solvability. It is shown that the state independence of the potential can be maintained by using a see-saw adjustment between the rotation quantum number and the exact solvability order. An analysis on the exactly solvable instances of the sextic potential is presented in correlation with the extended set of exactly solvable states.

MSC: 34Axx, 34Bxx, 81Qxx, 81Vxx

keywords: Schrödinger equation, Quasi exact solvability, bi-confluent Heun differential equation.

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[†]rbudaca@theory.nipne.ro Department of Theoretical Physics, "Horia Hulubei" National Institute for Physics and Nuclear Engineering, Reactorului 30, RO-077125, POB-MG6, Bucharest Magurele, Romania; Academy of Romanian Scientists, 54 Splaiul Independenței, RO-050094, Bucharest, Romania