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Quantum Groups in Nuclear Spectra and in Metal Clusters

Dennis Bonatsos^{#1}, B. A. Kotsos^{*2}, P. P. Raychev^{†3}, P. A. Terziev^{†4}

[#] Institute of Nuclear Physics, N.C.S.R. “Demokritos”,

GR-15310 Aghia Paraskevi, Attiki, Greece

^{*} Technological Education Institute, GR-35100 Lamia, Greece

[†] Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences,

72 Tzarigrad Road, BG-1784 Sofia, Bulgaria

Abstract

Quantum algebras (quantum groups), which are nonlinear generalizations of the usual Lie algebras, provide a rich variety of symmetries finding applications in the description of several physical systems [1]. Using irreducible tensor operators under $su_q(2)$ a rotationally invariant Hamiltonian which provides a good description of nuclear rotational spectra is constructed and its relation to existing nuclear models is considered. Using the same techniques a 3-dimensional q -deformed harmonic oscillator with $u_q(3) \supset so_q(3)$ symmetry is constructed, compared to the modified oscillator of Nilsson, and used for the successful description of magic numbers [2] and supershells [3] in metal clusters.

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¹e-mail: bonat@inp.demokritos.gr

²e-mail: bkotsos@teilam.gr

³e-mail: raychev@phys.uni-sofia.bg, raychev@inrne.bas.bg

⁴e-mail: terziev@inrne.bas.bg