Conformal Maps and Group Contractions in Nuclear Structure

D. Bonatsos[1]

[1] Institute of N.C.S.R. "Demokritos", GR-15310 Aghia Paraskevi, Attiki, Greece

In mathematics, a conformal map is a function which preserves angles. We show [1] how this procedure can be used in the framework of the Bohr Hamiltonian, leading to a Hamiltonian in a curved space, in which the mass depends on the nuclear deformation β, while it remains independent of the collective variable γ and the three Euler angles. This Hamiltonian is proved to be equivalent to that obtained using techniques of Supersymmetric Quantum Mechanics.

Group contraction is a procedure in which a symmetry group is reduced into a group of lower symmetry in a certain limiting case. Examples are provided in the large boson mumber limit of the Interacting Boson Approximation (IBA) model by a) the contraction of the SU(3) algebra into the [R^5]SO(3) algebra of the rigid rotator, consisting of the angular momentum operators forming SO(3), plus 5 mutually commuting quantities, the quadrupole operators, b) the contraction of the O(6) algebra into the [R^5]SO(5) algebra of the γ-unstable rotator. We show [2] how contractions can be used for constructing symmetry lines in the interior of the symmetry triangle of the IBA model.

References

[1] D. Bonatsos, P. E. Georgoudis, D. Lenis, N. Minkov, and C. Quesne, *Phys. Rev. C*, accepted (2011); arXiv 1103.5935 [nucl-th].

[2] D. Bonatsos, S. Karampagia, and R. F. Casten, *Phys. Rev. C*, accepted (2011); arXiv 1104.2104 [nucl-th].