

Prolate to oblate transition within the proxy-SU(3) symmetry

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The consequences of the attractive, short-range nucleon-nucleon (NN) interaction on the wave functions of the Elliott SU(3) and the proxy-SU(3) symmetry [1,2,3] are discussed. The NN interaction favors the most symmetric spatial SU(3) irreducible representation, which corresponds to the maximal spatial overlap among the fermions. The percentage of the symmetric components out of the total in an SU(3) wave function is introduced, through which it is found, that no SU(3) irrep is more symmetric than the highest weight irrep for a certain number of valence particles in a three dimensional, isotropic, harmonic oscillator shell [4]. The consideration of the highest weight irreps in nuclei and in alkali metal clusters, leads to the prediction of a prolate to oblate shape transition beyond the mid-shell region [4], which in the heavy rare earths is found to be located around $N=114$, in agreement with experimental evidence. Similar predictions are obtained within the pseudo-SU(3) symmetry, when the highest weight irrep is used [5].

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Co-authors: Dr MARTINO, Andriana (Institute of Nuclear and Particle Physics, National Centre for Scientific Research "Demokritos"); Mrs SARANTOPOULOU, Smaragda (Institute of Nuclear and Particle Physics, National Centre for Scientific Research "Demokritos"); Dr KARAKATSANIS, Konstantinos (Department of Physics, Faculty of Science, University of Zagreb); Prof. MINKOV, Nikolay (Institute of Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences)

Presenter: BONATSOS, Dennis (Institute of Nuclear and Particle Physics, National Centre for Scientific Research "Demokritos")

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