Approximate SU(3) Symmetry Inside the Symmetry Triangle of the Interacting Boson Model

D. Bonatsos[1], **S. Karampagia**[1], **R.F. Casten**[2]

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

[2]Wright Nuclear Structure Laboratory, Yale University,
New Haven, CT 06520, USA

The U(5), SU(3), and O(6) symmetries of the Interacting Boson Model (IBM) have been traditionally placed at the vertices of the symmetry triangle, while an O(5) symmetry is known to hold along the U(5)-O(6) side of the triangle. We construct [1] for the first time a symmetry line in the interior of the triangle, along which the SU(3) symmetry is preserved. This is achieved by using the contraction of the SU(3) algebra to the algebra of the rigid rotator in the large boson number limit of the IBM. The line extends from the SU(3) vertex to near the critical line of the first order shape/phase transition separating the spherical and prolate deformed phases. It lies within the Alhassid–Whelan arc of regularity, the unique valley of regularity connecting the SU(3) and U(5) vertices amidst chaotic regions, thus providing an explanation for its existence.

References

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