

The nature of the $^{16}\text{O} + \alpha$ clusterization

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Abstract

The nature of nuclear clusterization, i.e. the problem if the clusters are more shell-like or more rigid-molecule like is a longstanding question [1], [2]. In this contribution I plan to present a detailed quantitative investigation of the $^{16}\text{O} + \alpha$ cluster configuration in order to answer the question. In doing so the semimicroscopic algebraic cluster model [3] is applied, in which the two limiting cases correspond to exact dynamical symmetries.

Our detailed description includes calculation of the rotational bands, electromagnetic transitions and spectroscopic factors. The model space is fully microscopic, therefore alpha spectroscopic factors can be obtained in a *parameter-free manner*. A systematic investigation reveals that the experimental data define a position on the phase diagram, which is very close to the shell-like U(3) limit.

To the best of my knowledge no such study have been performed beforehand either for this, or for any other nucleus.

References

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