# Regularity and chaos in nuclear structure

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The relation between chaos in classical mechanics and quantum mechanics is well established for one-body systems. These ideas can be utilised in a mean-field picture of nuclei, and consequences of a possible chaotic component in the nuclear ground state (or nuclear mass) [1, 2] are briefly reviewed.

The BSC pairing gap, obtained from nuclear masses, shows large structural effects. A periodic orbit theory for the pairing gap has been developed [3], and generic expressions for the pairing gap fluctuations are derived, stressing the role of regularity/chaos. Results from the theory are compared to pairing gaps obtained from nuclear masses, calculated (as e.g. in [4]), as well as measured. The comparison provides another quality control of nuclear mass formula, and gives additional insight in the nuclear pairing phenomenon. The theory can be applied to pairing fluctuations in other finite-size Fermi systems, as ultracold atomic gases or small metallic grains [1].

Complexity of excited states in nuclei can be related to many-body quantum chaos. Although, there is no firm relation to the corresponding classical system, random matrix theory provides a good description of many-body quantum chaos. We discuss how chaos sets in with excitation energy, and some consequences of chaos for high-spin excited states.

## References

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