Mean-Field and Beyond Mean-Field Calculations of Λ Hypernuclei

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The studies of Λ hypernuclei has been mainly focused on light systems where few-body or shell-model techniques are applicable. It is, however, desirable to develop also reliable many-body approaches suitable for the description of medium and heavier hypernuclear systems.

In this work we construct a self-consistent mean field of the core nucleus [1,2] from the realistic chiral nucleon-nucleon (NN) potential [3] and additional density dependent term mimicking the effect of 3-body interactions. The Λ hypernucleus is then described using the Λ-nucleon (ΛN) interaction, assuming the Lambda hyperon interacts with the mean field of the core nucleus. So far we have applied in our calculations a phenomenological ΛN contact force [4] but in near future we intend to use more realistic ΛN interactions.

Further, we explain how to proceed beyond the mean-field description of hypernuclei. We discuss in detail the effect of (Λ) particle-phonon coupling. We demonstrate how to modify our approach for systems of one Λ plus odd-A core nucleus.

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