Study of Λ hypernuclei in the quark mean field model

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We study the single Λ hypernuclei in terms of the quark mean field (QMF) model, which has been successfully used to describe the properties of both nuclear matter and finite nuclei [1,2]. In the QMF model, the nucleon and the Λ hyperon are described in terms of the constituent quark model, in which the constituent quark satisfies the Dirac equation with a confinement potential χ_c. The meson mean fields couple directly with quarks and change the properties of nucleons and Λ hyperon in nuclear medium. Without adjusting parameters, the calculated results for Λ hypernuclei are acceptable as shown in Fig. 1.

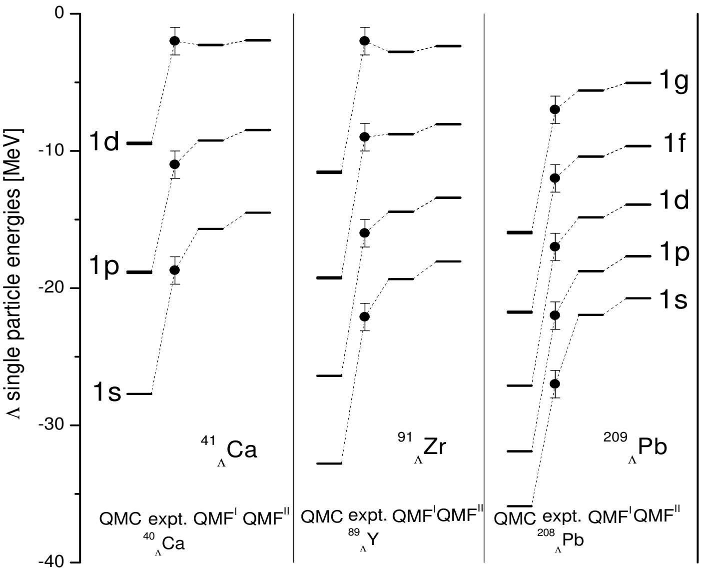

Figure 1: Single particle energies of Λ hypernuclei. QMF$^{\mathrm{I}}$ and QMF$^{\mathrm{II}}$ denote the models with $\chi_c = \frac{1}{2}kr^2(1+\gamma^0)/2$ and $\chi_c = \frac{1}{2}kr^2$, respectively. The results in the QMC model (without Pauli blocking effect) and the experimental values are shown for comparison [3].

References

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