

# The latest results for hypernuclei, and electro/photo-production of hypernuclei in the QMC model

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First, we discuss the results for hypernuclei [1] obtained by the most recent version of the quark-meson coupling (QMC) model, in which the effect of the mean scalar field in-medium on the one-gluon exchange hyperfine interaction is also included self-consistently. The calculations for  $\Lambda$  and  $\Xi$  hypernuclei are of comparable quality to earlier QMC results without the additional parameter needed there. Even more significantly, the additional repulsion associated with the increased hyperfine interaction in-medium completely changes the predictions for  $\Sigma$  hypernuclei. Whereas in the earlier work they were bound by an amount similar to  $\Lambda$  hypernuclei, here they are unbound, in qualitative agreement with the experimental absence of such states. The equivalent non-relativistic potential felt by the  $\Sigma$  is repulsive inside the nuclear interior and weakly attractive in the nuclear surface, as suggested by the analysis of  $\Sigma$ -atoms.

Next, we discuss the electro/photo-production of hypernuclei [2] based on the latest QMC model [1] and the method developed in Ref. [3]. We compare our results with those calculated with the traditional approach, which solely based on the hadronic degrees of freedom. This is expected to provide us with an opportunity to explore a possible role of the quark degrees of freedom in electro/photo-production of hypernuclei.

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[1] P. A. M. Guichon, A. W. Thomas, and K. Tsushima, arXiv:0712.1925 [nucl-th], to be published in Nucl. Phys. A.

[2] R. Shyam, A. W. Thomas, and K. Tsushima, in preparation.

[3] R. Shyam, H. Lenske, and U. Mosel, Phys. Rev. C **77**, 052201(R) (2008).