# $\Xi$ Single-Particle Potential in Nuclear Matter Predicted by the $SU_6$ Quark-Model Interaction between Octet Baryons

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Since experimental data on the baryon-baryon interaction in a strangeness $S = -2$ sector is very scarce, extension of the knowledge of the $NN$ and $YN$ interactions to the $S = -2$ sector has to be relied on theoretical constraint. Studies carried out so far in an OBEP approach using broken $SU(3)_F$ symmetry [1] indicate that this extension has ambiguities. An $SU_6$ quark model is a promising model to provide such a unified framework to describe interactions between octet baryons. In Refs. [2] and [3], we showed predictions of our quark-model interactions in the $S = -1$ sector, such as repulsive $\Sigma$ single-particle (s.p.) potentials in nuclear medium and a very small $\Lambda$ s.p. spin-orbit strength due to an important contribution of the antisymmetric $LS$ force. In this study we present $\Xi$ s.p. properties in nuclear matter obtained by $G$-matrix calculations with our most recent quark-model interaction, fss2 [4]. As is seen in Fig. 1(a), the $\Xi$ in symmetric nuclear medium should have an attractive s.p. potential with a depth of about 10 MeV. Calculations in rather fictitious matter of pure $\Lambda$'s, Fig. 1(c), demonstrate characteristic features of our baryon-baryon interactions in the $S = -1$, $-2$ and $-3$ sectors.

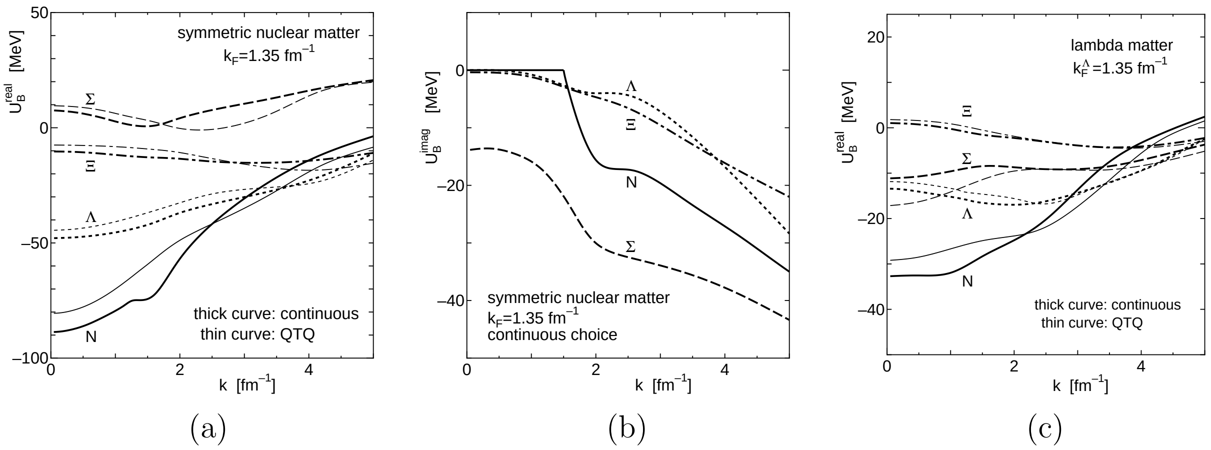


Figure 1: (a) Real part of $N$, $\Lambda$, $\Sigma$ and $\Xi$ s.p. potentials in symmetric nuclear matter with $k_F = 1.35$ fm$^{-1}$. Results by the continuous and the QTQ prescriptions for intermediate spectra are shown. (b) Imaginary part. (c) Results in $\Lambda$ matter with $k_F^{\Lambda} = 1.35$ fm $^{-1}$.

## References

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