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J. Hrtankova, J. Mares
Nuclear Physics Institute, 250 68 Rez, Czech Republic

The study of the antibaryon-nucleus interaction is an interesting issue as it provides valuable information about the behavior of the antibaryon ($\bar{B}$) in nuclear medium, the in-medium $\bar{B}N$ interaction as well as nuclear dynamics. The possibility of the existence of $\bar{B}$-nucleus bound states - and antiproton states in particular - has attracted much interest in recent years in view of future activities at FAIR [1-5].

This contribution reports on our recent calculations of $\bar{p}$ and $\bar{Y}$ (Y =\Lambda,\Sigma, *and*\Xi)*boundstatesinselectednuclei, performe*
field(*RMF*)*approach.*

First, the G-parity motivated antibaryon-meson coupling constants were employed and possible deviations from the G-parity values were taken into account by introducing a scaling factor [2]. Various RMF models were used, including a model with density-dependent couplings, in order to study model dependence of the extrapolation of equation of state to higher densities. Our calculations confirmed large polarization effects of the nuclear core caused by the presence of the antibaryon and revealed significant effect of the \bar{B} self-interaction which was not considered in previous RMF calculations.

Next, we focused on the calculations of \bar{p} nuclear bound states using a potential consistent with \bar{p}-atomic data [5]. The imaginary part of the phenomenological optical potential was introduced to describe absorption of the \bar{p} in the nuclear medium and all relevant decay channels were included. The reduction of the phase space for the annihilation products for deeply bound \bar{p} states was taken into account while treating fully self-consistently energy and density dependencies of the corresponding suppression factors. As a result, the \bar{p}$*absorptionwidthssignificantlydecreasew*

References:
[1] T.J. Bürvenich, I.N. Mishustin, L.M. Satarov, J.A. Maruhn, H. Stöcker, W. Greiner,
Phys. Lett. B 542 (2002) 261.
[2] I.N. Mishustin, L.M. Satarov, T.J. Bürvenich, H. Stöcker, W. Greiner,
Phys. Rev. C 71 (2005) 035201.
[3] A.B. Larionov, I.N. Mishustin, L.M Satarov, W. Greiner, Phys. Rev. C 78 (2008) 014604.
[4] T. Gaitanos, M. Kaskulov, H. Lenske, Phys. Lett. B 703 (2011) 193.
[5] J. Pochodzalla, Phys. Lett. B 669 (2008) 306.
[6] E. Friedman, A. Gal, J. Mares, Nucl. Phys. A 761 (2005) 283.

Primary author: Ms HRTANKOVA, Jaroslava (Nuclear Physics Institute, Rez, Czech Republic)

Co-author: Prof. MARES, Jiri (Nuclear Physics Institute)

Presenter: Ms HRTANKOVA, Jaroslava (Nuclear Physics Institute, Rez, Czech Republic)

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