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Singly heavy baryons in nuclear matter from an SU(3) chiral soliton model

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We discuss how the masses of the singly heavy baryons undergo changes in nuclear matter within the framework of a medium-modified SU(3) chiral soliton model. In order to incorporate a heavy quark inside a singly heavy baryon, we introduce the heavy mesons with heavy-quark spin-flavor symmetry considered. We first reproduce bulk properties of nuclear matter such as the saturation energy and pressure by fitting the model parameters in the light-quark sector. Using the bound-state approach, we produce the states of the singly heavy baryons by combining the SU(3) chiral soliton with the heavy mesons. They emerge as the states with the right hypercharge $Y_R = 2/3$ that picks up the baryon antitriplet ($\bar{3}$) and the sextet (6) properly. We then associate with the medium effects on the heavy mesons, which are essential in determining the mass dropping or raising of the singly heavy baryons. We find that information on the change of the heavy meson masses in nuclear medium is crucial in explaining the behavior of the masses of the singly heavy baryons.

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