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The $\Xi(1620)$ and $\Xi(1690)$ molecular states from meson-baryon interaction up to next-to-leading order

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We have studied the meson-baryon interaction in the neutral $S = -2$ sector using an extended Unitarized Chiral Perturbation Theory, which takes into account not only the leading Weinberg-Tomozawa term (as all the previous studies in $S = -2$ sector), but also the Born terms and next-to-leading order contribution. Based on the SU(3) symmetry of the chiral Lagrangian we took most of the model parameters from the BCN model [1], where these were fitted to a large amount of experimental data in the neutral $S = -1$ sector.

We have shown that our approach is able to generate dynamically both $\Xi(1620)$ and $\Xi(1690)$ states in very reasonable agreement with the data, and can naturally explain the puzzle with the decay branching ratios of $\Xi(1690)$. Our results clearly illustrate the reliability of chiral models implementing unitarization in coupled channels and the importance of considering Born and NLO contributions for precise calculations.

[1] A. Feijoo, V. Magas and A. Ramos, Phys. Rev. C
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