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Investigations of decuplet baryons from meson–baryon interactions in the HAL QCD method

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We study decuplet baryons from meson-baryon interactions. We report the analysis of the P-wave πN interaction with isospin $I = 3/2$ and the $\bar{K}\Xi$ interaction with $I = 0$, which have channels to a Δ and Ω baryon, respectively. The interaction potentials are calculated in the HAL QCD method using 3-quark-type source operators at $m_\pi \approx 410$ MeV. We use the conventional stochastic estimation of all-to-all propagators combined with the all-mode averaging to reduce statistical fluctuation. The scattering phase shifts estimated by using the potentials indicate that the Δ and Ω baryon exist as bound states in this setup. The results of the binding energies are consistent with those estimated from the 2-point functions.

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