

## Meson-baryon scattering and $\Lambda(1405)$ in resummed baryon chiral perturbation theory

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We investigated the meson-baryon scattering using time-order perturbation theory (TOPT) based on a manifestly Lorentz-invariant formulation of baryon chiral perturbation theory. Effective potentials are defined as sums of two-particle irreducible contributions of time-ordered diagrams and the renormalized scattering amplitudes are obtained by solving the integral equation, which is derived self-consistently in TOPT.

Our developed formalism has been successfully applied to the pion-nucleon scattering at leading order, and it has been also extended to the meson-baryon scattering in  $S=-1$  sector. By solving the coupled-channel integral equations with the full off-shell dependence of the effective potential and applying subtractive renormalization, we analyzed the renormalized scattering amplitudes and obtain the two-pole structure of the  $\Lambda(1405)$  resonance.

[1] X.-L. Ren, E. Epelbaum, J. Gegelia and U.-G. Meißner, Meson-baryon scattering in resummed baryon chiral perturbation theory using time-ordered perturbation theory, Eur. Phys. J. C80 (2020) 406, [arXiv:2003.06272 [hep-ph]].

[2] X.-L. Ren, E. Epelbaum, J. Gegelia and U.-G. Meißner, The  $\Lambda(1405)$  in resummed chiral effective field theory, [arXiv:2102.00914 [hep-ph]].

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