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Implication of heavy-quark symmetry in chiral Lagrangian of nucleon, D meson and charmed baryon

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Inspired by the forthcoming experimental data at J-PARC and $\overline{P}$ANDA, 3-point vertices chiral Lagrangian for nucleon, delta, D meson and charmed baryon is constructed in the framework of the SU(2) flavor symmetry. There are 15 terms in the Lagrangian at the chiral power counting orders Q^0. By applying the heavy-quark symmetry, that is, introducing degeneracy states of pseudoscalar and vector D mesons as well as spin $1/2$ and $3/2$ charmed baryons in the charm quark mass $M_c \to \infty$ limit, we have reduced the coupling constants of the chiral Lagrangian down to 7 free parameters at the leading order of $1/M_c$ expansion. The implication of the heavy-quark symmetry in physical processes are discussed. The chiral Lagrangian may be employed to study the charmed hadron production in J-PARC and $\overline{P}$ANDA.

Authors: SUYUPORN, Thananuwat (Suranaree University of Technology); SANGKHAKRIT, Thanat; Dr SAMART, Daris (Department of Applied Physics, Rajamangala University of Technology Isan); YAN, Yupeng (Suranaree University of Technology)

Presenter: SUYUPORN, Thananuwat (Suranaree University of Technology)

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