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論文題目 : Reaction dynamics of strange and charm hadron productions
(ストレンジ及びチャームハドロン生成反応の動力学)

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論文要旨:

Open strange and charm productions are considered to play a central role in unraveling the features of hadrons which include not only the ground states but also various excited states, so called exotic hadrons as well. These reactions give insights into the dynamics of quarks and gluons. To make a close link with the underlying QCD, we need microscopic descriptions for the reactions. In this thesis, we study the reaction mechanism of the photon- and pion-induced strange and charm productions. In the first part, we investigate the photoproductions of K*Σ and K*Λ off the nucleon targets focusing on the role of N* and Δ* resonances. An effective Lagrangian model is employed with hadronic degrees of freedom. Some PDG resonances are taken into account in the s-channel diagram process in addition to other mesons and baryons of ground states. The resonance parameters are determined by the PDG data if available, otherwise by using the SU(6) quark model. We find that the role of resonances is different from each other. In the K*Σ process, higher resonances scarcely affect the total and differential cross sections. Instead, certain higher resonances play a crucial role in the K*Λ process. However, in both cases, spin observables are more affected by resonances rather than other background contributions, in general. The structure and the interaction of charmed baryons are also important topics in hadron physics. They have become even more interesting by the recent observation of the pentaquark P_c^+ containing $c\bar{c}$. In the second part, therefore, we study the production of the most fundamental process, $\pi^- p \rightarrow D^{*-} Y_c$, where Y_c denotes a charmed baryon. Pion-induced K*Λ and D*Λ_c productions off the nucleon targets are also investigated with the effective Lagrangian and Regge models. Relying on the experimental data of the K*Λ process, the production rate of the $D*\Lambda_c$ one is estimated. This study gives an important clue to the upcoming J-PARC experimental project.