ID contributo: **77** Tipo: **Invited**

Systematic measurements of the differential cross sections of Sigma-proton scatterings at J-PARC

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Study of the hyperon-nucleon (YN) interactions is vital to expand our knowledge on the nucleon-nucleon (NN) interaction to the generalized baryon-baryon (BB) interactions within the SU(3) flavor symmetry. It leads to an essential understanding of the baryon-baryon interactions as the interactions between quark clusters. Such inter-quark interactions should play an essential role in generating the repulsive core in the NN interactions. Furthermore, the YN interactions are also a foundation to describe the nuclear system with hyperons such as hypernuclei and neutron stars. Scattering observables between a hyperon and a nucleon are essential inputs to test and improve YN interaction theories. Until now, the hyperon-nucleon scattering experiments have been experimentally difficult due to the short lifetime of the hyperons. Recently, the J-PARC E40 collaboration has succeeded in providing the differential cross sections of the Σ^+p, Σ^-p and $\Sigma^-p \to \Lambda n$ channels systematically. A 10% level accuracy of the differential cross section has been realized for a narrow angular step of $d\cos\theta$ = 0.1. The differential cross sections of the Σ^-p elastic and $\Sigma^-p \to \Lambda n$ inelastic scatterings are reproduced by theoretical models rather well because these interactions are mainly due to multiplet forces of 27-plet and 10*-plet that can be predicted based on the NN interaction under the SU(3) flavor symmetry. On the other hand, the measured differential cross sections of the Σ^+p channel were very different from any theoretical models. This is because the main contribution comes from a completely unknown multiplet force of 10-plet which includes a repulsive force due to the Pauli-forbidden state in the quark level. By combining all the experimental information, we expect so-called "realistic"hyperon-nucleon interactions will be established in the near future.
We also plan a new Λp scattering experiment, J-PARC E86, as a future project. We also would like to introduce the future project.

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Classifica Sessioni: Hypernuclei and kaonic atoms

Classificazione della track: Hypernuclei and kaonic atoms