"Parallel Invited"

Spin-Dependent Interactions in Hyperon-Nucleon Scattering

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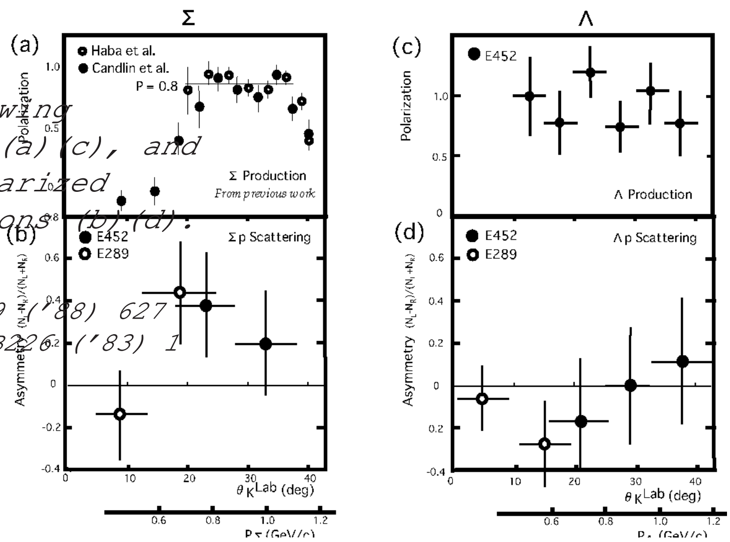
Since the first experiments indicating the smallness of the ΛN spin-orbit interaction, the Λ-hypernuclear experiments have been so well developed to confirm it by resolving a very small LS splitting with high precision. However, the original question about the ΣN LS-interaction has been left unsolved because the hypernuclear approach does not work for this case. In order to challenge this subject, we developed the hyperon-nucleon scattering experiment at KEK-PS with use of a track-imaging detector named SCITIC* as an active target. (*SCIntillation Track Image Camera [contribution to session 11])

Polarized hyperons produced through the (π^+,K^+) reactions with 1.6 GeV/c pion beam were used to observe their scattering in the liquid scintillator of the SCITIC, and left/right asymmetries were determined through analyses of the track-image data. The hyperon-scattering events were selectively stored with trigger signals from a spectrometer indicating the kaons. Roughly 1 million pictures were accumulated, out of which about 60,000 pictures have so far been analyzed. Already, the analyzed data on the left/right asymmetries have indicated a large Σ^+p LS-interaction in contrast to the small ΛN LS-interaction. Shown in the figure are results on asymmetries of polarized Σ^+ and Λ hyperon scattering on protons. Their polarization data following the (π^+,K^+) reactions are also shown. While the asymmetry data for Λp scattering are consistent with zero, those for Σ^+p scattering are significantly positive.

Analyses of about 10 times more data are under way to accumulate data not only on the asymmetry parameter but also more on spin-dependent interactions such as the depolarization parameter.



Hyperon polarization following the (π^+, K^+) reactions (a)(c), and L/R asymmetries of the polarized hyperon scattering on protons (b)(d).

References :
Haba et al., Nucl. Phys.B299 ('88) 627
Candlin et al., Nucl.Phys. B226 ('83) 1