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J. Phys. Soc. Jpn. 55 (1986) Suppl. p. 807

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Depolarization Measurement of Proton-Proton Scattering at E_p = 12 MeV. *)

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In this contribution we report on the first depolarization measurement in p-p scattering at low energies. This triple scattering observable yields an independent information about the spin dependent N-N force thus enabling an unambiguous determination of the p-wave phase shift splitting from a simultaneous analysis of differential cross section, analyzing power and depolarization.

The measurement was performed with the polarized proton beam produced by the Erlangen Lamb-shift source and the EN tandem accelerator. As target a foil of polyethylene was used, which serves in a twofold manner as a hydrogen scatterer and as a continuous polarization monitor for the incoming beam due to the p-^{12}C scattering at backward angles. The polarization of the scattered protons was measured in a double scattering arrangement [1] consisting of a small sliding seal chamber, a QDQ magnetic spectrometer and a high pressure ^{4}He polarimeter. For this measurement the solid angle for the first scattering was defined by a rectangular aperture of 1,5 mm x 10 mm (corresponding to $\Delta\theta = \pm$ 0.9°) located at the entrance of the QDQ spectrometer. The position of the protons at the place of the polarimeter can be checked with a removable position sensitive detector in front and two stripe detectors at the end of the polarimeter. A drastic reduction of background can be obtained by a coincidence measurement between the left-right polarimeter detectors and a 200µm scintillation detector at the entrance of the polarimeter. For the elimination of false instrumental asymmetries the spin of the incoming protons was reversed once per 10 seconds and the polarimeter was turned around 180° every ten minutes.

From the measured polarization of incoming and outcoming protons and from the analyzing power [2] the depolarization was determined up to now with an accuracy of $\Delta D = 2 \cdot 10^{-2}$ in an angular range of $20° \lesssim \theta_{CM} \lesssim 40°$. These first data points are shown in fig. 1 compared with predictions of the Bonn potential [3] and the Paris potential [4].

*) supported by the Deutsche Forschungsgemeinschaft

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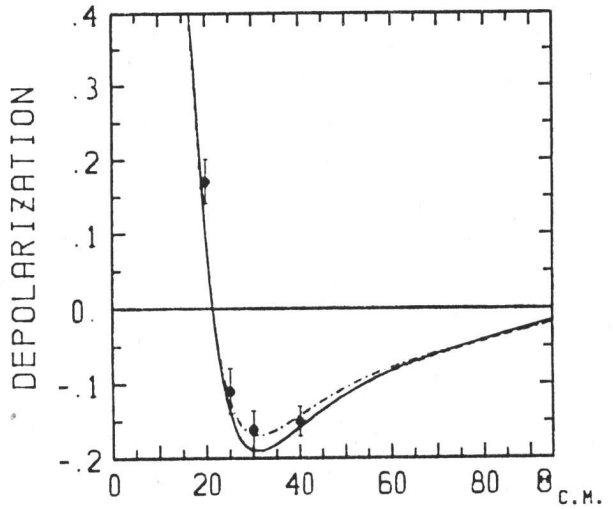

Fig. 1:
Depolarization of p-p scattering at 12 MeV compared with modell predictions:
Bonn potential: ——·——·——
Paris potential: ————————