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Measurement of the Spin Correlation Parameter A_{oonn} and the Analyzing Power A_{oono} for pp Elastic Scattering in the Energy Range from 0.5 to 0.8 GeV

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The spin correlation parameter A_{oonn} and the analyzing power A_{oono} for pp elastic scattering were measured simultaneously in the energy range from 0.5 to 0.8 GeV and in the angular region 45° - 80° CM. The polarized proton beam of SATURNE II was scattered at the Saclay frozen spin polarized proton target. The beam- and target-polarizations (P_B and P_T, respectively) were vertical, the orientation of the beam polarization was flipped every burst and the orientation of the target polarization was reversed every few hours.

The experimental set-up is shown in Fig. 1. The scattered particles ($\theta_{CM} < 90°$) are detected by the scintillation counter TD and the recoil particles are detected by the thin counter TG, analyzed by the magnet and detected in the hodoscope H3. The coincidence TD.TG.ΣH3 triggers four multi-wire proportional chambers C1, C2, C3 and C11. The beam intensity is monitored by up and down telescopes counting interactions in a thin (1 mm thick) lucite target placed upstream of the polarized target.

A total of about 6.10^6 events were registered at 6 energies : 0.494, 0.572, 0.644, 0.702, 0.720 and 0.790 GeV. The parameters A_{oonn} and A_{oono} were determined from the normalized numbers of selected scattering events for opposite signs of P_B and/or P_T . The results for A_{oonn} (Fig. 2a-f) show a good general agreement with most of the existing data and with predictions of the Saclay-Geneva phase shift analysis [1].

It now seems, likely that the large values from the Argonne ZGS experiment at 0.698 GeV (ref. [2], Fig. 2d) are probably due to an error in the beam or target polarization.

The results for A_{oono} (Fig. 3a-f) show excellent agreement with the precize SIN and LAMPF measurements at corresponding energies.

This experiment considerably increases the precision on A_{oonn} at most of the energies. The results will improve the precision of the phase shift analysis for pp elastic scattering below 0.8 GeV.

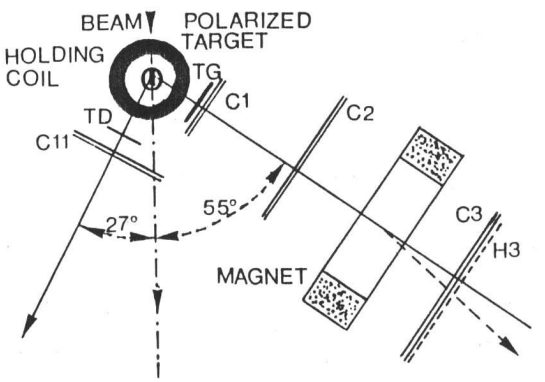

Fig. 1 - Experimental set-up

References

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2. D.A. Bell et al.: Phys.Lett. 94B (1980) 310

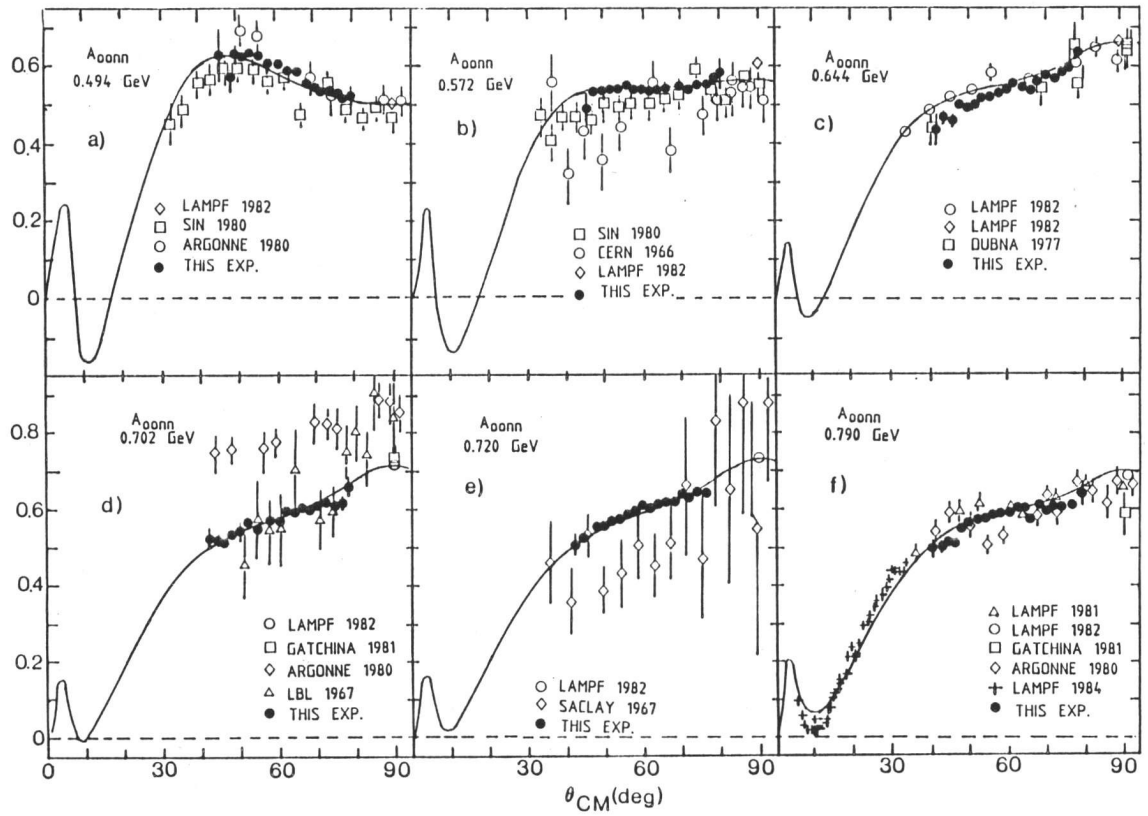

Fig. 2a-f - Results for A_{oonn} as a function of the CM scattering angle at six energies. Also shown are all previous data. The full curve represent the Saclay-Geneva phase shift analysis predictions [1].

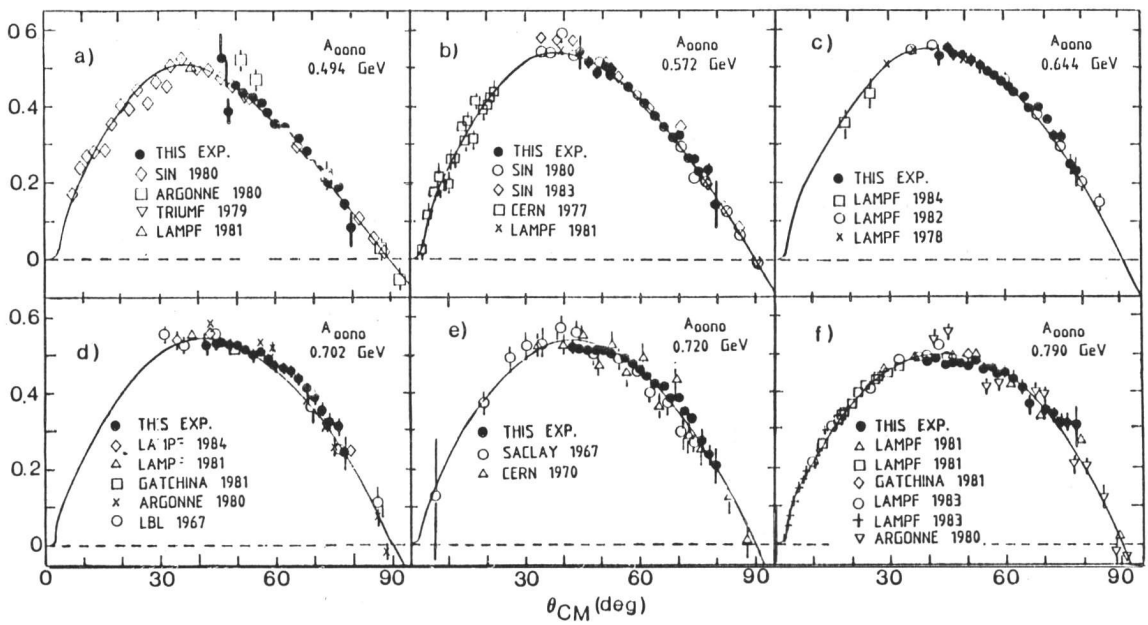

Fig. 3a-f - Results for A_{oono} as a function of the CM scattering angle at six energies. Also shown are most of previous data and the Saclay-Geneva phase shift analysis predictions [1] .