Proc. Sixth Int. Symp. Polar. Phenom. in Nucl. Phys., Osaka, 1985 J. Phys. Soc. Jpn. 55 (1986) Suppl. p. 982–983

5.15 Progress Report on the Experiment "The Measurement of A_{nn} Parameter at Large P_T Region in the $p^{\uparrow}n^{\uparrow} \rightarrow pn$ Scattering"

N. Horikawa, S. Fukui, T. Ikoma, T. Iwata, T. Kinashi, M. Kurashina, T. Matsuda, T. Nakanishi, S. Okumi, C. Omori, T. Toyama, K. Mori¹, K. Imai², A. Masaike², S. Kasai³, T. Kono³, Y. Morita³, Y. Sumi³, R. Tanaka³, H. Hasai⁴, K. Iwatani⁴, F. Nishiyama⁴, F. Sai⁵, S. Yamamoto⁵, S. Ishimoto⁶, I. Yamauchi⁷, T. Hasegawa⁸, K. Baba⁹ and G. Igo¹⁰

Dept. of Phys., Nagoya Univ., Nagoya 464, Japan

Nagoya University College of Medical Technology, Nagoya 461, Japan
² Dept. of Phys., Kyoto Univ., Kyoto 606, Japan
³ Dept. of Phys., Hiroshima Univ., Hiroshima 730, Japan
⁴ Faculty of Engineering, Hiroshima Univ., Higashi-Hiroshima 724, Japan
⁵ Dept. of Phys., Univ. of Tokyo, Tokyo 113, Japan
⁶ National Laboratory for High Energy Physics, Ibaraki 305, Japan
⁷ Tokyo Metropolitan Technical College, Tokyo 140, Japan
⁸ Institute for Nuclear Study, Univ. of Tokyo, Tanashi, Tokyo 188, Japan
⁹ Hiroshima Shudo Univ., Hiroshima 731-31, Japan
¹⁰ UCLA, Los Angeles, CA 90024, USA

The characteristic behaviors seen in the A-parameter¹) and A_{nn}-parameter²) at the large P_T region in p-p elastic scattering suggest the possible existence of the special reaction mechanism in the very short distance collision. As shown in Fig. 1, both values start to increase at $P_T^2 \simeq 3.2$ (GeV)² and especially A_{nn} reaches to 0.6 at $P_T^2 = 5.0$ (GeV)². To understand this feature, it was proposed several models, i.e. optical model, Regge model, some kinds of quark models and so on. Among them the quark model based on the QCD seems to be most fascinating, because it can predict other processes, for example p-n elastic scattering, by using the nucleon wave function consisted of quark combinations. In Table 1, the predictions by three kinds of quark models are presented concerning p-p and p-n processes. On the A-parameter, a summary is reported elsewhere³.



Tabel 1 The predictions of Ann by several quark models.

Motivated by this short range interaction in the hadron-hadron collision, we proposed to KEK the measurement of A_{nn} parameter in the $p^{\uparrow}n^{\uparrow} \rightarrow pn$ scattering at nearly same P_T region with the previous pp scattering and allowed to run if the polarized proton beam facility is performed in the KEK-PS. Setting the start of the experiment at the end of 1986, the following arrangements of the experimental conditions and the constructions of some apparatus are being prepared.

(1) The beam channel

The polarized beam is planned to be extracted to the A-line and fed to the BENKEI spectrometer which is most preferable for the detection of the high momentum protons scattered by polarized neutrons. The whole area is shown in Fig. 2.



Fig. 2 Beam channel and experimental layout.

(2) The polarimeter

The polarimeter consisted of the plastic scintillation counter hodoscope will be set in the so-called Λ -cave with Liq. H₂ target. The counter check by the unpolarized beam and CH₂ target will start from next November, 1985.

(3) Spectrometer system

For the scattered charged particle, the existing πI spectrometer system will be converted by adding some detectors (i.e. Cerenkov counter and Drift chambers etc.). The neutron counter which will be newly prepared consists of the sandwitch of Fe plates and the plastic streamer tube arrays for the exact coplanarity check of the scattering.

(4) Polarized deuteron target

For the polarized deuteron target, ND3 target which has been recently developed at Bonn Univ.⁴) shows the excellent characteristics in the value of the polarization, resistivity to the radiation and the less background nucleus. Aiming at this target, our group has succeeded in the dynamic nuclear polarization (DNP) of NH₃ as a first step and now is preparing the further development to the ND3, together with the modification of the polarizing magnet for larger target size.

References

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