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P-P ANALYZING POWER EXCITATION FUNCTION BETWEEN 510 AND 725 MeV

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—35th YAMADA CONFERENCE—
10th INTERNATIONAL SYMPOSIUM
ON
HIGH ENERGY SPIN PHYSICS
Nagoya, November 9-14, 1992

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Commissariat à l'Energie Atomique

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In an experiment made in 1990 at the KEK-synchrotron [1] some evidence was observed for narrow dibaryons in the analyzing power excitation function of $p-p$ elastic scattering at $\sqrt{s} = 2160$ MeV and 2192 MeV, with width $\Gamma \simeq 13 - 14$ MeV. In view of the limited accuracy of this measurement, we decided to use a different procedure at the SATURNE synchrotron, in order to obtain a very high accuracy of the analyzing power for a large number of energies between 510 and 725 MeV ($s^{1/2} = 2.116$ to 2.210 GeV). The results were published in Physics Letters [2] and they show no evidence for any structure with width ~ 5 to 20 MeV (in the center of mass) and with an amplitude of 4.10^{-3} or more above a smooth distribution (see ref. [2] for details).

It has been pointed out that the 2 experiments did not covered exactly the same angular range. In particular the large angular aperture of the SPES 3 spectrometer that has been used at SATURNE could have been a reason for the non-observance of narrow resonances as observed in the KEK experiment.

The large aperture of the spectrometer was in fact decomposed into five subsets of solid angles which were defined by the coincidence of elementary detectors (A_k, B_ℓ) inside two successive horizontal hodoscopes (A, B) placed downstream the focal plane detector (FOC) (Fig. 1).

Each coincidence (A_k, B_ℓ) corresponds to a partial solid angle, centered at a mean scattering angle $(\theta_{k,\ell})$. A Monte-Carlo calculation allowed us to get precisely the mean angle and the mean aperture corresponding to each couple (A_k, B_ℓ). Fig. 2 shows the results obtained for the asymmetry renormalized to the maximum polarization of SATURNE ($\simeq$ 92 %), for five such subsets centered roughly at angles of 17,18,19,20,21° in the lab each covering an angular aperture of about 16 msr.

Small angular corrections have been applied, due to the fact that for a primary energy beam E_i, the sixteen secondary energies E_{ij} produced by the rotating absorber gave focussing points on the focal plane which varied in position ($\pm$ 1 cm). As a result, the mean angle defined by each set (A_k, B_ℓ) was a little different for each E_{ij}, inducing a small error ΔA_{ij} in the measured asymmetry. The applied correction is given by :

$$\Delta A_{ij} = \left(\frac{\partial A}{\partial \theta}\right) \cdot \left(\frac{\partial \theta}{\delta p/p}\right) \cdot \left(\frac{\partial p}{p}\right)_{ij} \tag{1}$$

where $\frac{\partial A}{\partial \theta}$ is the local derivative of the asymmetry as a function of θ and $\frac{\partial \theta}{\partial p/p}$ the derivative of the mean angle seen by a couple (A_k, B_ℓ) as a function of the momentum variation. The maximum correction varied from $5.5.10^{-4}$ (at 520 MeV) down to $1.5.10^{-4}$ (at 700 MeV).

The dashed curves in Fig. 2 are 3rd order polynomial fits. No particular deviations were observed, compared to the final set of 182 points [2] obtained by summing over the whole aperture which was used in the experiment ($\sim$ 80 mrad).

Finally, Fig. 3 shows a set of 16 points in energy covering the incident energy range 0.59 to 0.64 GeV ($s^{1/2}$=2.151 to 2.173 GeV) where the KEK experiment suspected a deviation of the order of 1 % over a smooth background. No such a bump is visible in our experiment.

References

[1] H. Shimizu et al., Phys. Rev. **C42** (1990) 483.

[2] R. Beurtey et al., Phys. Lett. **B293** (1992) 27

Figure Captions

Fig. 1 : Schematic view of the experiment set-up. (II) Intermediate image, (C) iron collimator, (LH_2) liquid hydrogen target, (FOC) detector on the focal plane, (A_k, B_ℓ) 20 scintillator hodoscopes, (R_1, R_2) recoil detectors, ($M_{up}M_{down}$) monitors, (BS) beam stopper.

Fig. 2 : Asymmetry excitation function for five differents angles (P_{beam} = 0.92).

Fig. 3 : Set of 16 points in energy around 615 MeV (Lab) covering the energy range $s^{1/2}$= 2.151 to 2.173 GeV.

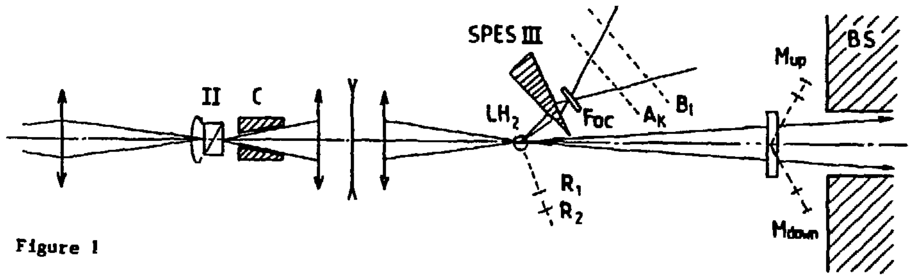

Figure 1

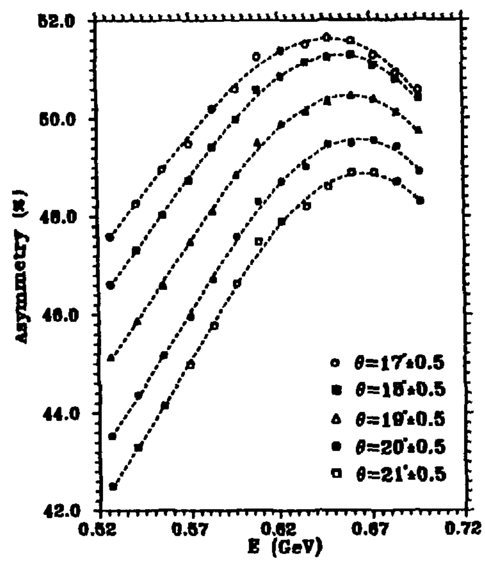

Figure 2

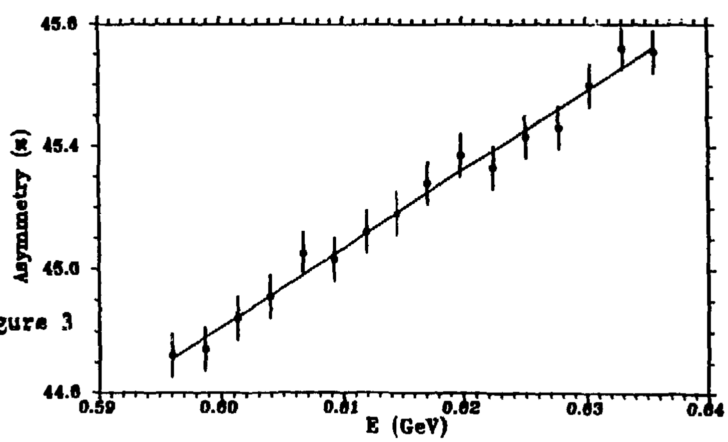

Figure 3

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