We present the results of a bubble chamber experiment for the study of the reaction

$$ \pi^- + p \rightarrow \pi^0 + n $$

angular distribution at an incident $\pi^-$ kinetic energy of 960 MeV.

The forward differential cross section is compared with the value predicted by Cronin (1) on the basis of dispersion relations and charge independence hypothesis. Satisfactory agreement is obtained.

For the experiment the Ecole Polytechnique 1 m propane bubble chamber, provided with a 17.5 kgauss magnetic field, was exposed to a $\pi^-$ beam from the Saturne protosynchrotron (Saclay). A total of 45000 useful pictures, with an average beam intensity of 7 tracks/photo, were obtained.

The film was scanned for events in which two electron pairs point to a $\pi^-$ interaction with no visible secondaries. The 735 events so obtained come from single and multiple $\pi^0$ production in hydrogen and carbon.

Measurements of the $\gamma$-rays and incident $\pi^-$ directions and of conversion electron momenta have allowed to select a sample of 98 events of reaction (1) in free hydrogen, in a restricted fiducial volume.

Each event was corrected for its detection efficiency given by the formula

$$ (1 - \exp (-L_1 / \lambda_1)) (1 - \exp (-L_2 / \lambda_2)) $$

in which $L_1$ and $\lambda (E)$ are the $\gamma$-rays potential path and materialization lengths.

Fig. 1a shows an histogram of the corrected $\pi^0$ angular distribution in the c.m. $\pi^-$ p system.
The angular distribution, normalized to a total cross section of 6.4 mb\(^2\), has been fitted to a polynomial of the form

\[
\frac{d\sigma}{d\Omega} = A_0 + A_1 \cos \theta + \ldots
\]

Table I shows the coefficients \(A_i\) and their error matrix for the best fit (fifth order polynomial).

Our results are consistent with those obtained at the same energy by Weinberg et al. \(^{(2)}\) (Fig. 1b).

The forward differential cross section

\[
\frac{d\sigma(0^\circ)}{d\Omega} = (1.71 \pm 0.45) \text{mb/sr}
\]

agrees, within the errors, with the value \((2.4 \pm 0.9)\) predicted by Cronin\(^{(1)}\).

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REFERENCES
