PNE 7

PS/Int. MG 60-2
6.1.1960

Layout and needed Facilities.

Initial γ-ray Experiment.

The appended sketch, figure I, shows the layout for an experiment to observe the energy spectrum of γ-rays emitted from an internal target bombarded by 25 GeV protons in the P.S.

As shown, a wall shielded γ-ray counter telescope will be set to observe energetic quanta coming off from the target No.6 at a large angle (150°) from the incoming proton beam. Between the counting room and the location of the counters, 9 125 ohm signal and 7 H.V. cables will be required.

The photons to be detected come from the decay of neutral pions produced in the high energy nucleon collisions. Observation of the γ-ray energy distribution enables a comparison to be made with the predictions of various models of pion production.

Figure II, shown below, exhibits the spectra predicted by Hagedorn's evaluation of the statistical model, assuming an isotropic angular distribution in the centre of mass system. Due to the rapid motion of the c.m.s. the energy of the emitted photons is shifted strongly by the Doppler effect and in the backward direction a convenient and readily measurable range of γ-ray energies is the result. In the forward direction there would appear to be difficulties in measuring the very high energies encountered and, clearly, observations in the backward direction have the obvious advantage of avoiding the intense secondaries at forward angles.

It is hoped that this experiment could be performed when a target is available at position No.6.

Distribution: (closed)

Machine Group Committee members.

G.Cocconi
A.Diddens
H.Faissner
A.Wheterell

/jdw

Supplement to Description of Initial γ-ray Experiment.

Until the target at position No.6 is in use a shielded counter telescope, mounted on a moveable trolley, will be used to detect charged particles from the available target, with a ion to developing a suitable relative beam monitor for the γ-ray experiment.

At the present time this counter set up is situated in the mouth of the access tunnel and is directed towards target No.1. Cable connections are made through extensions to terminal box 13.

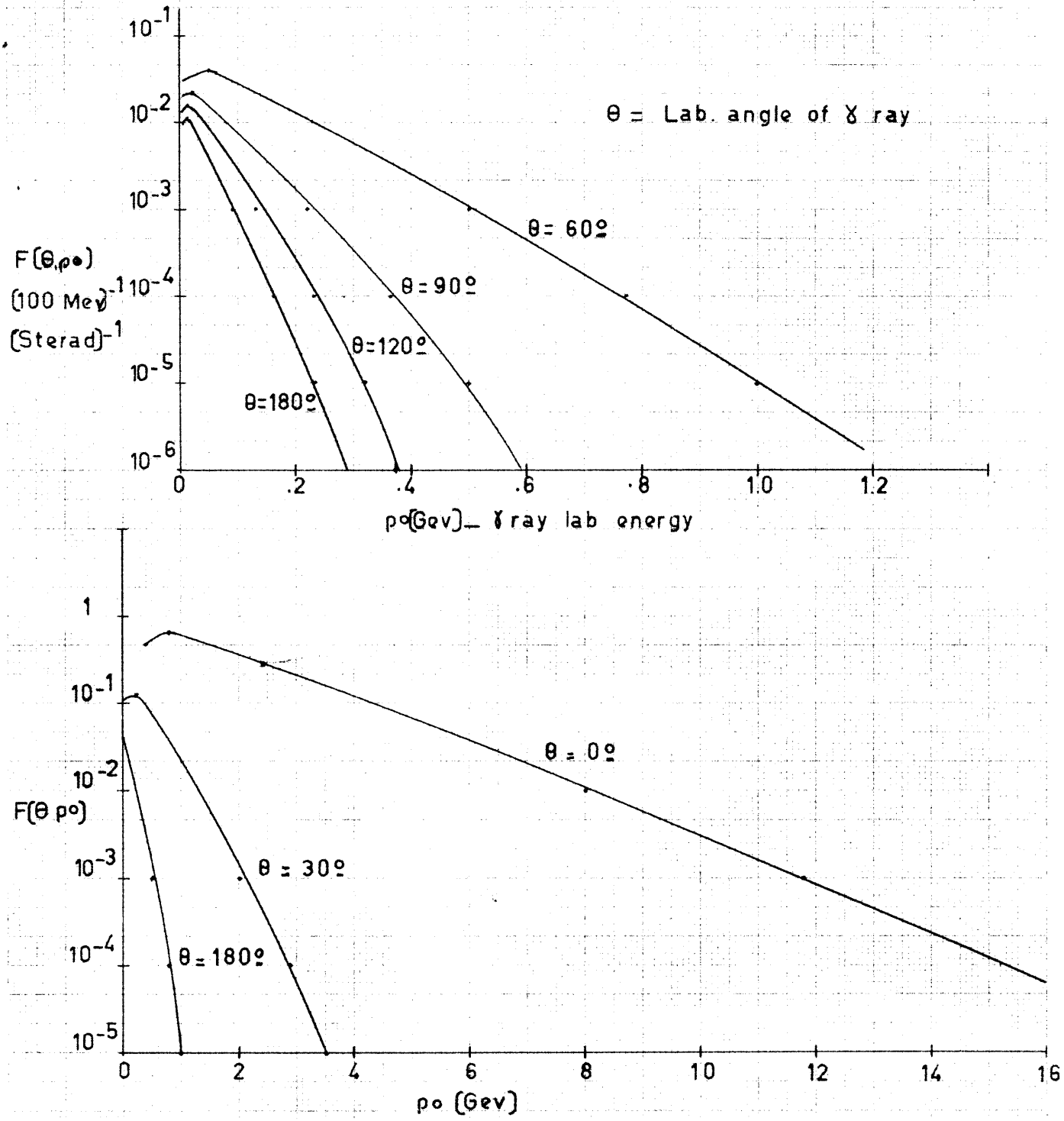

Fig II Lab system energy spectra of photons from π° produced in p–p collisions at 25 Gev.

HAGEDORN's π° spectrum was used assuming c.m. isotropic distribution.