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SECONDARY BEAMS FROM A LONG D-TYPE STRAIGHT SECTION

I. INTRODUCTION :

One of the proposals concerning possible target and ejection schemes for the East Area asks for a rearrangement of certain magnet straight sections. Magnet unit 61 should be shifted by 1.20m in the direction of SS 62-centre line towards unit 60.

The new azimuthal distance between the iron faces of units 61 and 62, so length SS 62, becomes 2.9432 m.

The location and properties of secondary beams from a standard target in the long SS 62 has been found by using Keyser's programme[1].

II. SCOPE OF THE CALCULATIONS :

One was interested at secondary beams from SS 62-long for $\pm$ (6.0, 10.0, 12.0 and 18.0) GeV/c momentum particles, emission angles -50(10)100 mrad.

To enable a somewhat more general comparison between the properties of different type of straight sections as well, trajectories has been obtained for $\pm$ 25 GeV/c and emission angles up to 130 mrad has been taken.

The results of the calculations include :

- The Michaelis coordinates (fig. 1 and 2)
- The asymptotic trajectories from SS 62 long in the East target area (fig. 3)
- The horizontal and vertical matrix transformed to the Michaelis target, representing the total effect of the magnetic fields
- The radial position of the beam inside the magnetic fields at least after every 1 m azimuthal displacement.

III. THE NEGATIVE PARTICLE BEAMS :

3.1 Optimal emission angle : The particles are focused horizontally and vertically in a wide range of emission angles.

The optimal emission angle is found where $/a_{21}/$ has its maximum. (a_{21} in the horizontal matrix at the Michaelis target is equal to the inverse focal length).

Momentum in GeV/c	Optimal emission angle in mrad.	Distance object(target)-image, called d. in m	
		hor. plane	vert. plane
- 6.0	- 10.0	6.9(7.1)	4.4
- 10.0	0.0	8.3(8.8, 9.0)	4.3
- 18.0	10.0	12.0(17.0, 20.0)	3.8
- 25.0	10.0	19.0(50.0, defoc.)	3.6

The figures in between brackets are referring to the distance d in a standard D and a long F straight section respectevely.

So at low momenta the focal properties differ little but the focusing effect remains at higher momenta in the long D section only.

3.2. Acceptable emission angles : Particles with momentum in the range of -6.0 to -25.0 GeV/c leaving the target with emission angles below -20 mrad will pass twice the inside wall of the vacuum chamber in the downstream magnet unit before going to the outside and are therefore of limited interest.

IV. THE POSITIVE PARTICLE BEAMS :

For outgoing beams, positive emission angles are of interest only.

The beams are divergent in the horizontal plane for all positive emission angles.

Beams which are not affected by the magnetic fields can be obtained at lower emission angles when the straight section is longer.

The beam data are worked out by M. Perret to obtain the trajectories lay-out drawing.

J.H.B. Madsen

Ref. 1) R. Keyser, DD/CO/63.2 : Particle trajectories in the C.P.S. magnetic field computed by a Fortran progress.
2) J.A. Geibel, MPS/EP/14, Note on high energy π beams from targets n° 1 and 2.

Distribution :

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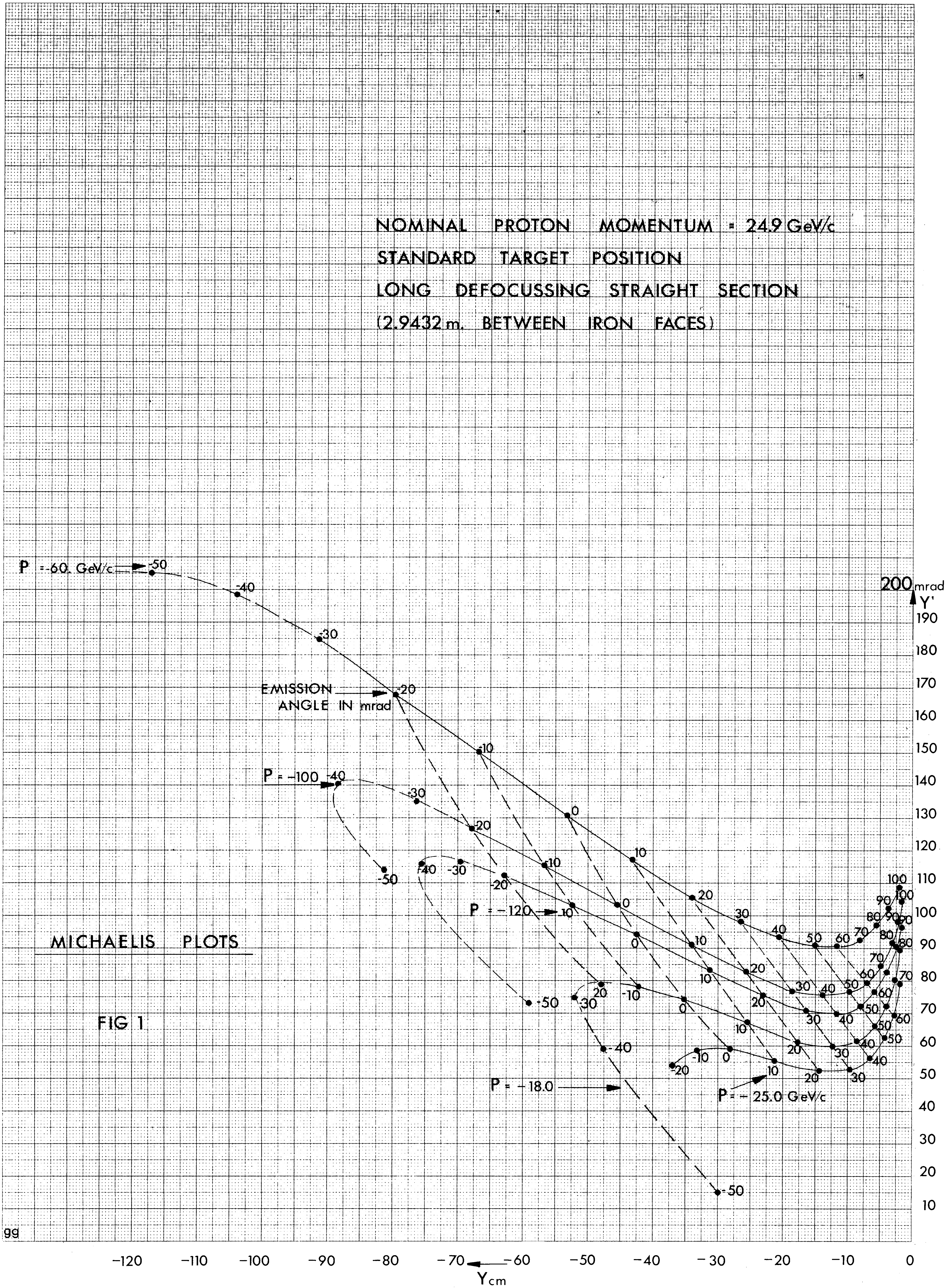

MICHAELIS PLOTS

FIG 1

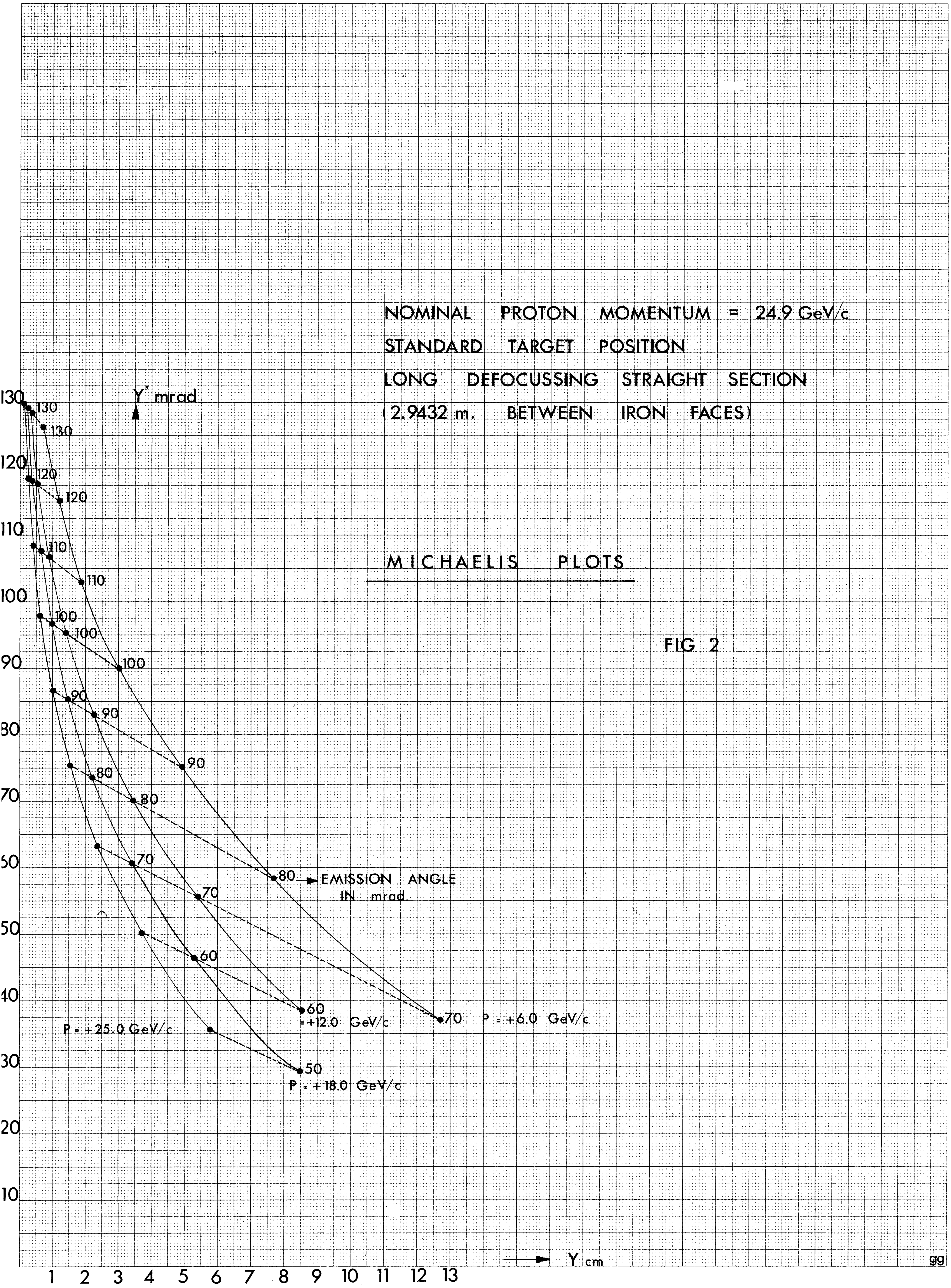
NOMINAL PROTON MOMENTUM = 24.9 GeV/c
STANDARD TARGET POSITION
LONG DEFOCUSSING STRAIGHT SECTION
(2.9432 m. BETWEEN IRON FACES)
MICHAELIS PLOTS
Y' mrad
Y cm
EMISSION ANGLE IN mrad
P = +25.0 GeV/c
= +12.0 GeV/c
P = +6.0 GeV/c
P = +18.0 GeV/c
gg

FIG 2