national accelerator laboratory

TM-469
2200.

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SUMMARY OF TRIPLET TRAIN NOT

Configuration of the Triplet Train NOT:

The triplet train has the following configuration:

Target (12" of aluminum)
13 ft drift space
0QT1-1 (3Q120)
1 ft drift space
0QT1-2 (3Q120)
4 ft drift space
0QT2-1 (3Q84)
1 ft drift space
0QT2-2 (3Q84)
4 ft drift space
0QT3 (3Q84)
1 ft drift space
0QT4 (3Q84)
23 ft drift space
0QT5 (3Q84)

In addition, three dipoles are used to target and align the beam through the beam transport system: 0UT, an EPB dipole, before the production target, is used to target the proton beam at 0.5 mr while 0VT and 0HT, vertical and horizontal trims before and after 0QT5, are used to steer the pion and muon beams through the aperture at the end of the decay pipe at the entrance to Enclosure 100. See Fig. 1 for a schematic of the layout.

All quadrupoles are bussed independently. The EPB Quads, 0QT1-1 and 0QT1-2 (3Q120's) are powered by individual Ling power supplies. Three Transrex power supplies are available to power some combination of the five Ring Quads (3Q84's). However, one of the Transrex supplies does not have water-cooled bus and hence, cannot exceed a current of 1200 amps. This supply is normally used to power 0UT.

The proton beam will be incident on the production target at 0.5 mr (the angle of the targetting being determined by the EPB dipole, 0UT, located upstream of the pion production target). This produces an 8" separation of the pion and proton beams at the entrance to Enclosure 100. This separation is large enough for an adequate dump of the proton beam.

Beam Optics of the Train Load

The pion beam is constrained to a focus, both vertically and horizontally, at the entrance to Enclosure 100. It is also required to have similar magnification in both the vertical and horizontal projections, so the $M_x \approx M_y$. In addition the configuration of the train load is chosen to produce the maximum angular acceptance for a particular energy region of the pion beam, after the constraints at Enclosure 100 are satisfied. This maximizes the pion acceptance in the decay pipe.

It should be noted, that because of the symmetry of the vertical and horizontal projections at the entrance to Enclosure 100, the trainload is equally sensitive for both negative and positive particles, so that no change in targetting and dumping of the proton beam is required for the production of negative or positive particle beams. The charge of the muon beam is then determined by the subsequent setting of the dipoles in the muon beam line.

A. Momentum of pion beam equal to, or less than, 200 GeV/c. Fig. 2 and Table I illustrate solution.

B. Momentum of beam equal to or less that 125 GeV/c. See Fig. 3 and Table II.

C. Momentum of pion beam equal to or less than 100 GeV/c. Fig. 4 and Table III illustrate solution.

D. Momentum of pion beam equal to or less than 50 GeV/c. See Fig. 5 and Table IV. For this case the magnification at Enclosure 100 is considerably larger, than in the previous cases, and may counteract any gain in angular acceptance of the train itself.

The neutrino and anti-neutrino flux curves are given in Fig. 6 and 7 respectively.*

RS:dla

*Neutrino curves calculated by R.Stefanski and A.Windelborn.

Table I:

	Field (Kg./in.)	Current (Amps)	D.C.Power (KW)
0QT1-1	3.9874	84.53	9.54
0QT1-2	3.9874	84.53	9.54
0QT2-1	off		
0QT2-2	off		
0QT3	-4.4576	3250.0	47.55
0QT4	-4.4576	3250.0	47.55
0QT5	4.7824	3487.2	54.75
		Total	168.93

Table II:

	Field (Kg./in.)	Current (Amps)	D.C.Power (KW)
0QT1-1	5.4235	114.97	17.65
0QT1-2	1.3287	28.17	1.06
0QT2-1	-4.4601	3251.86	47.61
0QT2-2	-4.4601	3251.86	47.61
0QT3	off		
0QT4	4.4601	3251.86	47.61
0QT5	off		
		Total	161.54

Table III:

	Field (Kg./in.)	Current (Amps)	D.C.Power (KW)
0QT1-1	-0.6262	13.3	0.24
0QT1-2	5.2152	110.6	16.33
0QT2-1	-4.7961	3496.8	55.05
0QT2-2	-4.7961	3496.8	55.05
0QT3	4.7961	3496.8	55.05
0QT4	off		
0QT5	off		
		Total	181.72

Table IV:

	Field (Kg./in.)	Current (Amps)	D.C.Power (KW)
0QT1-1	-2.9735	63.04	5.31
0QT1-2	4.2298	89.67	10.73
0QT2-1	-2.1735	3444.34	53.41
0QT2-2	-2.1735	3444.34	53.41
0QT3	1.5482	1128.79	5.73
0QT4	off		
0QT5	off		
		Total	128.6

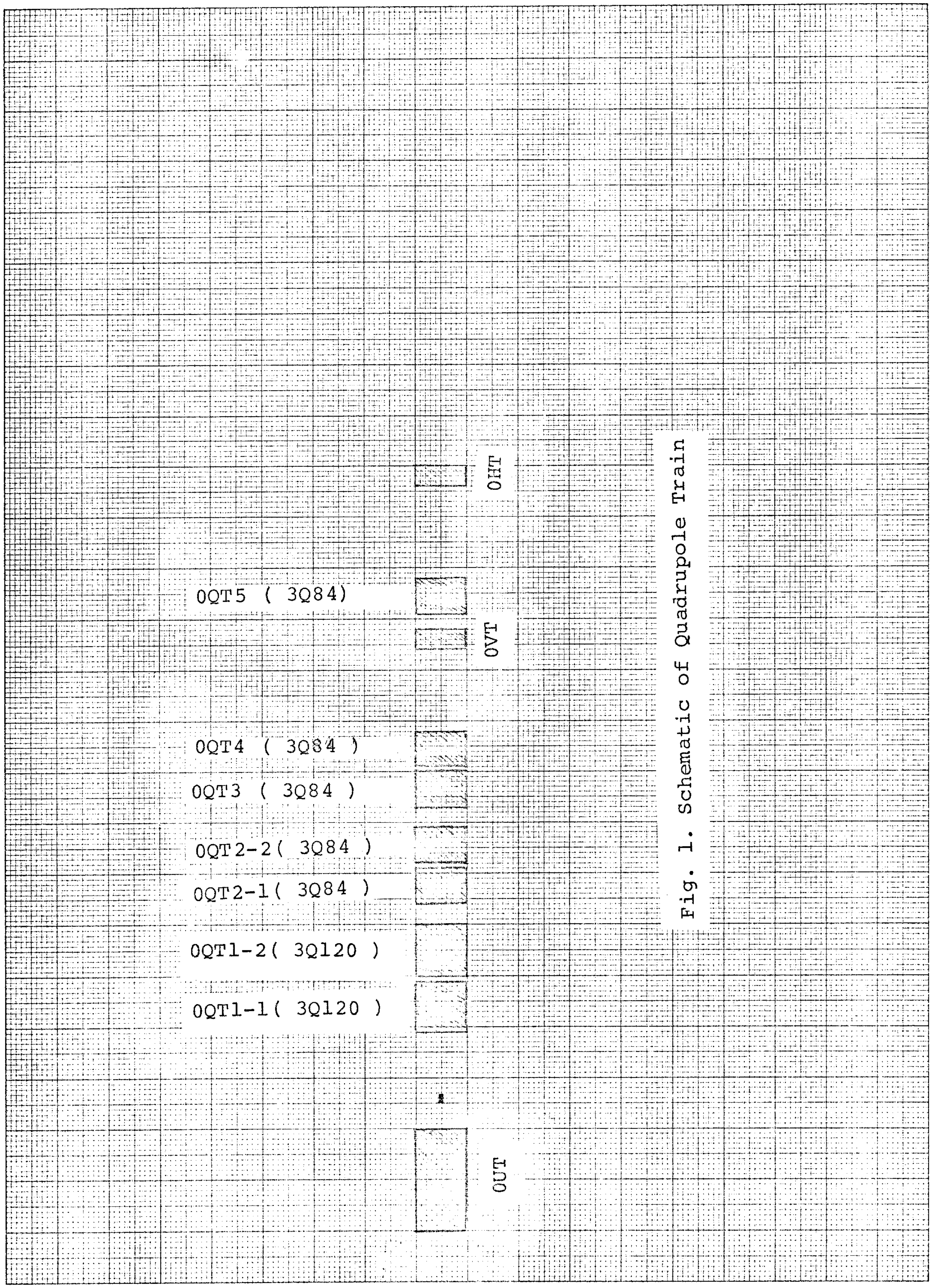


Fig. 1. Schematic of Quadrupole Train

Fig. 2. Triplet Trainload: Solution 1. Momentum 200 GeV/c

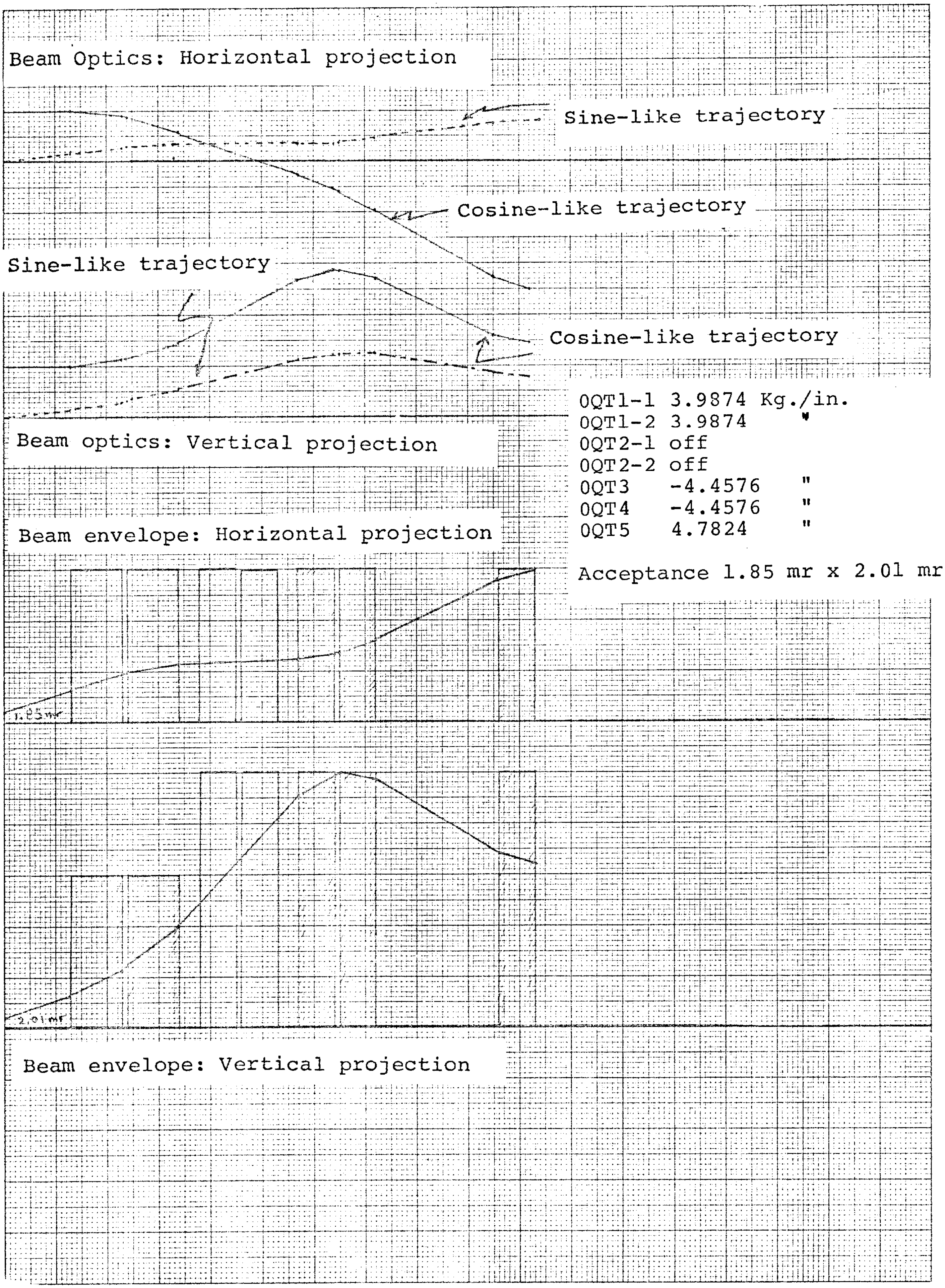


Fig. 3. Triplet Trainload: Sclution 3. Momentum 125 GeV/c

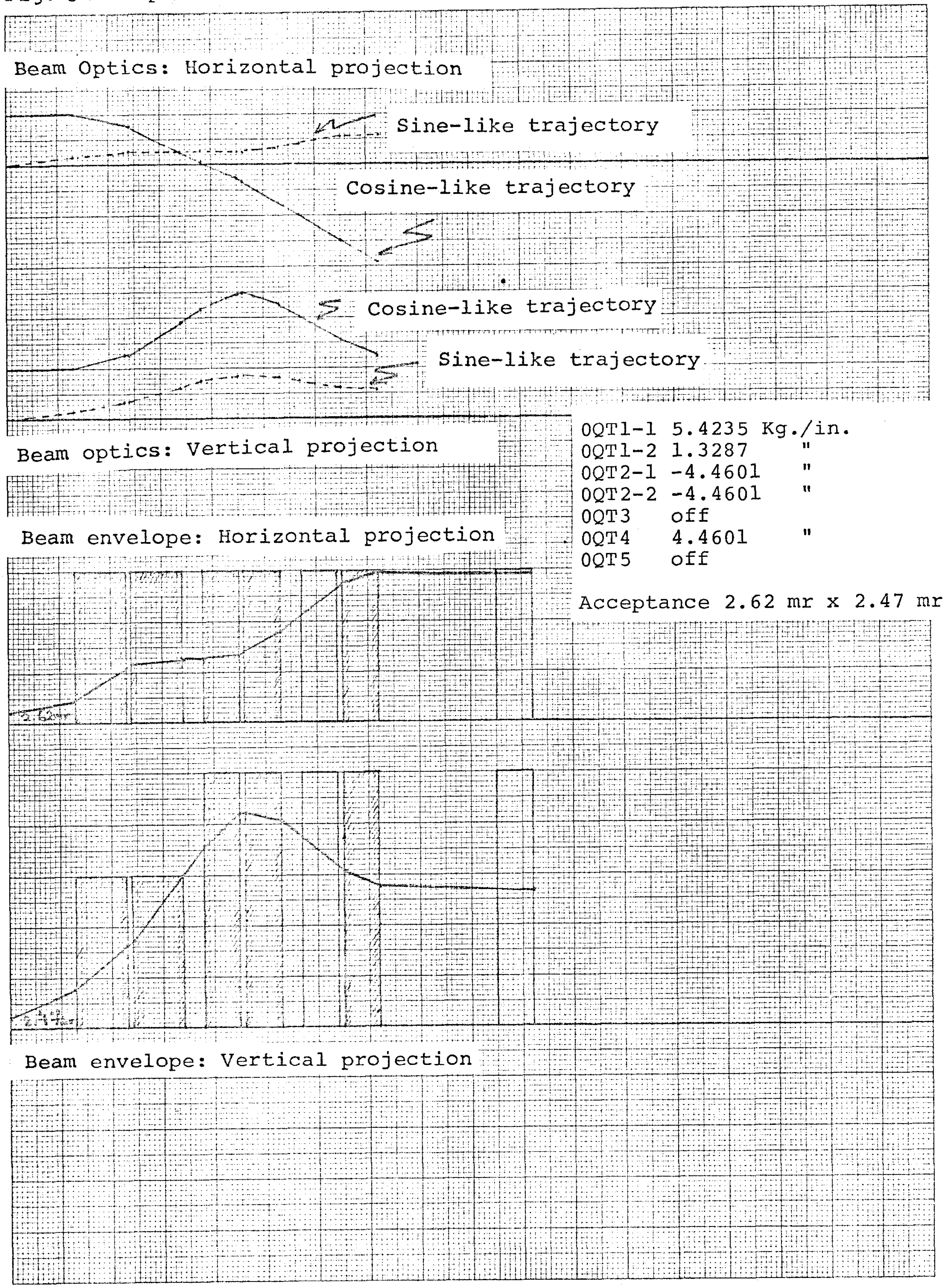


Fig. 4. Triplet Trainload: Solution 5. Momentum 100 GeV/c

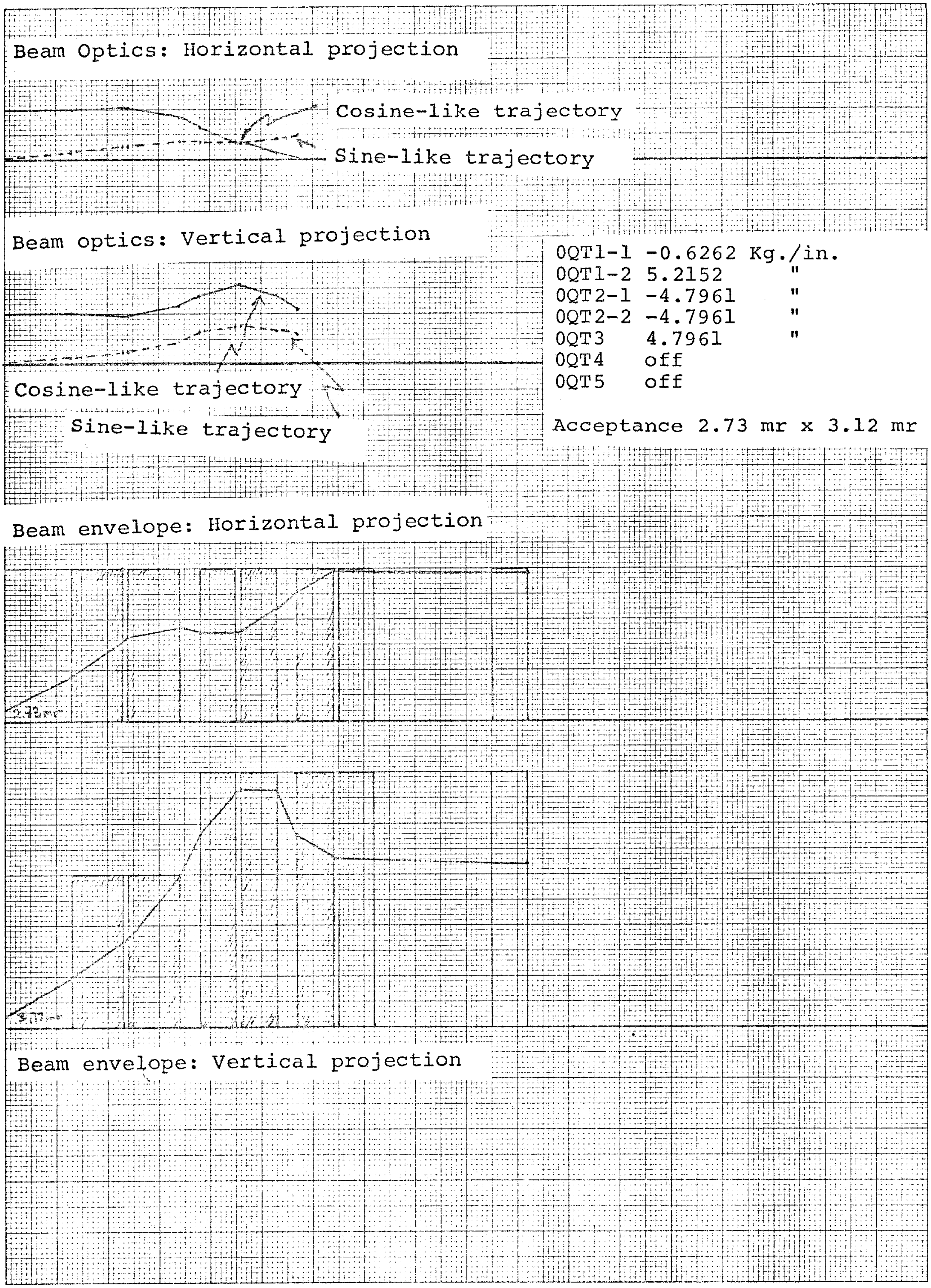
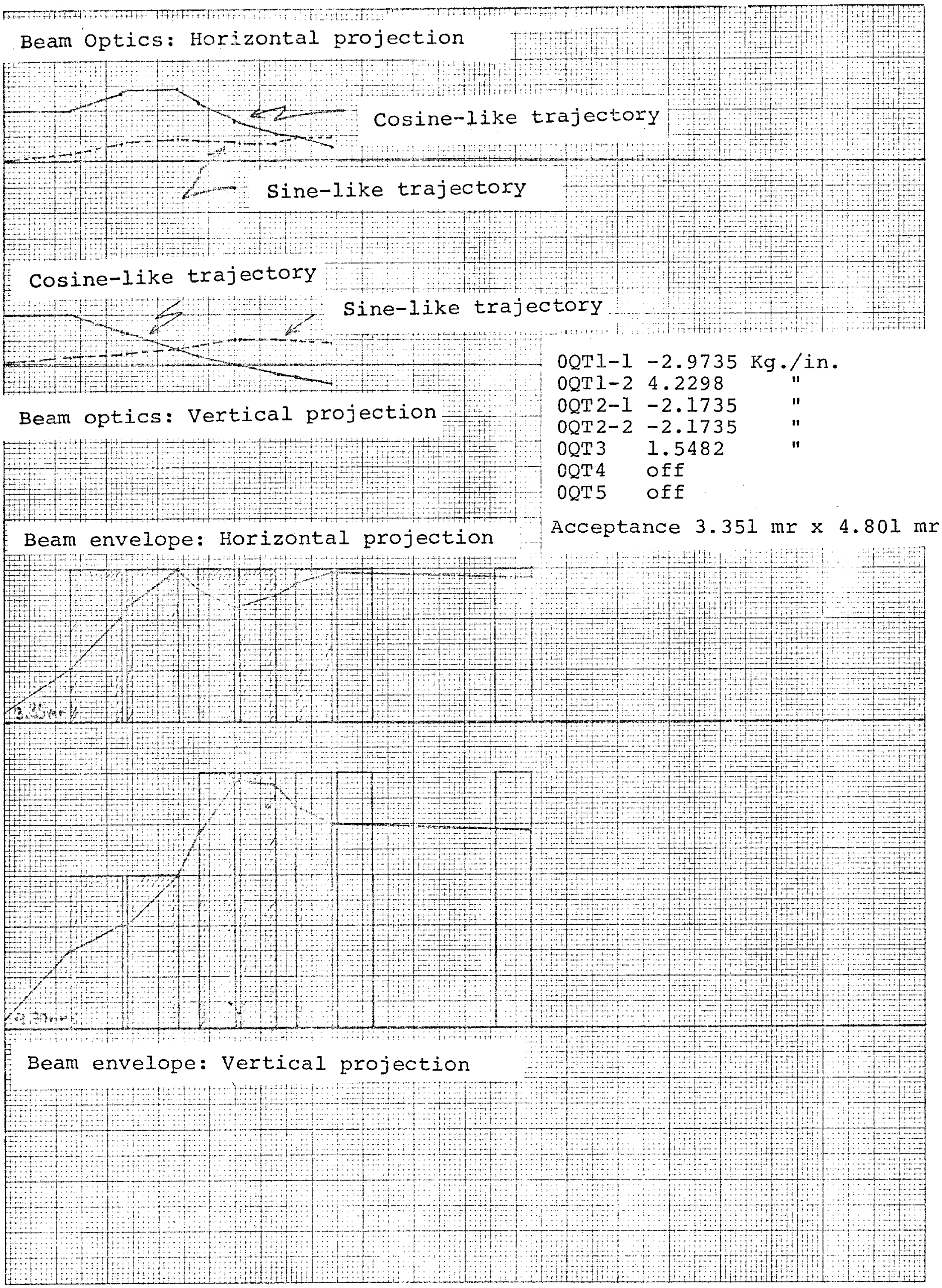


Fig. 5. Triplet Trainload: Solution 6. Momentum 50 GeV/c



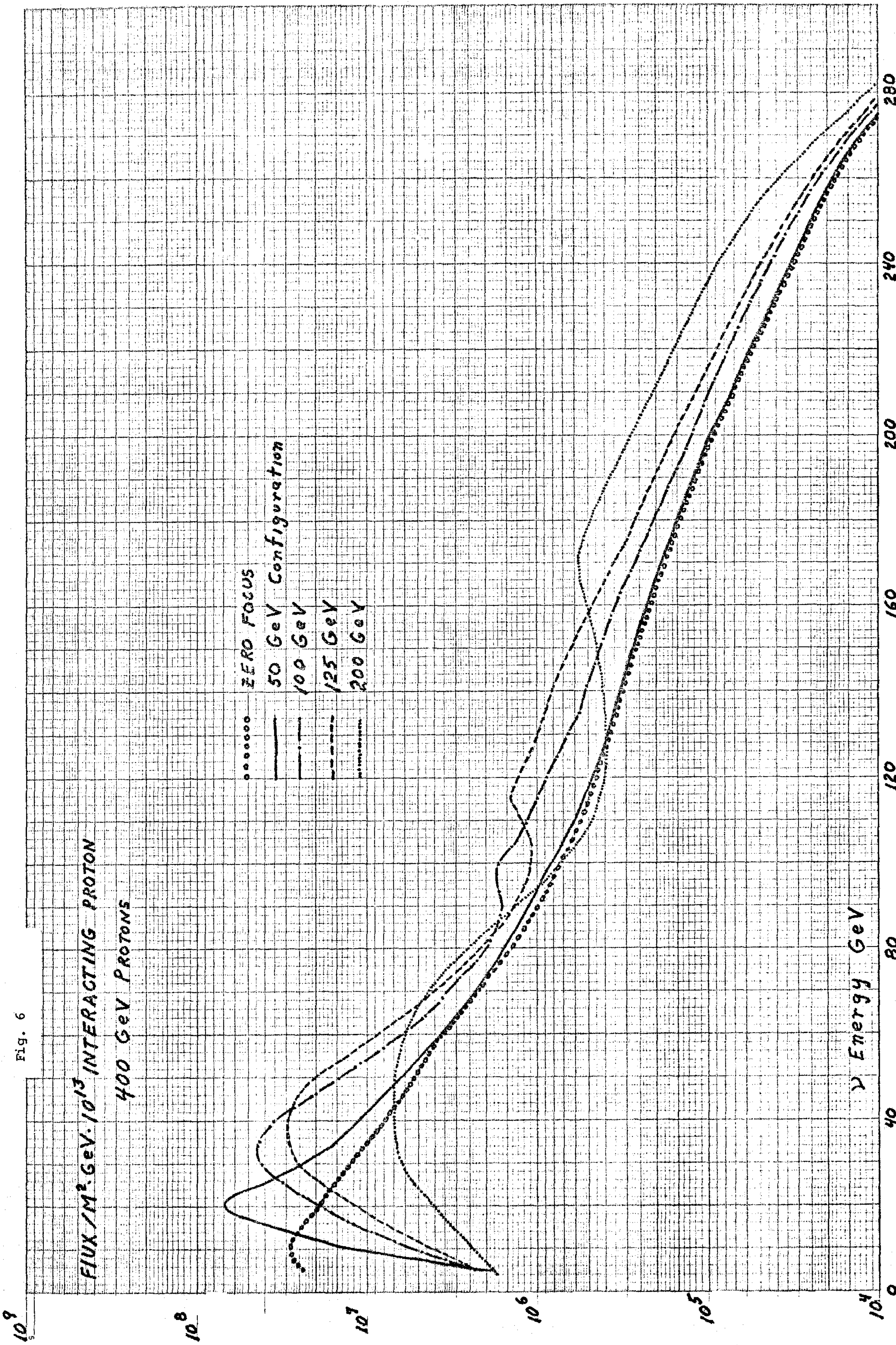

FLUX/M²·GeV·10^13 INTERACTING PROTON
400 GeV PROTONS
ZERO FOCUS
50 GeV Configuration
100 GeV
125 GeV
200 GeV
ν Energy GeV
0
40
80
120
160
200
240
280
10^9
10^8
10^7
10^6
10^5
10^4

Fig. 6

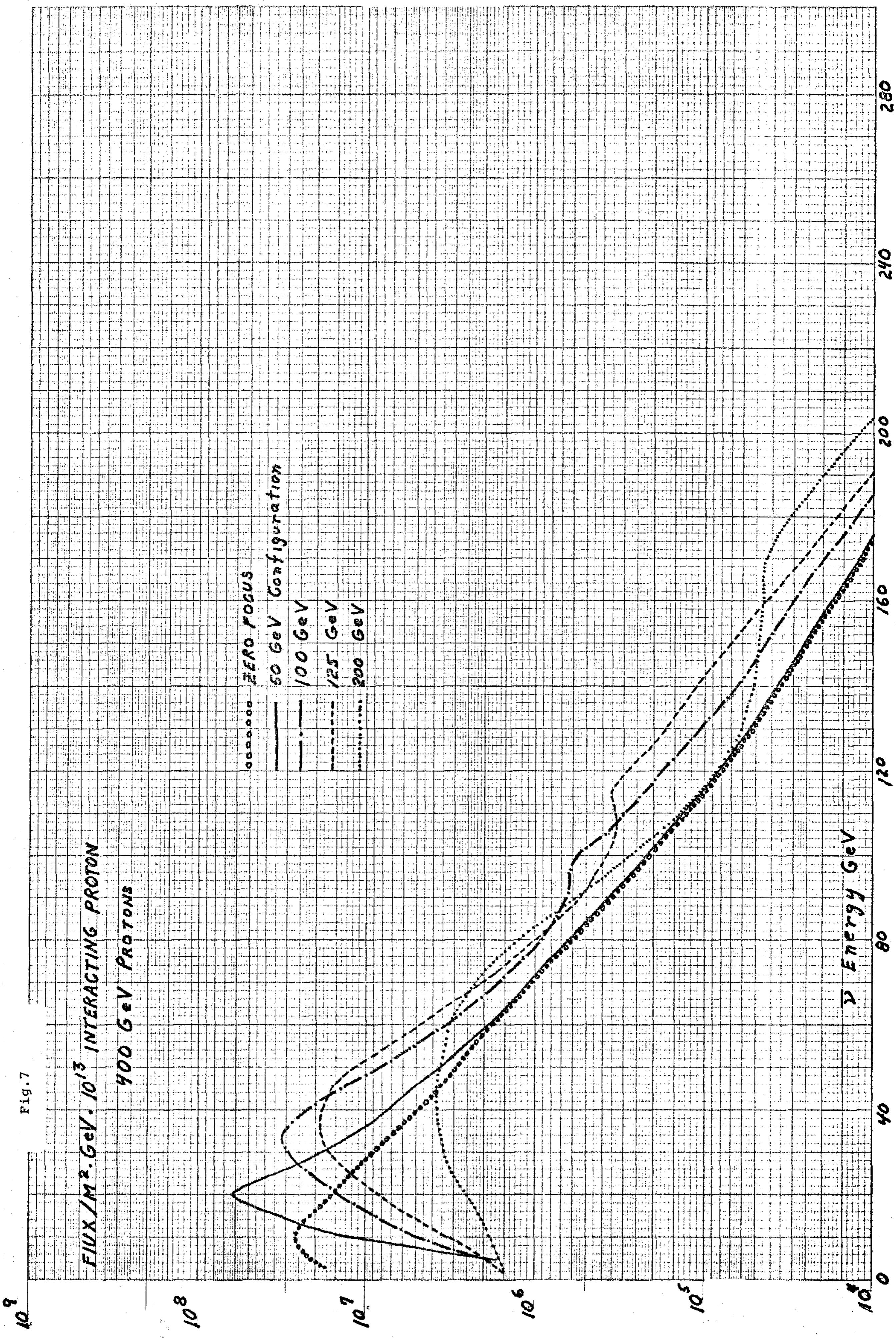

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Fig.7