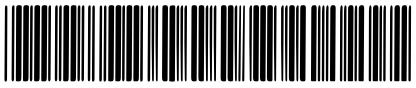


CM-P00071629

ISR-OP/FL/svw

22nd October, 1973

ISR PERFORMANCE REPORT

Run 372 - 26.6 GeV/c, Ring 4

1. Horizontal and Vertical apertures Ring 1
2. Beam loss detection with ionization chambers

CONCLUSIONS

1. Aperture Ring 1

a. Horizontally: +54, -55 mm ($\bar{\alpha}p$)

b. Vertically : the vertical angular kick given by the Q-kicker was not enough to blow the beam up vertically until it touched the vertical aperture. By using the dump kicker (decreasing the voltage from 50 to 10 KV and reducing the pressure in the new spark gap to ~ 1 Atm.) we can lose about 20 mA for each kick and then we can mesure a free aperture of ± 22 mm (β_V = 47.6 m - lower edge beam probe) for a pulse accelerated to 51 mm ($\bar{\alpha}p$) (figure 1).

2. Ionization chamber efficiency

Kicking an 85 mA pulse several times vertically (leaving 9 mA) we found that the maximum losses given by the ionization chamber system coincide rather well with the maxima of the β vertical (figure 2). Exceptions are in intersections 4 and 7 where unexpected but real losses appeared. This gives confidence to the ionization chamber device which can be used more and more to study beam losses around the machine.

EXPERIMENTAL PROCEDURE

1. Aperture - Ring 1

a. Horizontally

The dump block being centered and the chamber protector out we inject one pulse (90 mA) in R1 and accelerate it until losing current. We then measure its position with BFFB and with beam probe. We found

+ 54 mm ($\bar{\alpha}p$).

Injecting another pulse, withdrawing the girder we decelerate the pulse until losing current. With the same measurement we obtained - 55 mm ($\bar{\alpha}p$).

b. Vertically

The dump block being centered and accelerating 1 pulse (85 mA) to a radial position we tried first to give it vertical betatron oscillation by kicking with the Q_V - kicker. But after ~50 kicks we could not observe any appreciable current losses, so we abandoned this method and chose to use the dump kicker. At the nominal H.V. value we lost all the beam but reducing voltage to 10 KV and reducing also the pressure in the new spark gap to ~ 1 atm., we lost about 20 mA at each kick. After several kicks we were left with about 9 mA. We then measured the vertical beam size with the lower edge beam probe. Figure 1 gives the result and we deduce a free aperture of ± 22 mm (β_V = 47.6 m) for X = 51 mm ($\bar{\alpha}p$). However, because this procedure takes time it was not possible to scan all the radial aperture and more time is required for the next MDs.

2. Ionization Chamber Efficiency

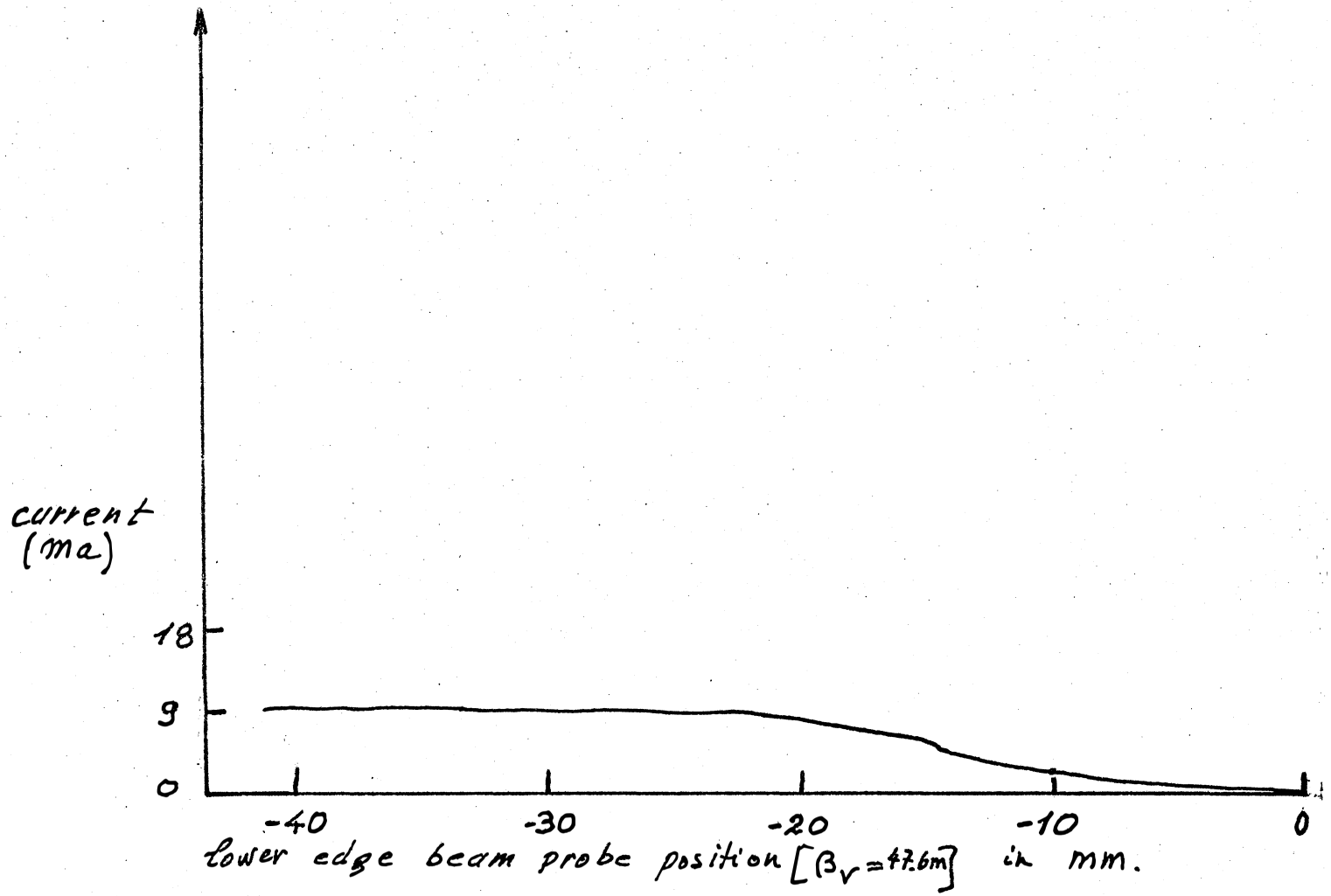
During the experiment we kicked the 85 mA initial pulse several times (for vertical aperture limit R1), we recorded for 10 seconds the ionisation chambers' output integrated signals.

Fig. 2 shows the results. On the same figure are plotted the $\sqrt{\beta_V}$ curves in full lines and ionization chamber output levels in dotted lines.

We can see that the peaks of losses correspond generally to the peak of $\sqrt{\beta_V}$. The kicks are given near I_3 and the beam is going to the left. The ionisation chamber peaks are slightly shifted to the left of $\sqrt{\beta_V}$ peaks. The reason could be that the ionization chamber received particles scattered upstream.

In I7 and I4 (unfortunately 2 ionization chambers faults - F -) we can see losses appearing at the intersections ($\sqrt{\beta_V}$ low). This should be investigated.

RUN 372 - Ring 1 -



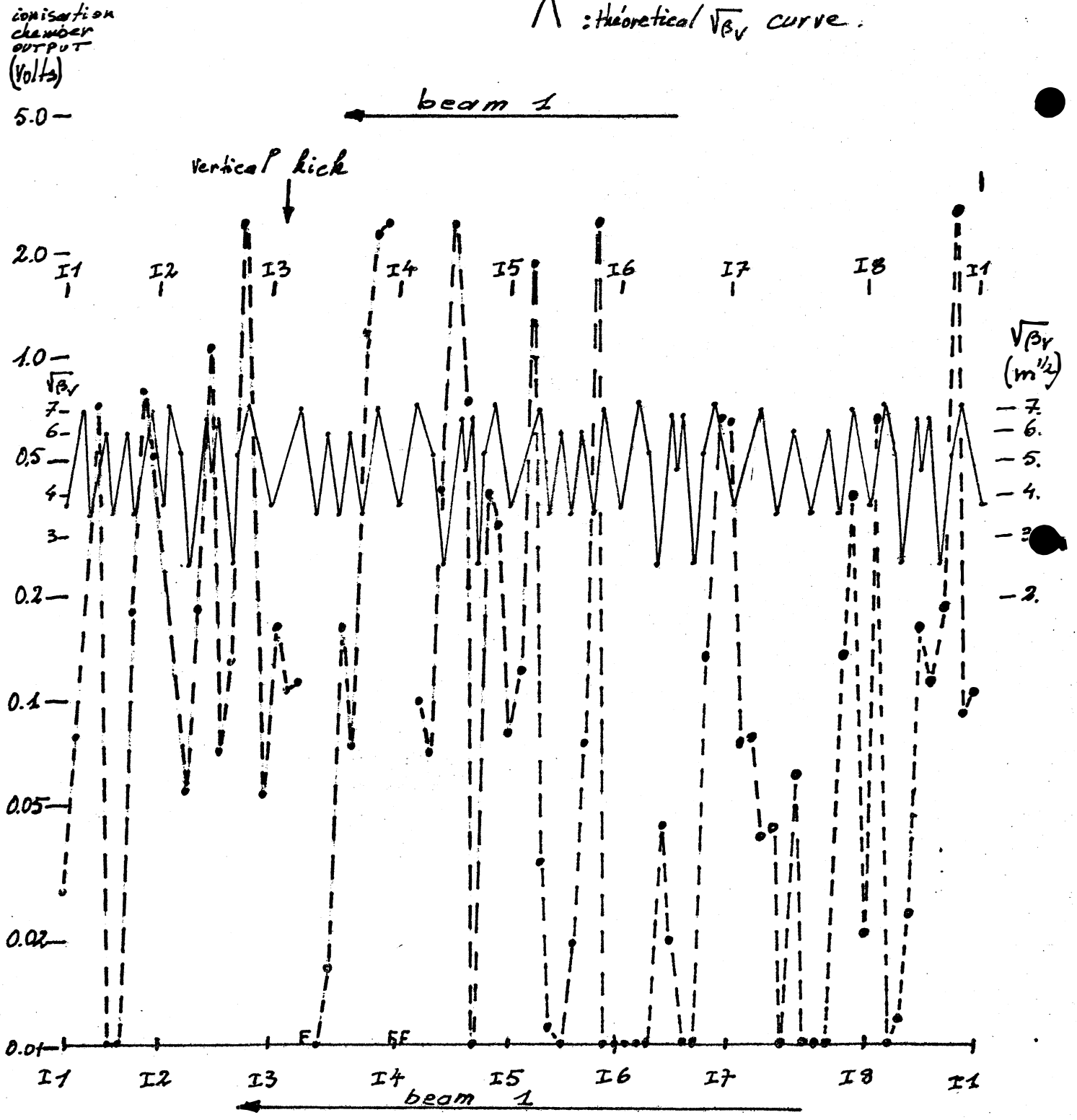
- Figure 1 -

- RUN 372 - (11-10-73)

26.6 GeV/c - Ring 1.

: ionisation chamber level outputs

: théoretical $\sqrt{\beta_v}$ curve.



- Figure 2 -