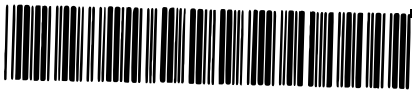

CM-P00071622

ISR-RF/KH/MdeJ/RK/ps

15th October 1973

ISR PERFORMANCE REPORT

Run 370, 26 GeV/c, 20 bunches, 9.10.73

Phase displacement acceleration

Conclusions

(a) When stacked properly in the resonance-free region (between -5 and +25 mm) at least 4 A can be accelerated to 31 GeV/c without any difficulty.

(b) The working lines, in the presence of the stack, are precisely what they are supposed to be.

(c) The present system used for acceleration whereby the whole process is controlled from the Argus computer can be handed over to the Operations group after the January shut-down.

Details

(a) The working line

The working line is shown in fig. 1. The resonance-free region is $-5 < x < 28$ mm allowing the centring of the stack around $x = 12$ mm corresponding to a beam momentum of 31.6 GeV/c at maximum field.

The space charge induced Q-shift resulting from a beam current of 10 A will reduce the resonance-free region to about $0 < x \ll 25$ mm.

The working lines were measured with the Q diagram meter in the presence of the stack at 26.57, 28.511, 29.96 and 31.4 GeV/c and found to be correct. The observed Q shift corresponds approximately to the current in the stack.

(b) The phase displacement

Two stacks were made:

Stack 1: 7.069 A with $0 < x \leqslant 20$

From this stack 4.037 A (this figure assumes that all the current lost during the Q measurements could have been accelerated to 31 GeV/c) was accelerated to 31 GeV/c.

Stack 2: 8.79 A with $-8 < x \leqslant 20$
thus with a tail across the 5th order resonances.

From this stack 4.02 A was left over after phase displacement to 31.4 GeV/c.

The current losses as function of momentum are given in Fig. 2 for these two stacks, and for a few typical examples measured during physics fills.

From Fig. 2 it is obvious that the heaviest current loss always occurs at the beginning of the process. Slight movements of the stack across the 5th order resonances seem to stimulate a mechanism that results in a higher loss rate at all momenta. All the measurements given in Fig. 2 are done with phase displacement under computer control and it is very difficult to understand why with this computer-controlled process currents above the 5 A level can never be achieved, since they have been achieved before with the manual displacement.

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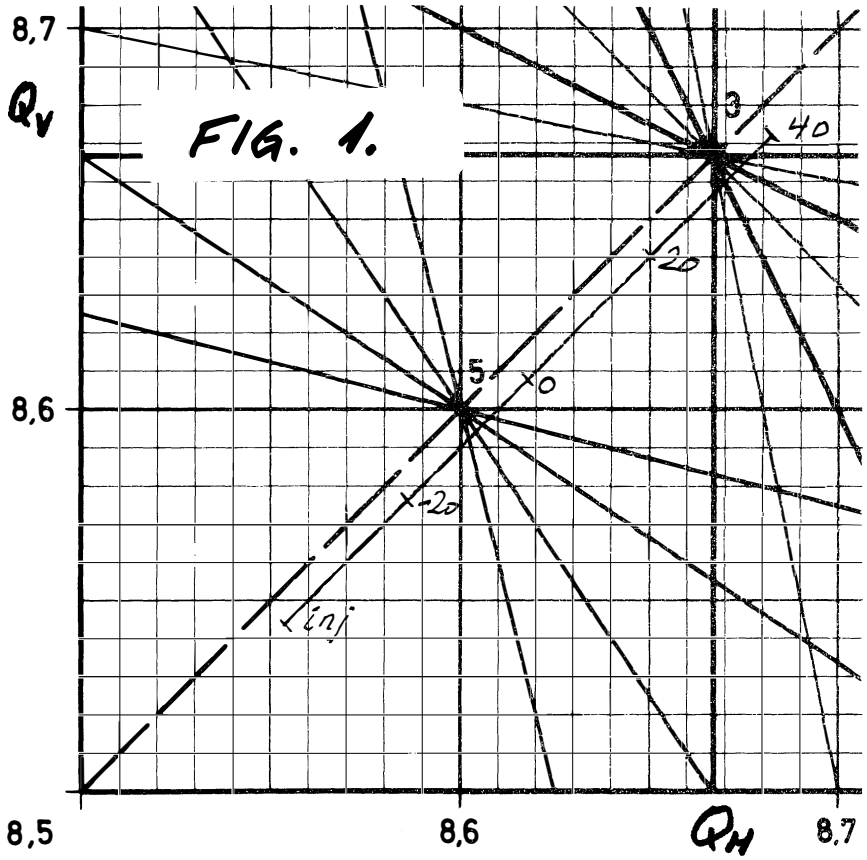
8,7
Q_V
FIG. 1.
3
40
20
5
0
+2σ
+inf
8,6
8,5
8,6
Q_H
8,7

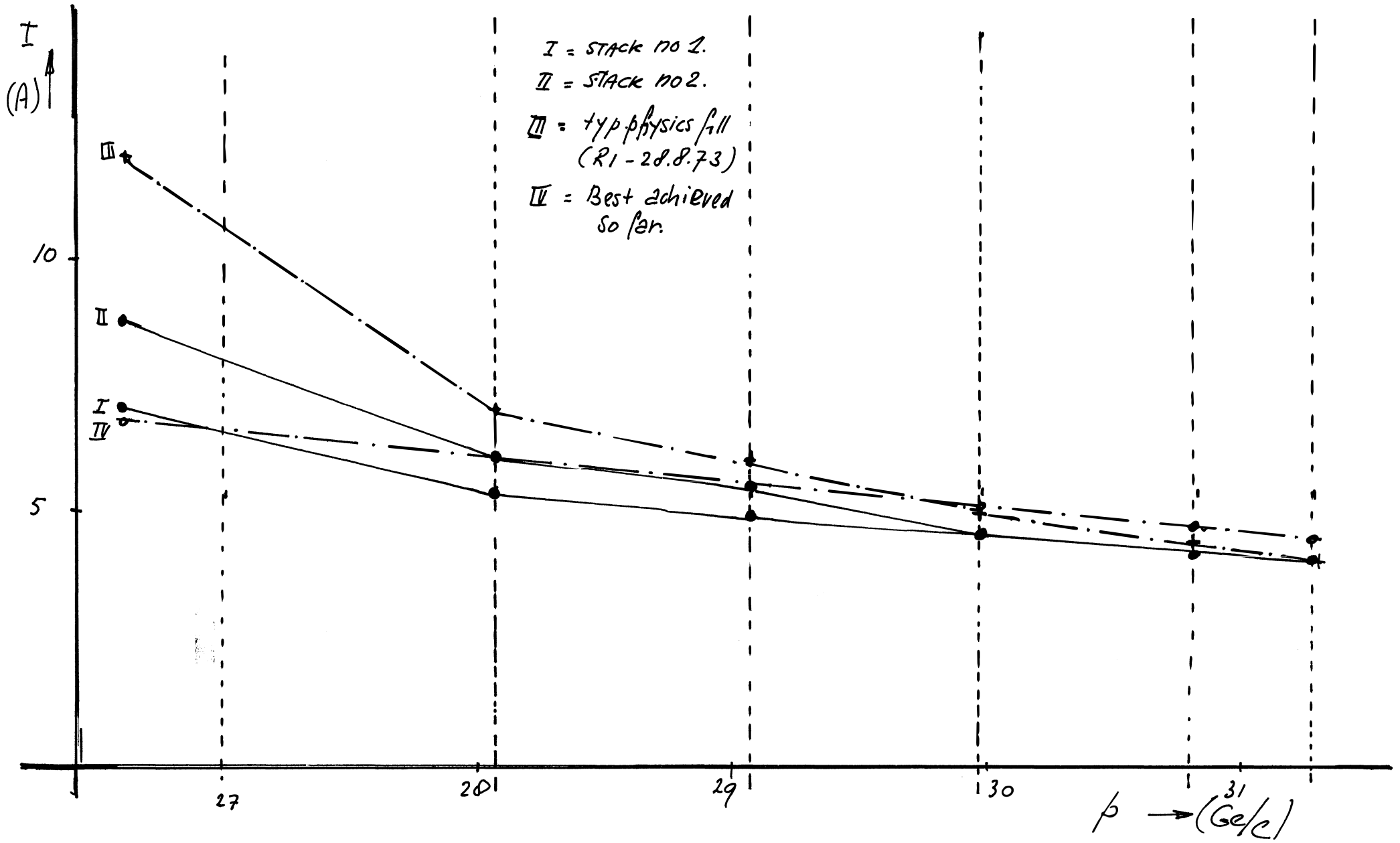

Fig 2. current loss as function of momentum.