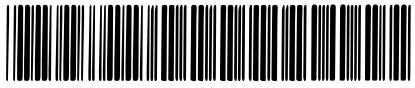

ISR-MA/JPG/ww June 30, 1971

ISR RUNNING-IN

Run 76 - June 28, 1971

Ring 2 - 15 GeV/c - 20 bunches

Possibility of measuring the magnetic field produced by the beam to detect its position

The purpose of this experiment made as a secondary activity in R2 was to investigate the possibility of deducing the position of the beam (for the time being the vertical position) from measurements of its own magnetic field outside the vacuum chamber.

The measuring system (see figure 1) which consists of 2 peaking strips, have been installed in Ring 2 close to the crossing point in I7 the electronics being in A7.

The most critical aspects of this system are

- a sensitivity better than 0.04 mG (0.04 mG corresponds to a beam of 2A displaced by 0.1 mm)
- the effect of fluctuations of the external magnetic field (earth field and various ISR fields) which are interpreted as a beam displacement and which must be of the order of the sensitivity.

In our system this field is compensated separately on each peaking strip using a very stable coil fed by a constant current. (Later we intend to have an automatic compensation using a third peaking strip sensitive to the external field only.)

1. Results

- When ISR conditions are kept constant the fluctuations of the local field (at least in I7) are smaller than 0.04 mG (see figure 2).
- A small modulation appears on the sum signal in synchronism with the PS cycle which could be an earth current of 6 mA circulating in the vacuum chamber.

- We used, later in the evening, the beam made for physicists which we displaced in I7 by local vertical bumps.

  It appears from the results (figure 1) that a displacement of 0.1 mm can be measured.

  The correspondance between applied bumps and measured displacements is good if one takes into account that the system is not calibrated and the very poor resolution on $H_1 + H_2$.

  The initial position of the beam - 2.5 mm is not significative the measuring system being not precisely aligned in the ISR geometry.

2. Conclusion

These preliminary results prove that it is possible to detect displacements of 0.1 mm of a 2A beam.

A more detailed investigation of this system will be made in run 81.

J.P. Gourber

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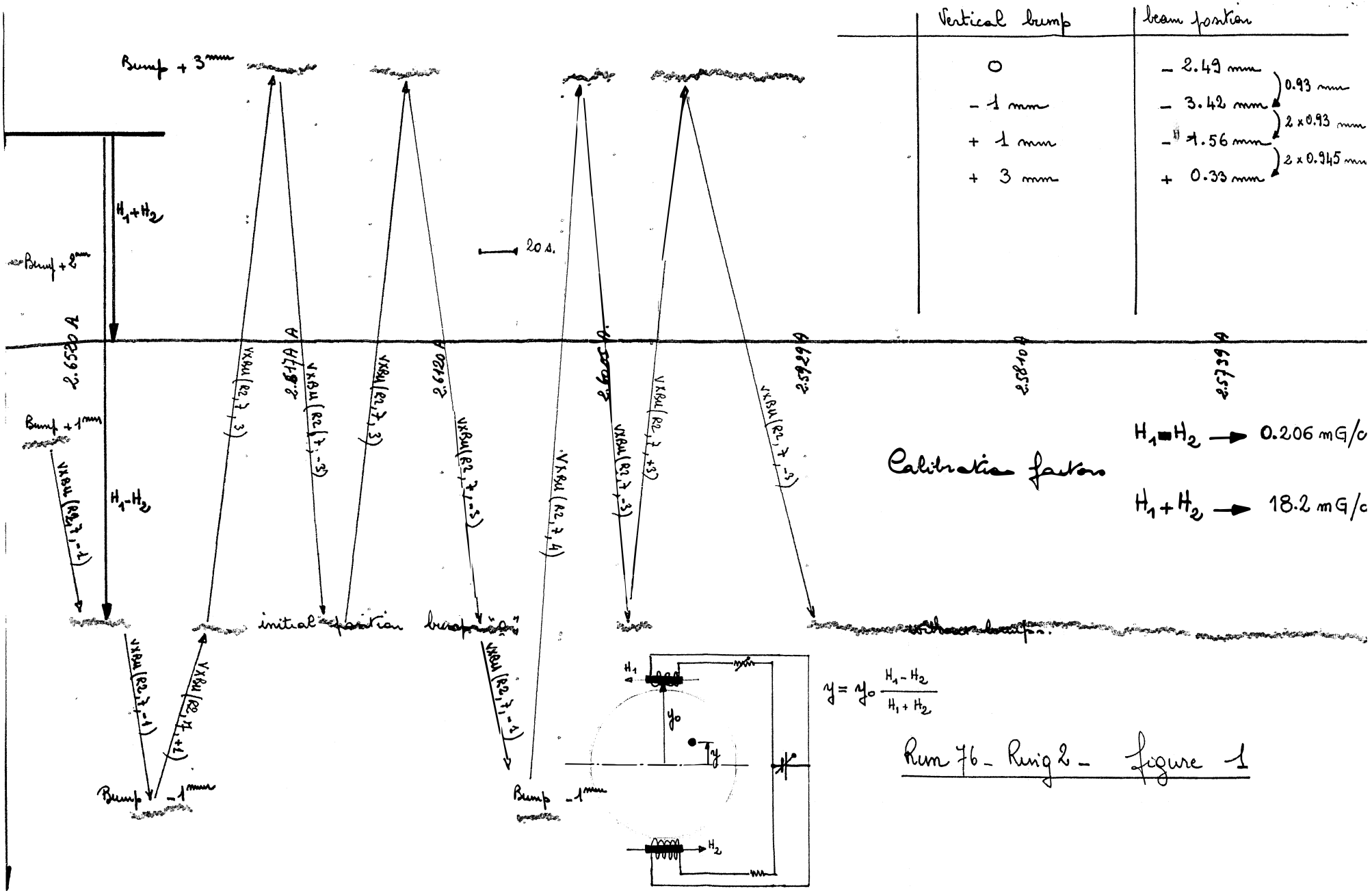


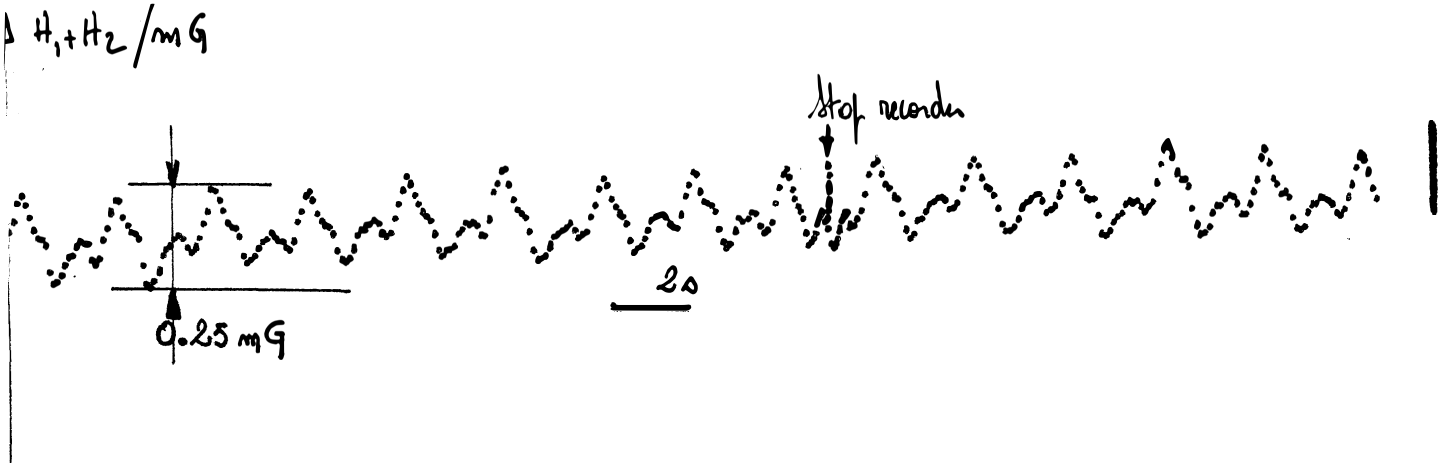
Vertical bump	beam position
0	- 2.49 mm
	- 3.42 mm (0.93 mm)
- 1 mm	
	- 1.56 mm (2 x 0.93 mm)
+ 1 mm	
	+ 0.33 mm (2 x 0.945 mm)
+ 3 mm	

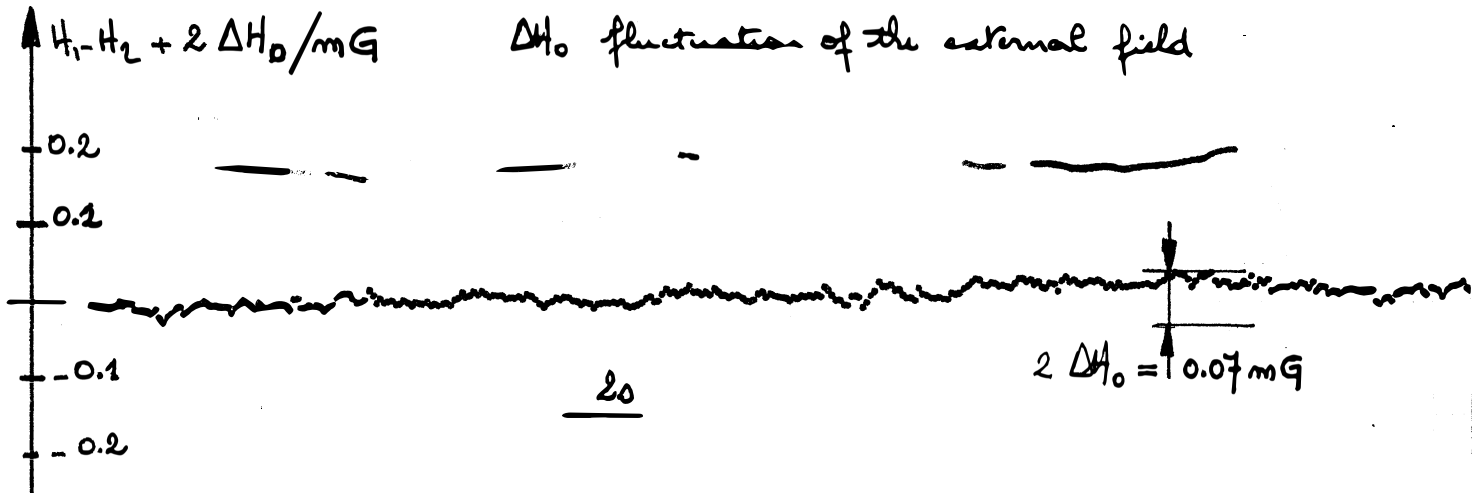
Calibration factor

$H_1 - H_2$ → 0.206 mG/c

$H_1 + H_2$ → 18.2 mG/c

Run 76 - Rwig 2 - figure 1





Run 76 - Rung 2 - figure 2