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STATUS REPORT ON THE WIGGLER MAGNET FOR ADONE

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Abstract

A 1.9 Tesla, 6 full poles wiggler magnet, decreasing the critical wavelength of synchrotron radiation in Adone from 8.3 Å to 4.4 Å has been built in the Frascati National Laboratories. The results of the first measurements are presented.

General information

The Frascati wiggler magnet design has been extensively discussed in previous papers [1,2,3]. Its main characteristics are summarized in Table I.

Table I - Wiggler parameters

Number of poles	5 full + 2 half-poles
Gap Height	40 mm
Overall length	2100 mm
Wavelength (λ_w)	654 mm
Maximum field	1.9 T
Ampereturns per pole	35.000
Current	5000 A
Electrical power	230 KW
Critical wavelength at 1.9 T, 1.5 GeV	4.4 Å (2.8 KeV)
$\int B^2 ds$ @ 4500 Å	4.27 T^2. m

Performance

The magnet has been delivered at the end of January '79.

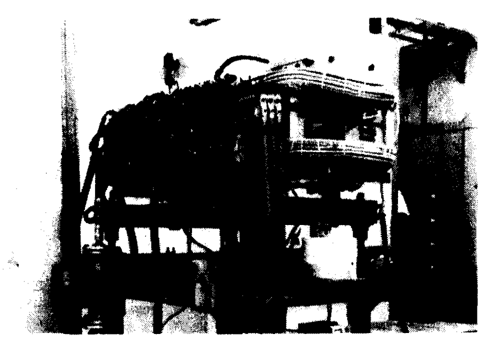

FIG.1 - The assembled magnet on the magnetic measurements stand.

Magnetic measurements have started in February. Calibrated Hall probes and, for a quick measurement of $\int B\,ds$, a 2.5 m long flip coil are being used. The block diagram of the measuring stand electronics is shown in Fig. 2.

Fig. 3 shows the field behaviour versus distance along the beam direction for one half of the magnet.

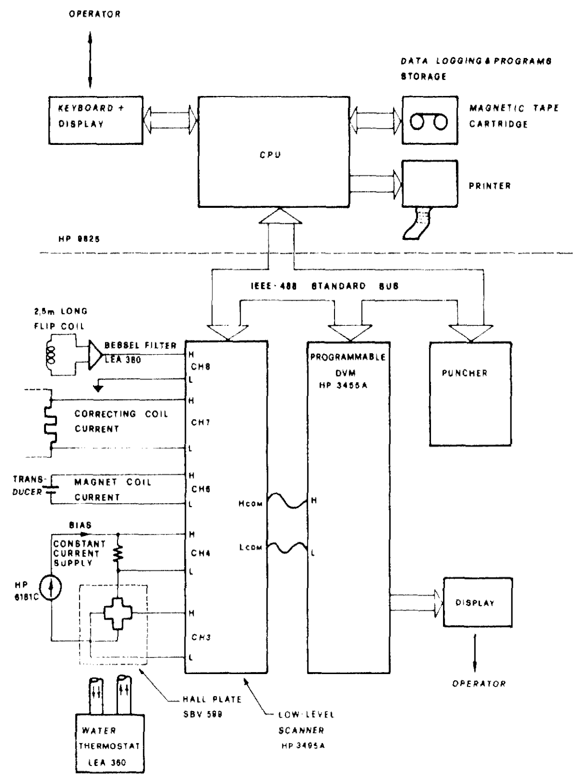

FIG.2-Block diagram of the magnetic measurements electronics.

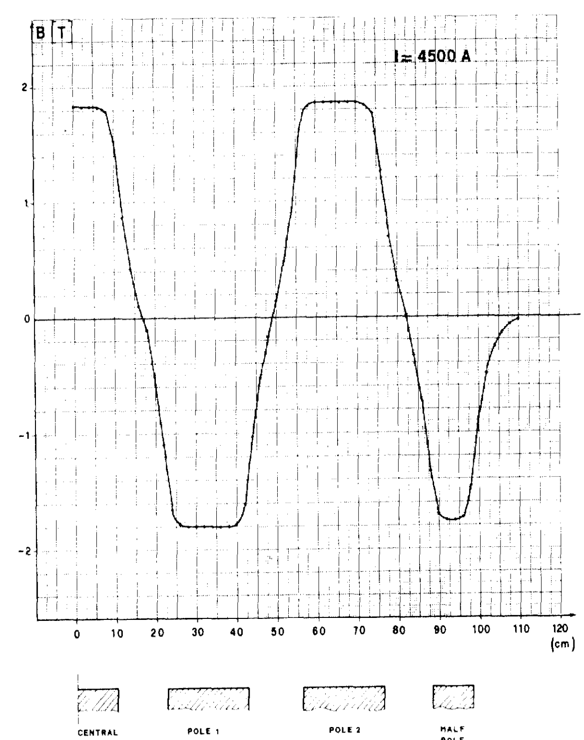

FIG.3 - Field along beam direction, at the center of the gap.

The points are taken at the center of the gap. The field versus current curves are given separately for the various poles of one half magnet in Fig. 4. It has to be kept in mind that the center pole gap is 2% wider than the gaps of the other poles. This was done on the basis of calculations with the three dimensional computer program G-FUN to minimize the field integral ($\int B\,ds$).

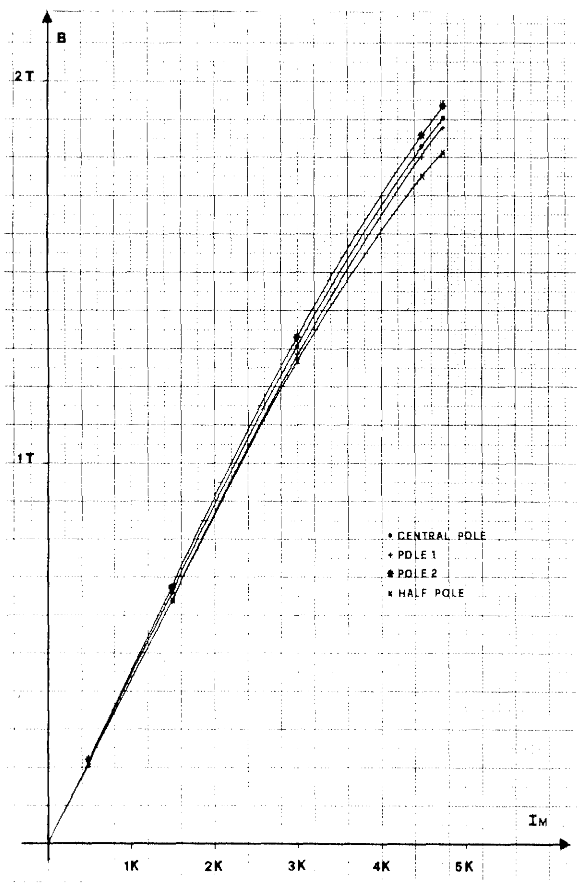

FIG.4 - Excitation curves for the various poles of one half of the magnet.

Unfortunately the results of the calculations have proved not accurate enough and the field integral, shown in Fig. 5, is much larger than predicted. This is not too surprising since the residual value of $\int B\,ds$ is due to small differences of large (opposite sign) terms. An investigation into the possible reasons for the program to be mistaken is nevertheless being carried out.

The correction coils provided on the magnet are capable of correcting the integral; it is however preferable to try and decrease the residual field integral by mechanically adjusting the pole pieces. This work is now in progress.

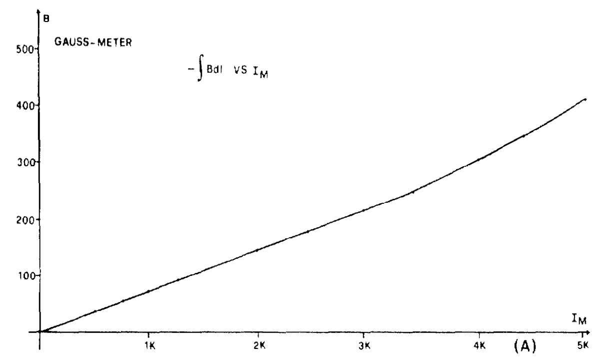

FIG.5 - $\int B\,ds$ versus excitation current.

REFERENCES

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2 - A. Luccio: Status report on the Adone wiggler and X-Ray beam line. Wiggler Meeting, Frascati, June 1978.

3 - A. Luccio, G. Pasotti, M. Ricci: Computer design of the magnetic field of a transverse wiggler. Compumag, Grenoble, September 1978.