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Magnetization Effect of Pressure Gage Block

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The preloading of the SSC magnet coil is measured by the bending of a beam installed in the collar. This material is known to have small magnetization. A measurement of the remanent field was made using Rawson-Lush type 789 field probe in the study of "periodic field" in DSA321 50 mm dipole magnet. Figure 1. is the observed magnetic field as a function of axial position.The plot is indicated with subtraction of current-produced field assuming transfer function is $10.30G/A$.

The field has a clear bump at the position of the pressure gage. Magnetization increases when the current of the magnet is increased. The change of the field pattern is shown in the figure. The arrow attatched to the current indicates the direction of the ram,p going up or down. Since the back ground field of this magnetization also behaves nonlinearly, the magnetization effect of the gage block is measured as the difference of the field to the other part of the magnet.

Figure 2 shows the magnetization effect of the gage block extracted from the change of the field pattern. It seems like having tendency of satulation. Probably the disturbance to the field will be about 40 gauss for the injection field. A little surprise is that the magnetization goes away if the magnet is quenched. This could be due to either a temperature rise of the gage block to disorder the ferro-magnetism or an eddy current which produces a demagnetization field.

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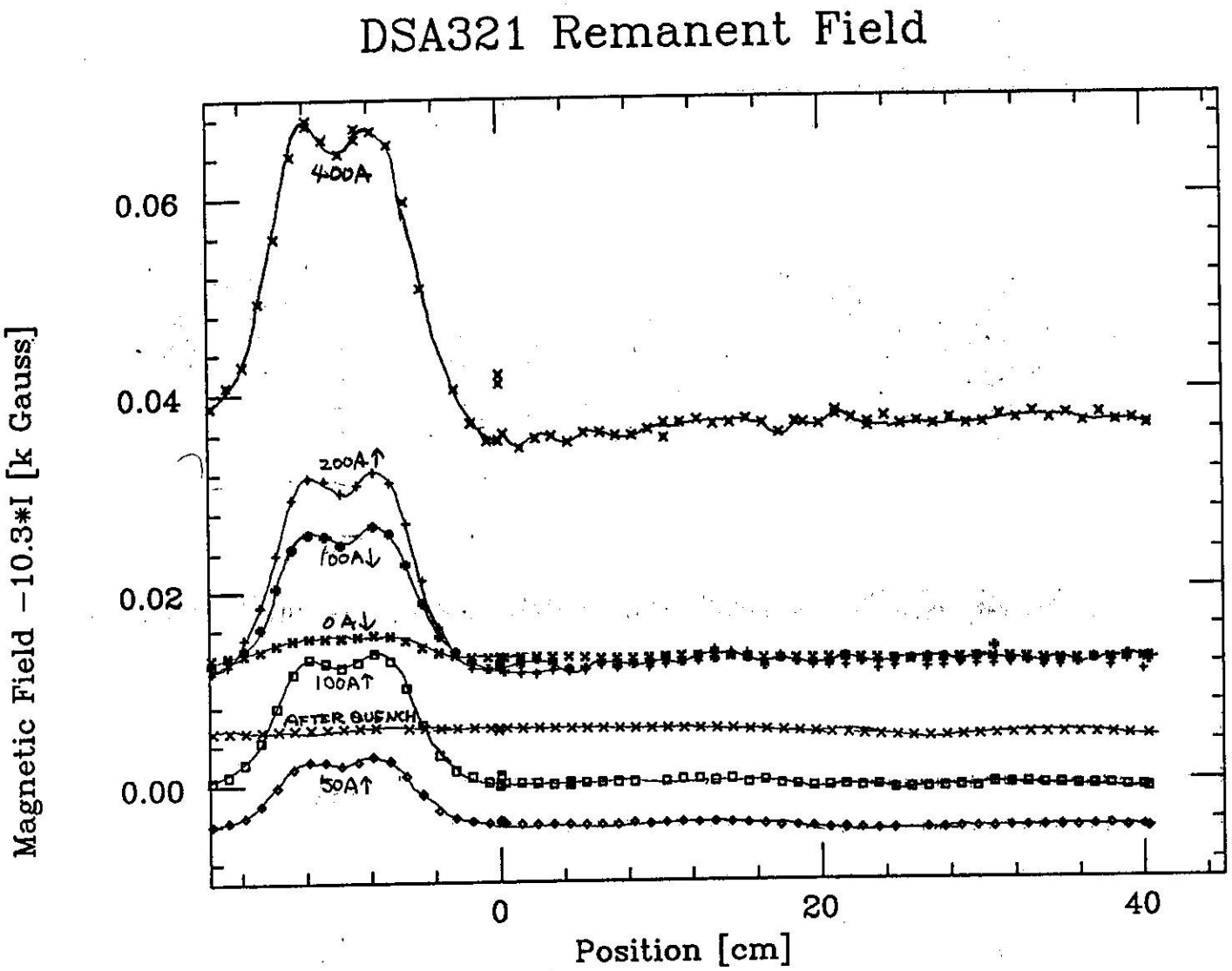
DSA321 Remanent Field
Magnetic Field −10.3*I [k Gauss]
0.06
0.04
0.02
0.00
400A
200A↑
100A↓
0A↓
100A↑
AFTER QUENCH
50A↑
0
20
40
Position [cm]

Fig. 1.

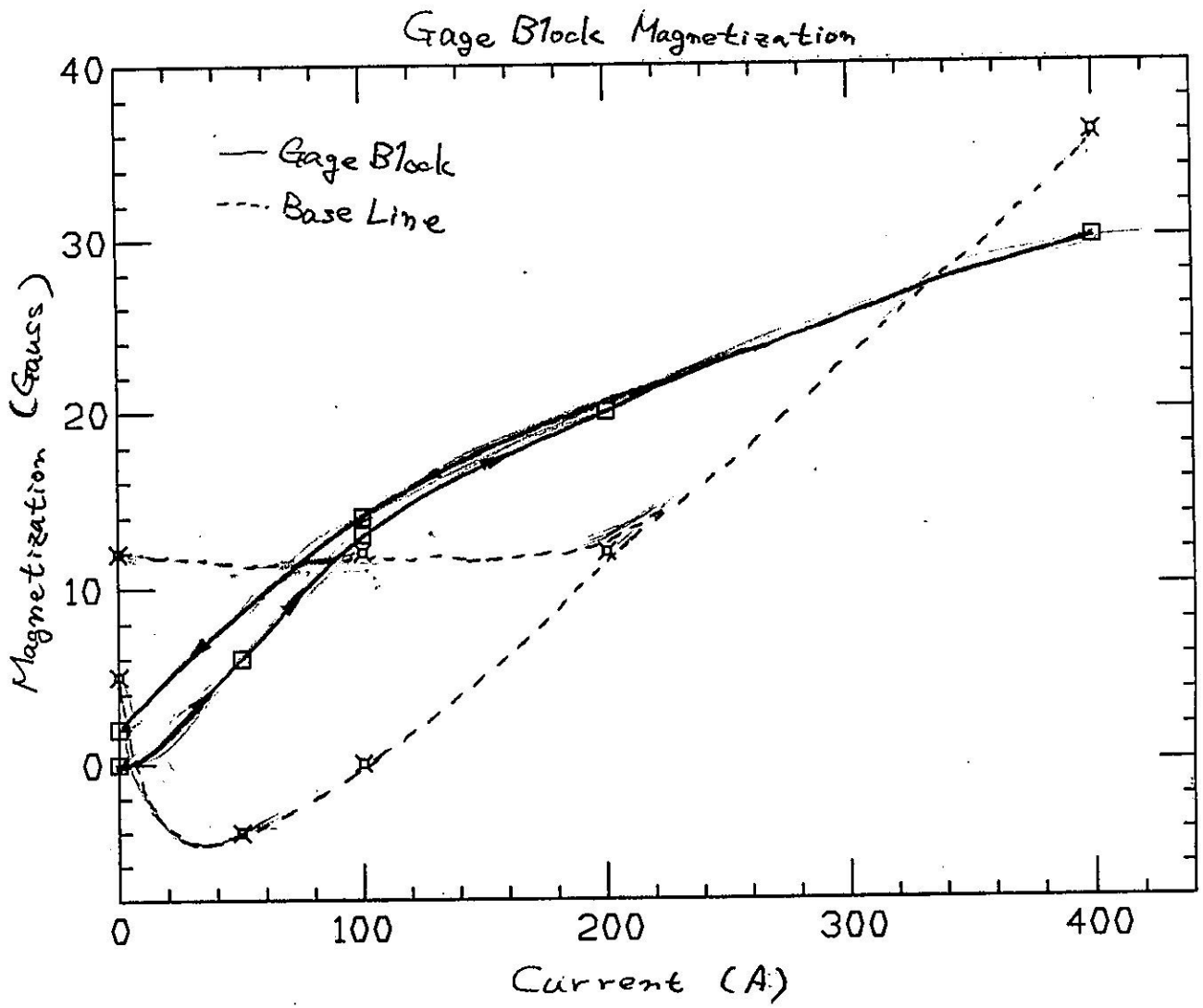
Gage Block Magnetization
Gage Block
Base Line
Magnetization (Gauss)
Current (A)
40
30
20
10
0
0
100
200
300
400

Fig. 2