

C magnet to allow 11 GeV FFA tests in BSY dump line
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28 March 2023

Discussion

In TN-23-014 three colleagues and I discussed the possibility of upgrading the decommissioned BSY dump line as an 11 GeV test bed for 22 GeV energy upgrade components. In TN-23-016 I provided information on a 300 cm H magnet with a reduced cross-section which could be used in splitters. In the conclusion of that TN I mentioned that 1.78T was achievable at 820 A drive. Below I show a C magnet created by rearranging the H magnet steel. The first magnet in the BSY string must be a C so both the vacuum line to the BSY dump and the vacuum line to Hall C can pass through. See TN-23-014 for drawing. The modeling was again, as in TN-23-016, done at 380 cm length and the average fields calculated rather than generating a shorter model.

Requirements

The requirements were taken from an old Optim file scaled to 11023 MeV.

Table 1. Requirements

Name	L[cm]	B[kG]	Tilt[deg]	Tilt_out	BendAng[deg]
Lambertson	230	-4.46445	0	0	-1.6
MBJ4C01	304.52	-15.1017	14.2837	14.1766	-7.16581
MBJ4C02	304.596	-17.7623	7.87195	7.53147	-8.43036
MBJ4C03	304.596	-17.7623	0.0473263	-0.378036	-8.43036

The Lambertson remains as is as do the quads in the line. The three MBJs get replaced. The first must be a C magnet. The second and third should be H magnets to minimize stray field on the Hall B line and to more easily achieve the required field. The field is lower in MBJ4C01 because of the bending from the Lambertson. External shielding in addition to the present “coffin” will be required on the B line. If the idea in TN-23-014 is followed MBJ4C03 will be replaced with a permanent magnet FODO cell instead of an H magnet.

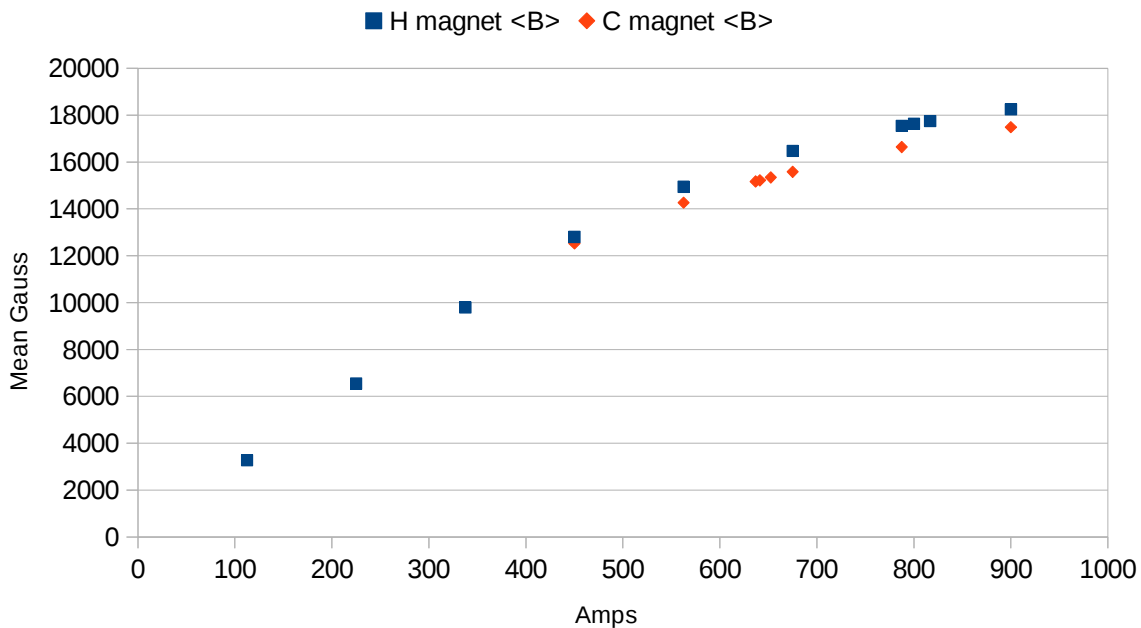


Figure 1. Average field in 380 cm H and C magnet models as a function of current.

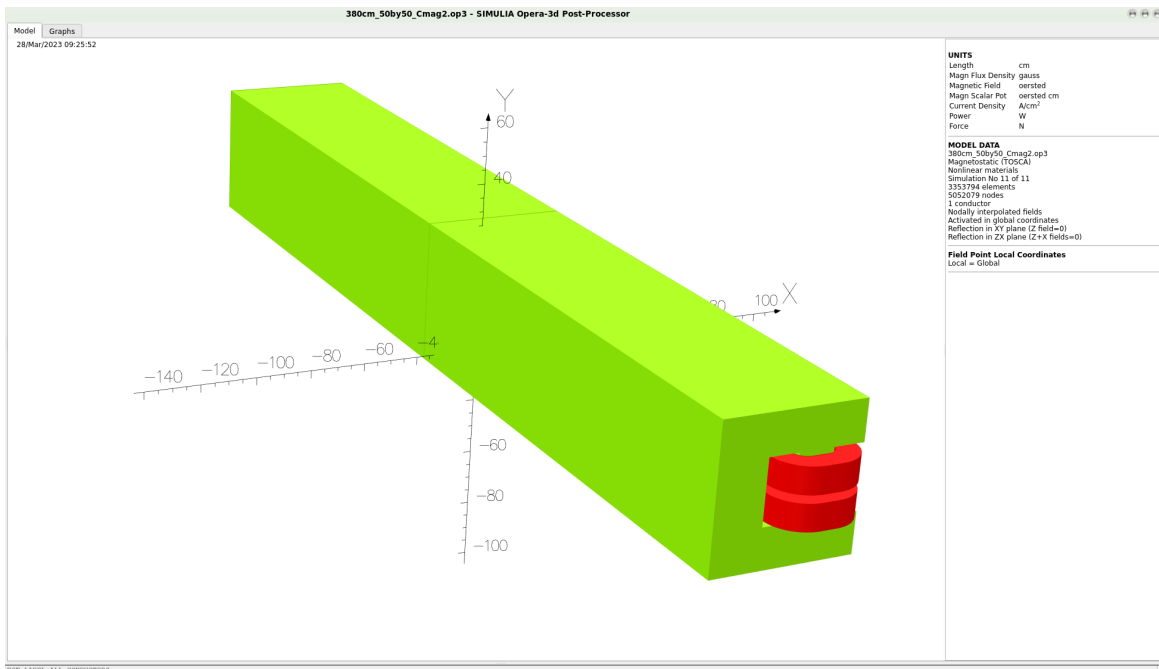


Figure 2. C magnet with coil. Steel on the right side of the H magnet has been moved to the left side here so all the parts are the same. This will reduce procurement cost.

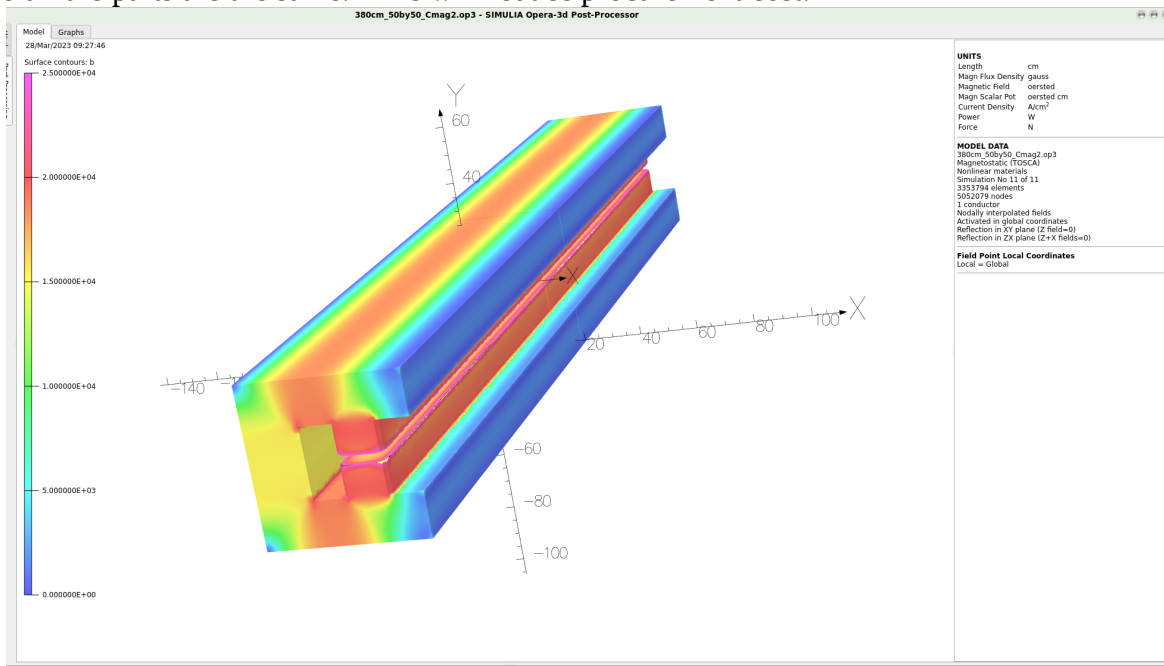


Figure 3. Field on the surface of the steel with 637 A in the coils, yielding 15167 Gauss average, 4 ppt above the 15102 Gauss required per Table 1.

Conclusion

The same steel and coils may be used in C and H magnets to upgrade the BSY dump line to 11 GeV.

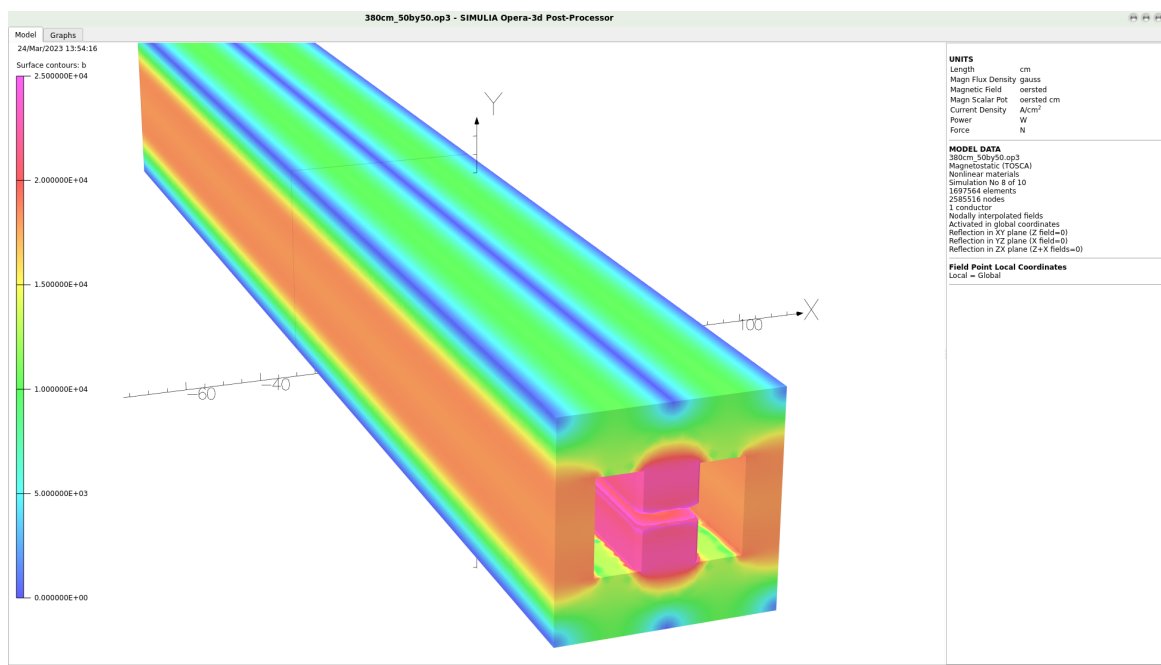


Figure A. Figure 1 of TN-23-016 is repeated here, 900 A in the coils, for comparison with Figure 3.