Bob Weggel Particle Beam Lasers, Inc. June 13, 2015

Magnets 20&15to4T5m120cm Winding-pack X-sections, Field Profiles & Parameters

Figure 1 shows the coil cross sections and field magnitude, direction & streamlines of a magnet with superconducting solenoids of 120-cm I.R. to z = 10 meters; Fig. 2 plots the on-axis field profile. Figure 3 applies for the superconducting coils only. Table I lists selected parameters, with dimensions in cm and current densities in A/mm^2. Between SC coils #2 and #3 is an axial gap of 155 cm that will be very convenient for facilitating robotic assembly and disassembly.

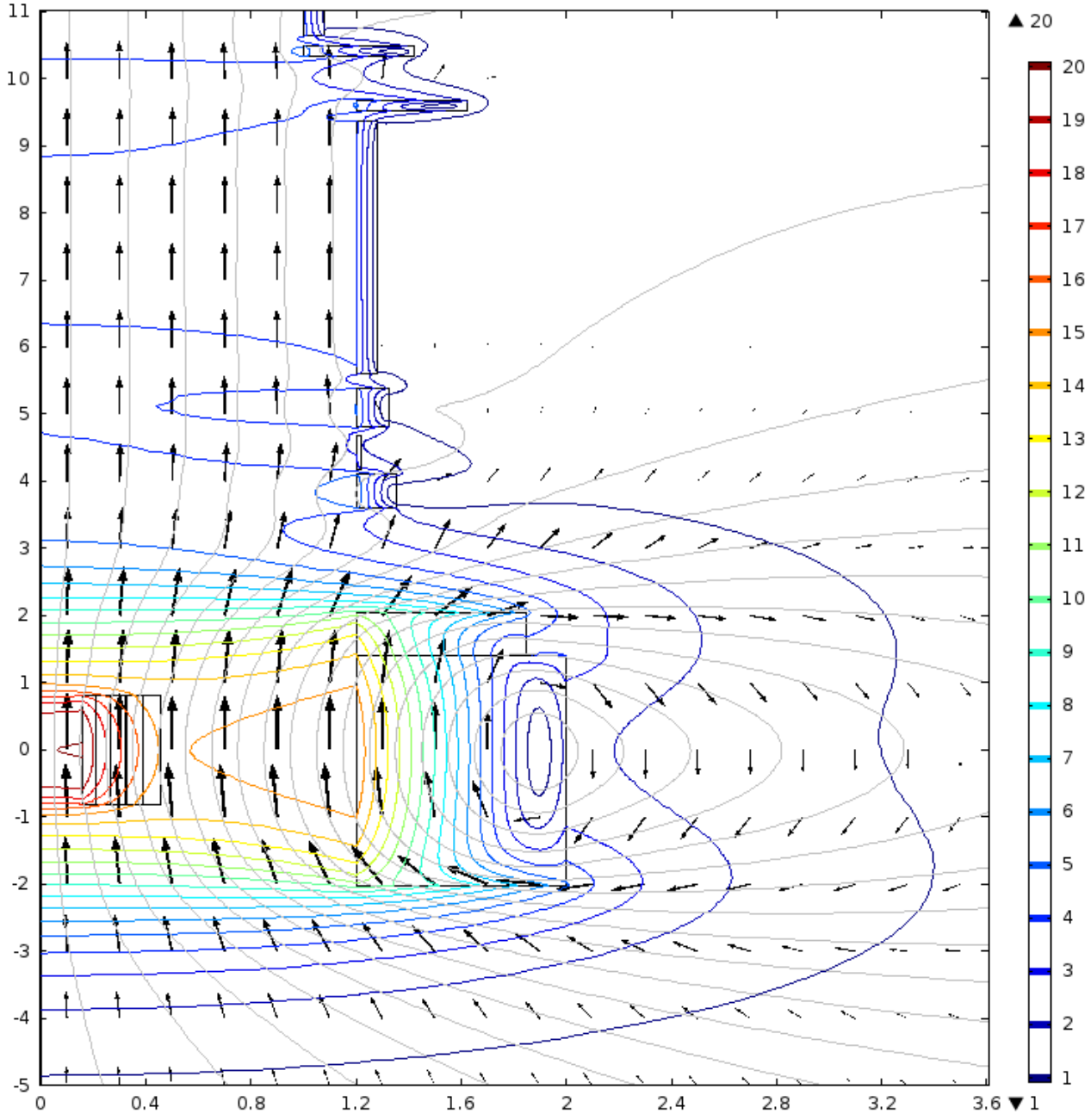

Fig. 1: Target Magnet "20to4T5m120cm4pDL," whose on-axis field B(z) tapers to ~4 T at z ≈ 5 m: winding-pack cross sections, field direction (arrows), streamlines (grey), & field magnitude (contour lines).

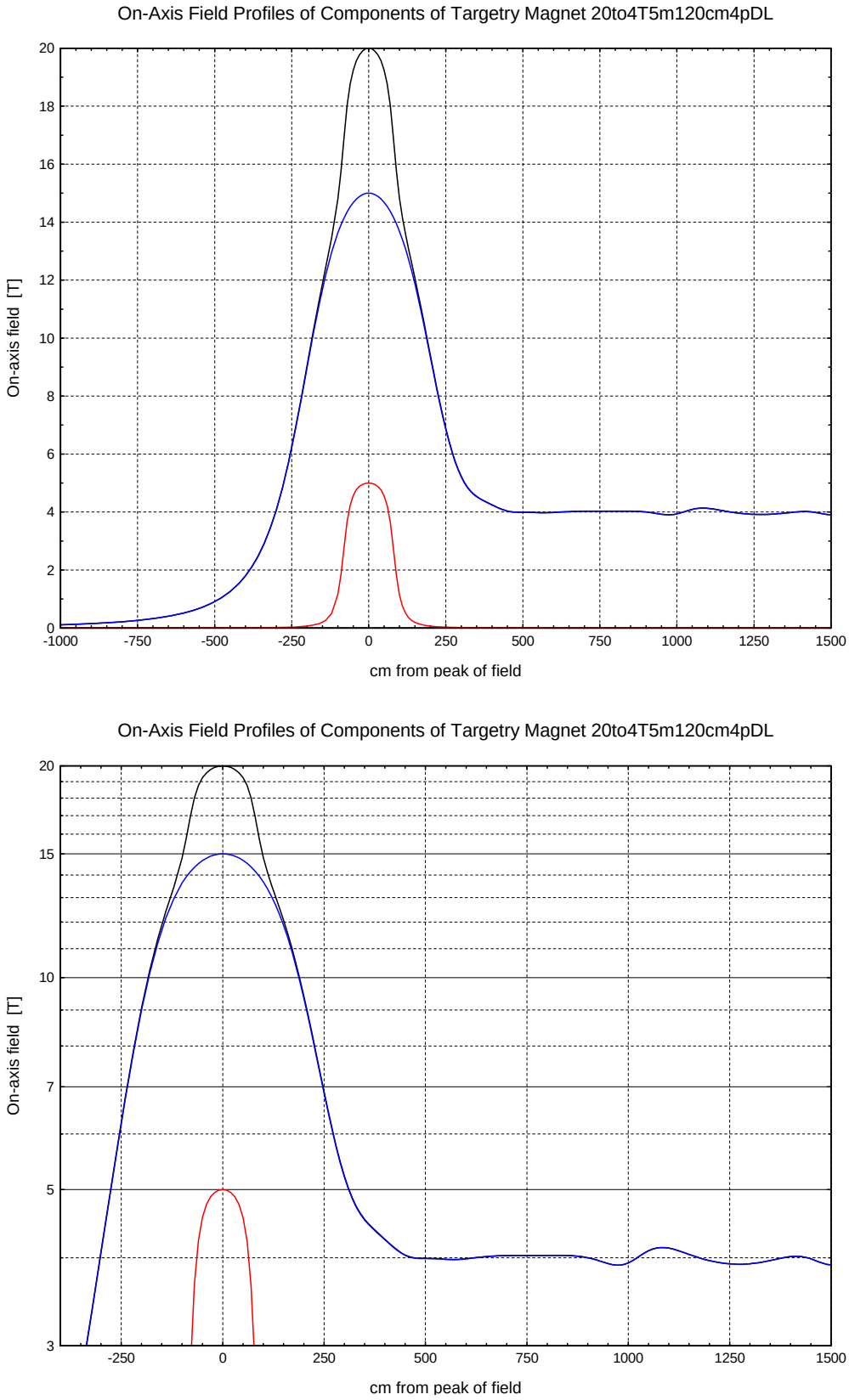

Fig. 2. On-axis field profile of Target Magnet 20to4T5m120cm4pDL; B = 4 T at 4.7 m, 4.24 T at 4 m, & 5.21 T at 3 m.

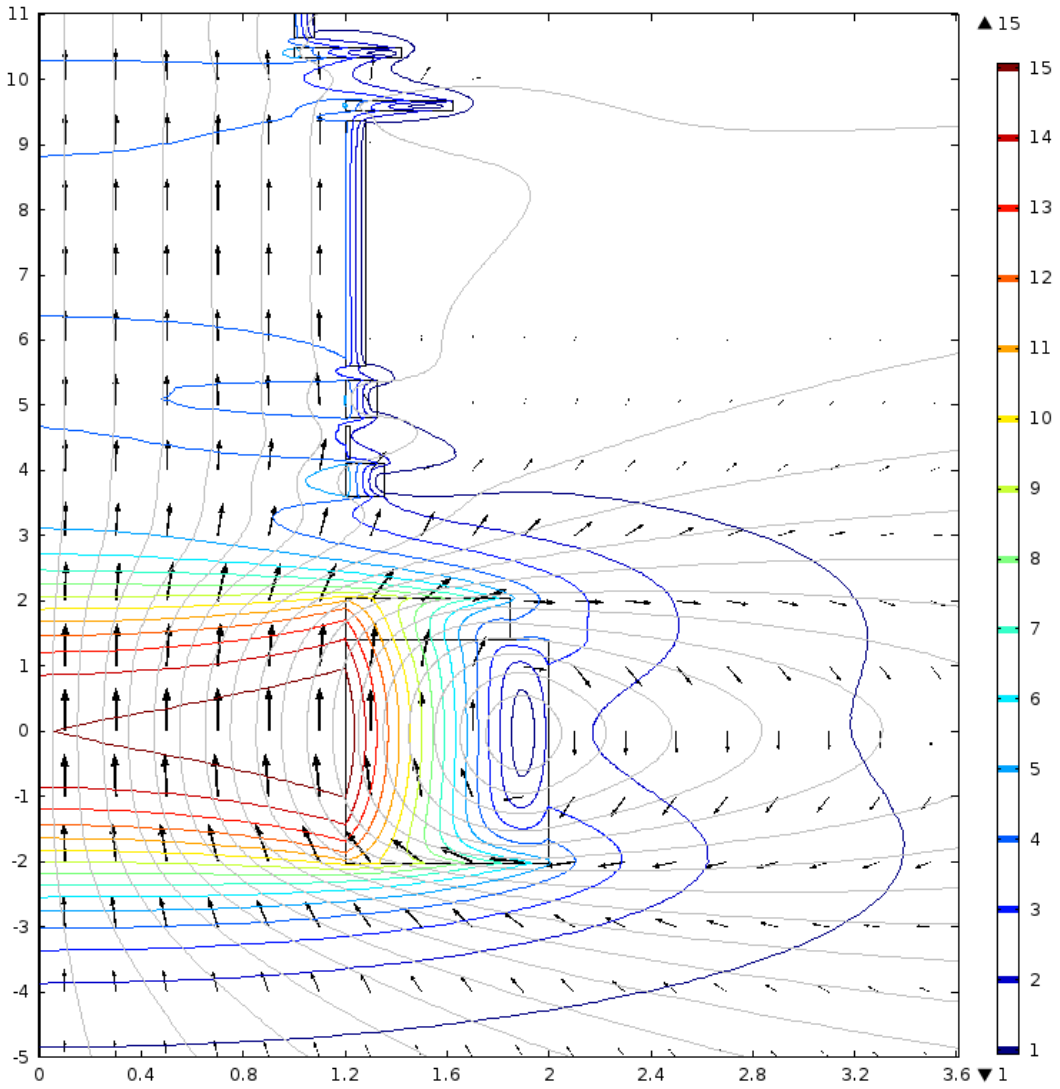

Fig. 3: Target Magnet "15to4T5m120cm," identical to the superconducting solenoids of "20to4T5m120cm4pDL": winding-pack cross sections, field direction (arrows), streamlines (grey), & field magnitude (contour lines).

Table I: Parameters of Superconducting Solenoids of Target Magnet 20to4T5m120cm4pDL

Cur. density	1.911	2.101	3.702	3.809	3.824	3.800	3.590	3.590	3.590	3.590
Inner radius	120.0	120.0	120.0	120.0	120.0	120.0	120.0	100.0	100.0	100.0
Radial depth	79.66	64.82	15.28	1.63	12.59	8.15	42.12	12.11	8.15	42.12
Outer radius	199.66	184.82	135.28	121.63	132.59	128.15	162.12	142.12	108.15	142.12
Upstr. end	-201.6	141.5	359.4	417.6	480.6	561.2	952.0	1033	1063	1455
Coil length	343.12	62.97	51.64	49.57	57.36	376.28	15.00	15.00	377.00	15.00
Down. end	141.5	204.5	411.0	467.2	538.0	937.5	967.0	1048	1440	1470
Axial gap	0.00	154.91	6.55	13.44	23.22	14.54	66.00	15.00	15.00	600.0