Bob Weggel 2/25/2011 etic flux density norm (T) Arrow: Magnet Surface: Magnetic flux density norm (T) **▲** 21 **A** 20 19 ▼ 8.4502×10 1.5 2.5 Contour: Magnetic flux density norm (T) Arrow: Magnetic flux density Surface: Magnetic flux density norm (T) **A** 21 **A** 20 20 2.5 20 19 18 17 16 1 15 1.5 15 14 1 13 12 11 0.5 10 10 9 0 t 1 -0.5 1 -12 -1.5 ▼ 8.4502×10⁻⁸ ▼ 1 1.5 0.5 2

Magnetic Field, Hoop Strain, von Mises Stress & Energy of "Opt20T120cm3"

Field magnitude (color & contours) & direction (arrows); avg. field = 20 T over on-axis range -75 cm<z<0; energy = 3.22 GJ. Left: Resistive magnet and upstream eleven superconducting coils. Right: Resistive magnet and upstream three superconducting coils; peak field seen by superconductor ≈ 16.8 T, in superconducting coil #2.

1

0

On-Axis Field Profile of Target Magnet "Opt20T120cm3%"



On-axis field of magnets: resistive (red), superconducting (blue), combined (magneta) & desired profile (black). Field inhomogeneity = 3% peak-to-peak; B(z) = 20.2 T at & $z \approx 37.5$ cm; B(z) = 19.6 T at z = -75 cm & 0.



Von Mises stress, σ_{vM} ; maximum σ_{vM} = 448 MPa, in superconducting coil #2.



Right: Hoop strain ϵ_{phi} ; maximum ϵ_{phi} = 0.374%, in superconducting coil #2.