Status and Plans for New Modeling of Backgrounds

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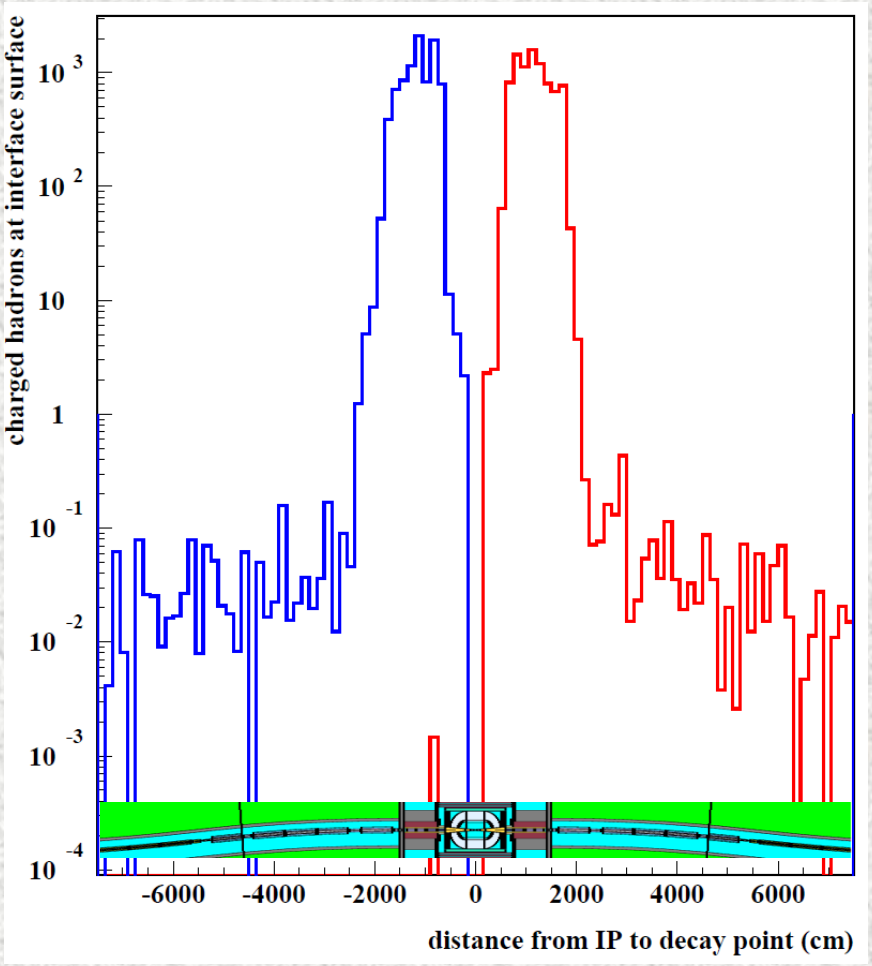
MDI Plans (Telluride, June 2011)

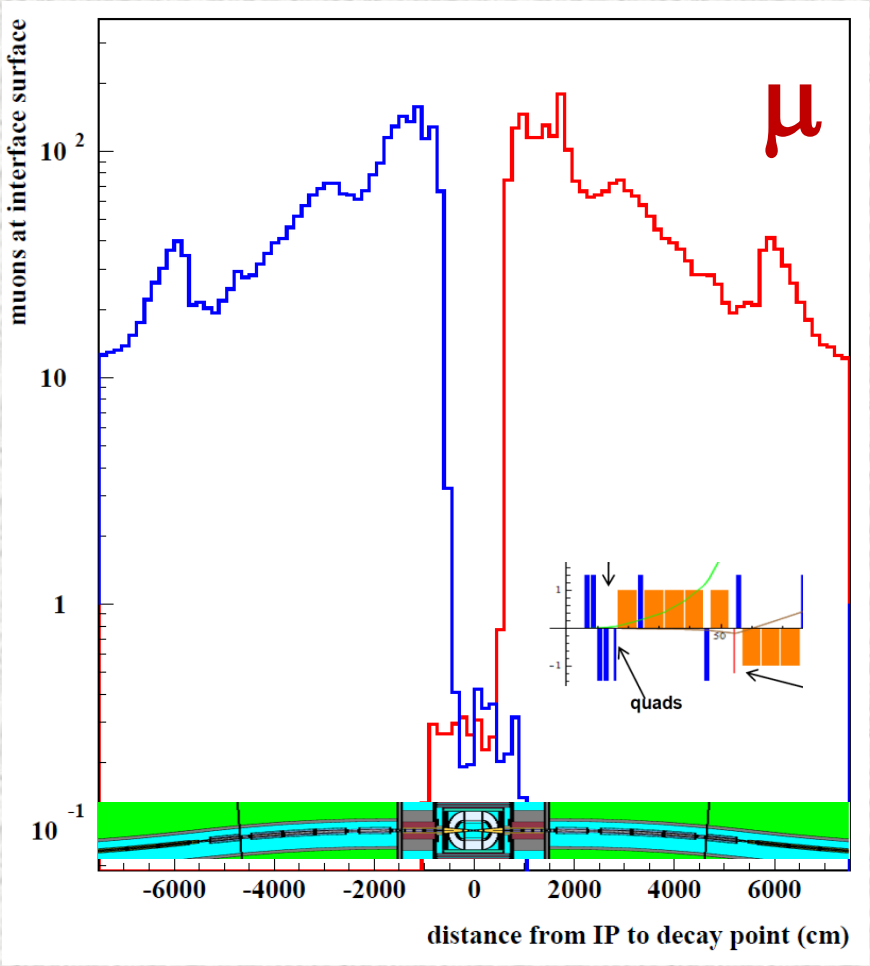
- Generate new $\sqrt{S}$ = 1.5 TeV source term files with
  - ➢ new mask/liner/spacer configuration at ±200 m

    Model is up and running **but decided to change magnet design** (!)
  - ➢ updated MARS15 with no weight variation for low-energy n, γ and e
  - ➢ E_{th} = 0.001 eV (n), 1-100 keV (ch.h. & μ) and 1 keV (e & γ)*
  - ➢ 1 to 10 full bunch crossings (???)
- Same for $\sqrt{S}$ =3 TeV lattice* to be released by Y. Alexahin
- In detector response modeling focus on time gating in tracker and calorimeter and event reconstruction in presence of updated backgrounds

* Work in progress

Source Tagging

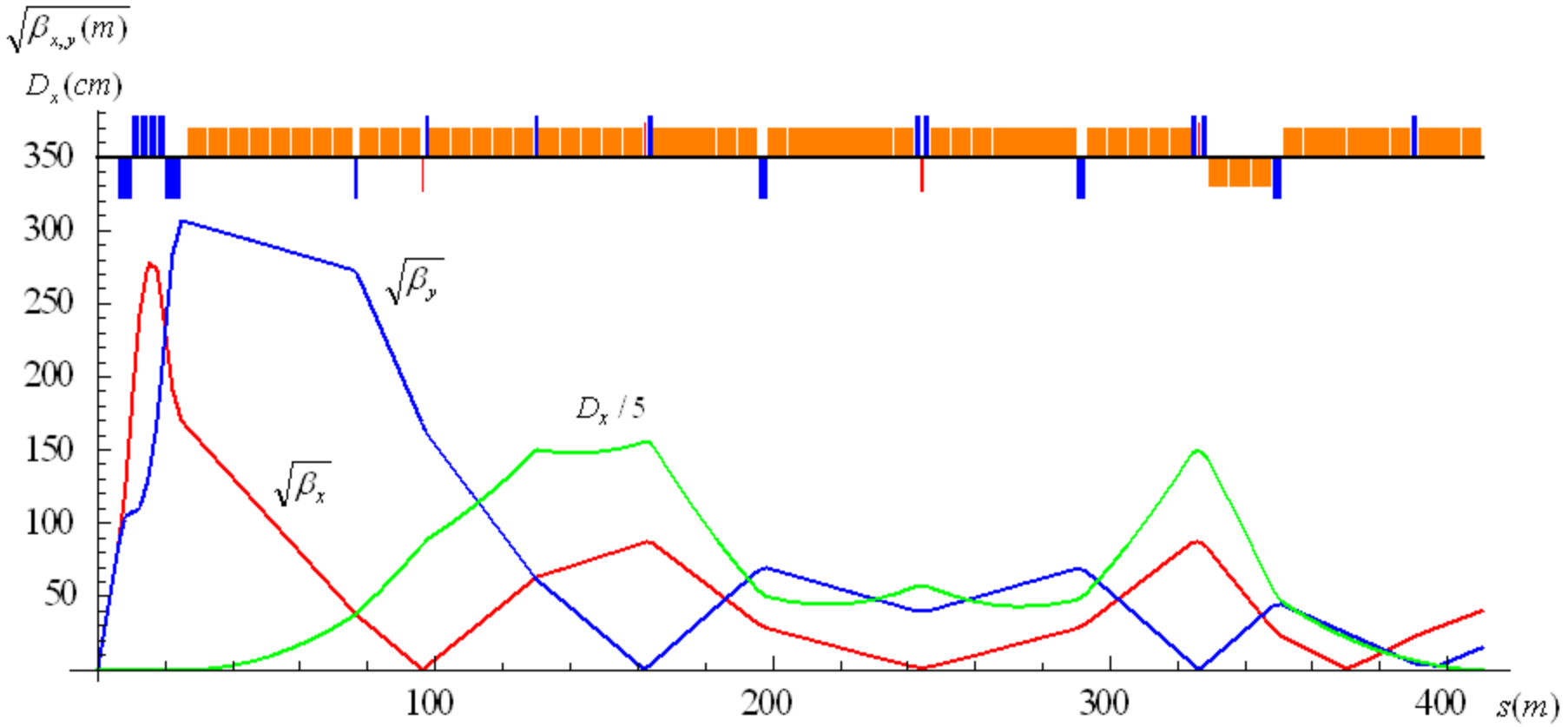




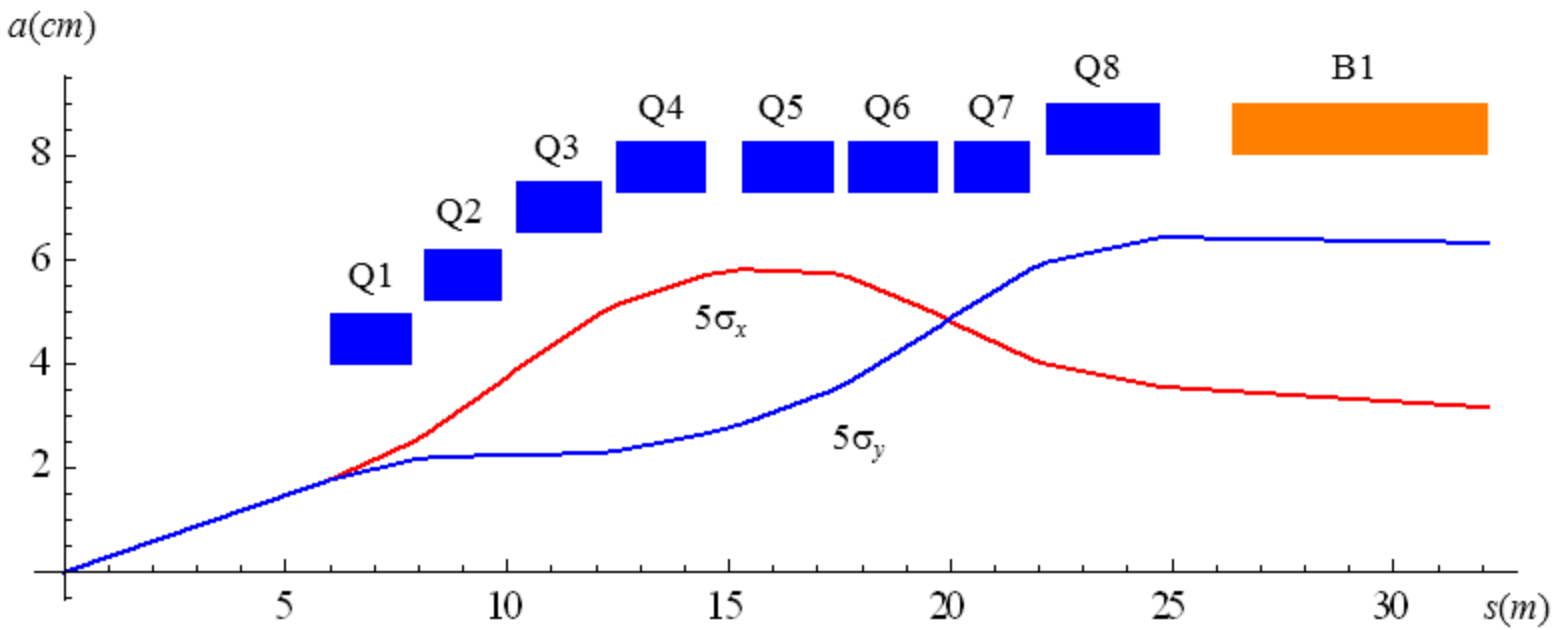
Muon source: |S| < 200 m from IP

other particle source: |S| < 30 m from IP

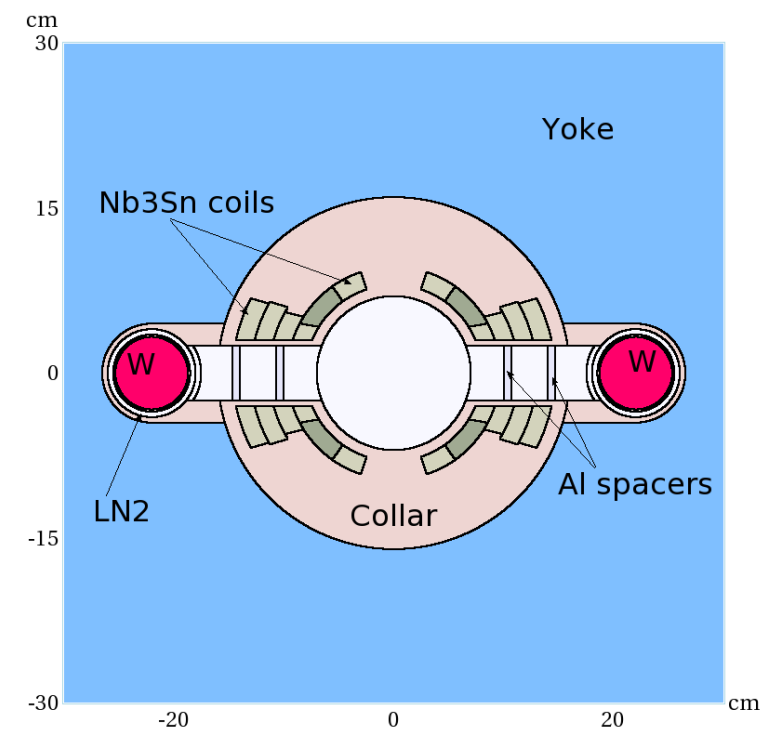
New 3-TeV Lattice By Y. Alexahin

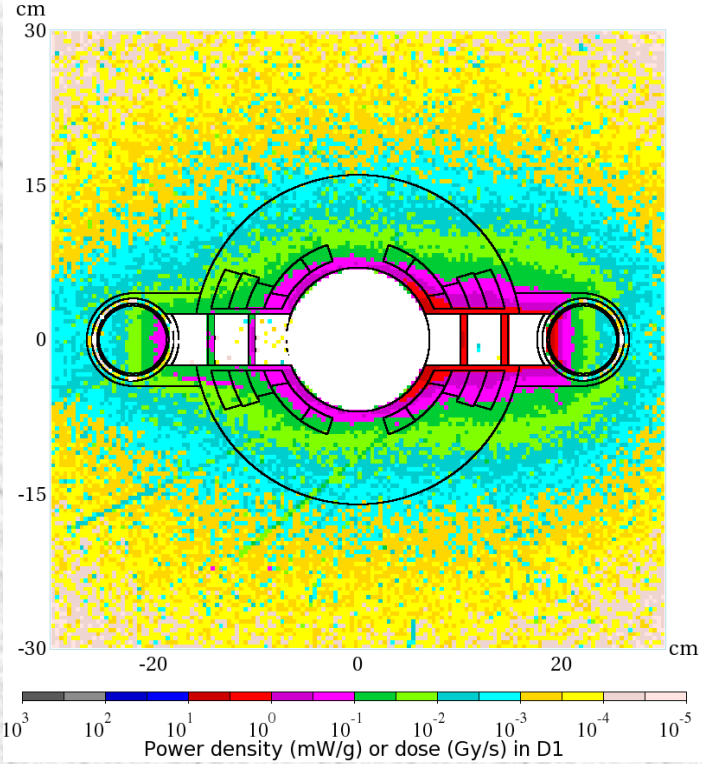


Details in the 30-m region



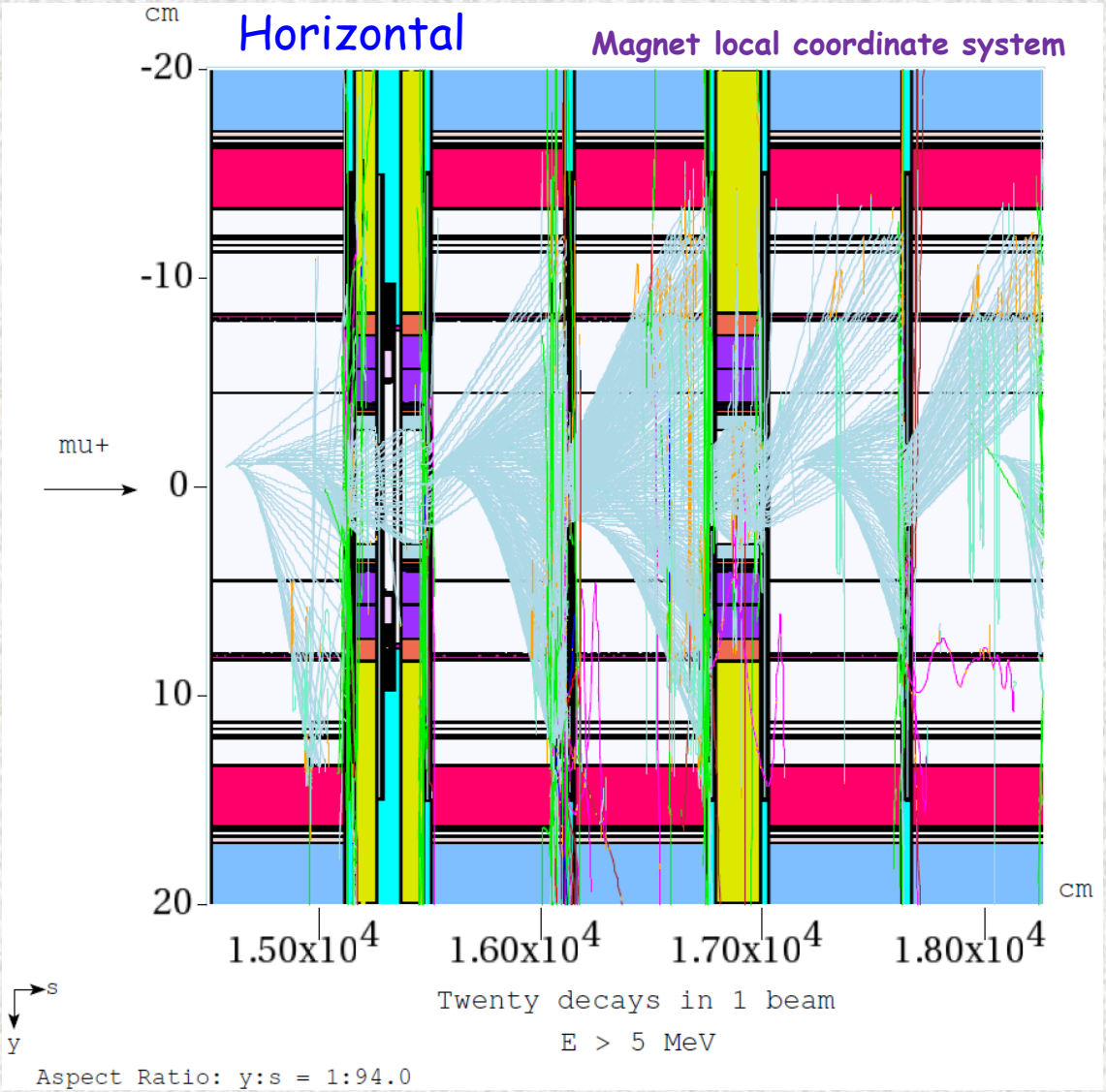
Energy Deposition in IR Dipoles





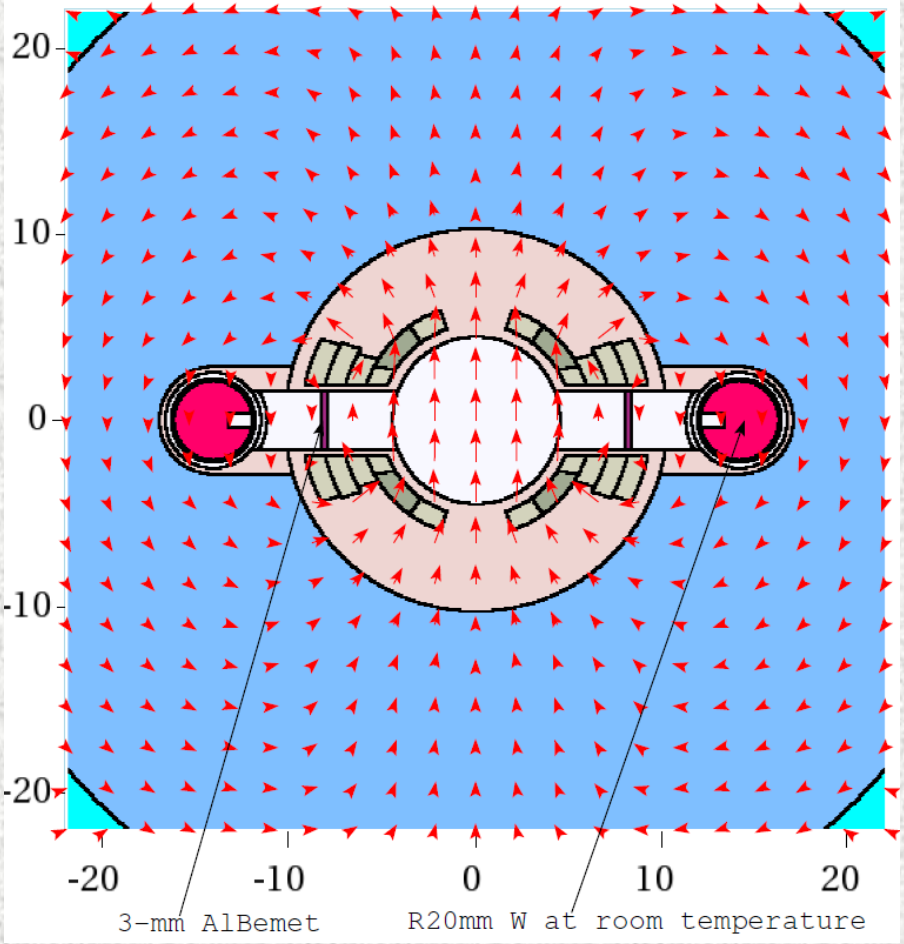
Dynamic heat load: 200 W/m in W-rods, and 245 W/m in cold mass

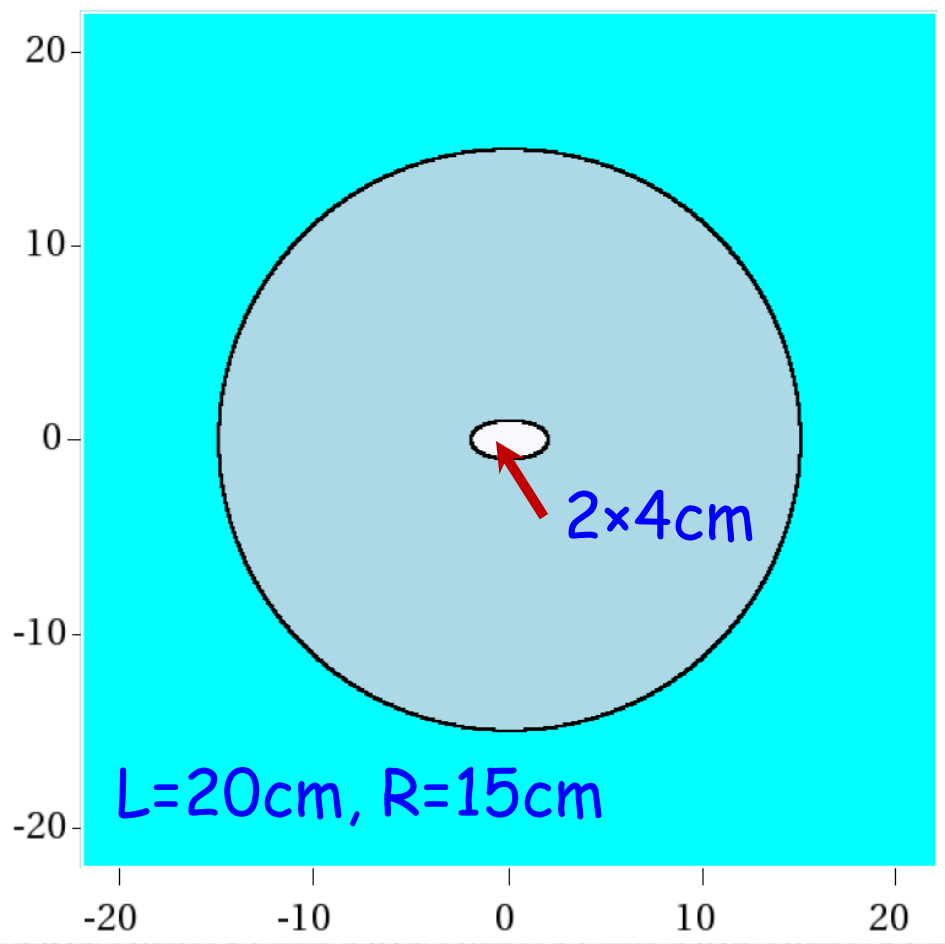
μ^+ Beam Decays



Ring outside

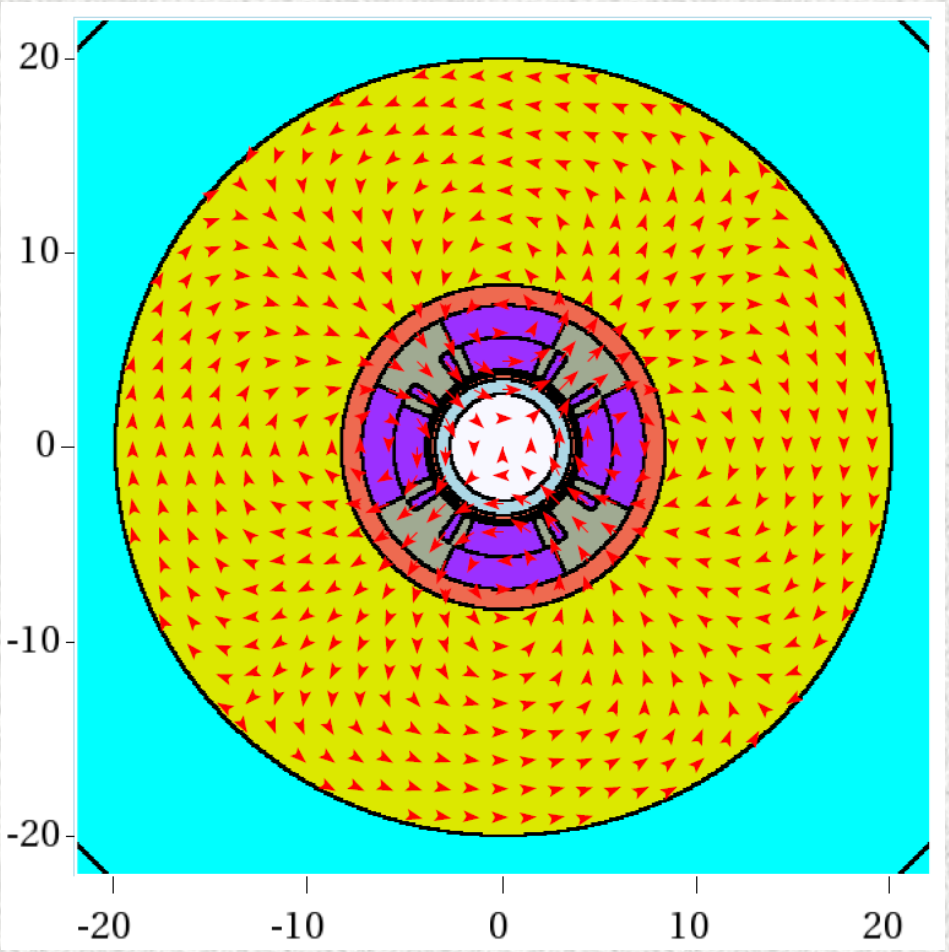
Dipole and Tungsten Mask

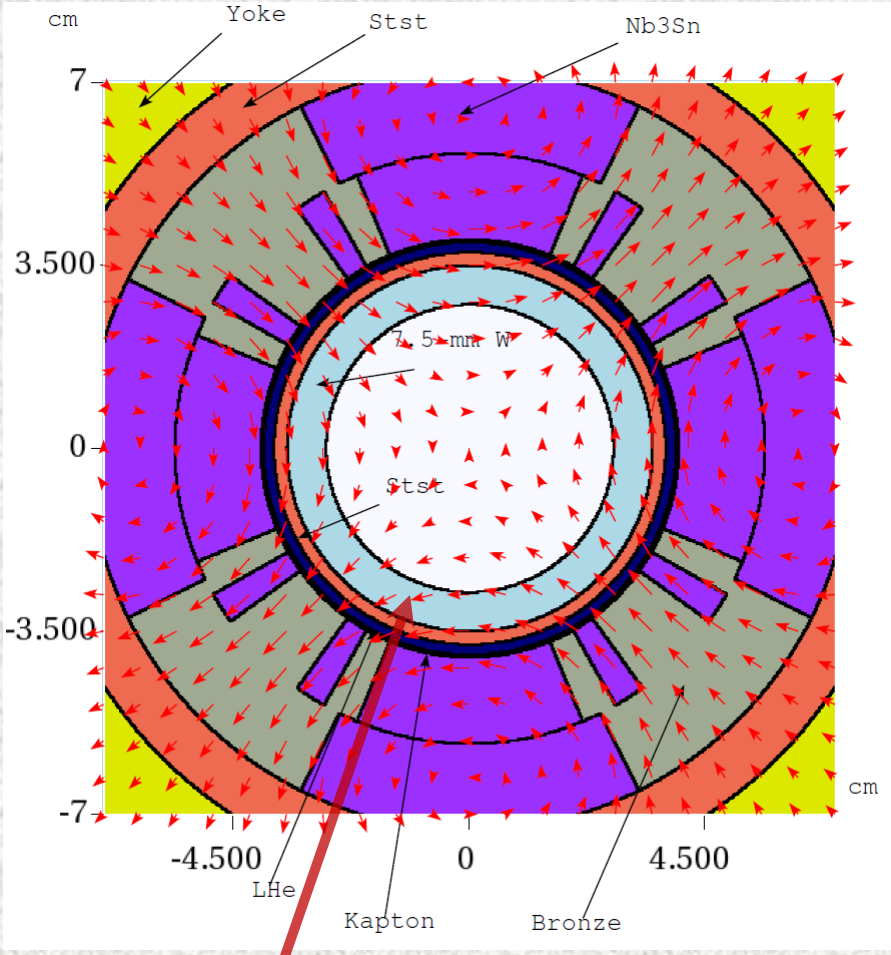




Albedo trap in water-cooled W-rods; two 3×30mm AlBemet spacers

Ring Quadrupole

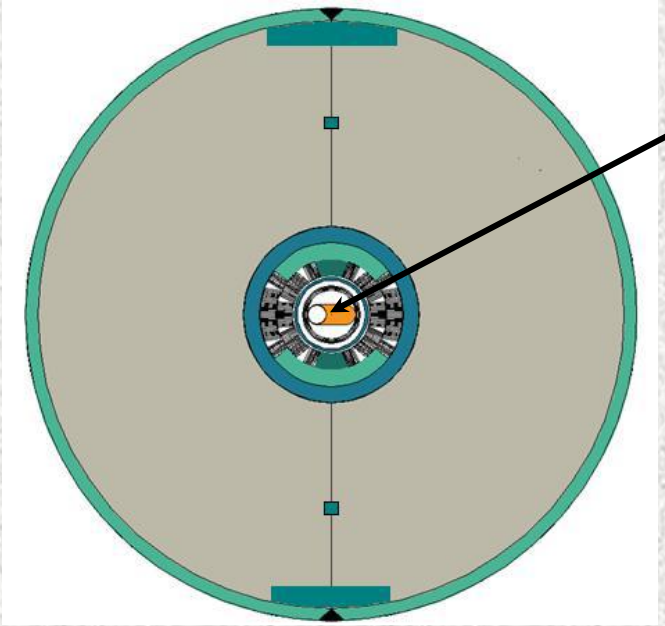




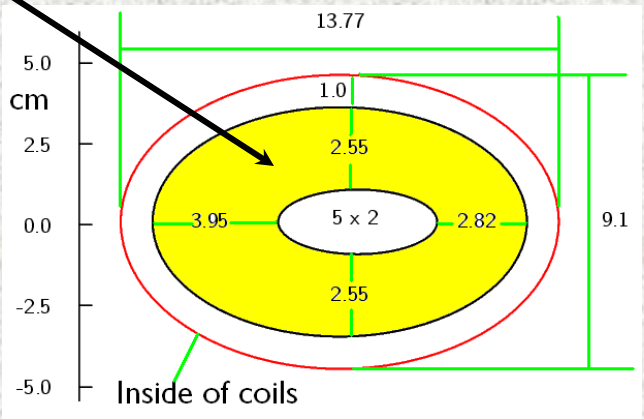
7.5-mm W liner

Cos-theta Dipole with Asymmetric Absorber

Field quality and stress problems in the open-midplane dipole are extremely difficult to mitigate. Dynamic heat loads are still too high. Therefore, switch to a classical Cos-theta large-aperture design with an asymmetric absorber inside

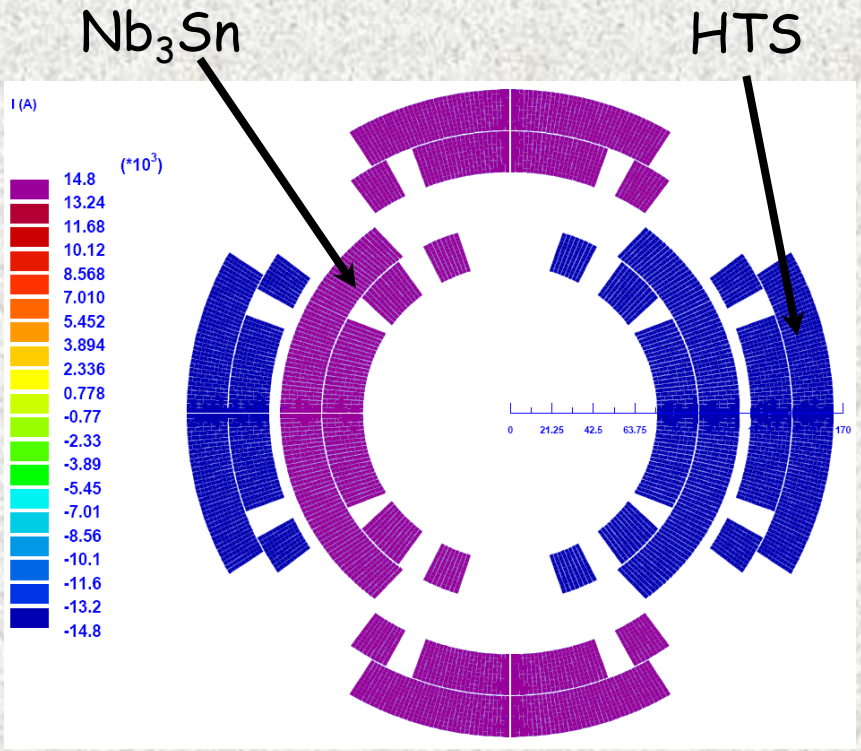


To be optimized

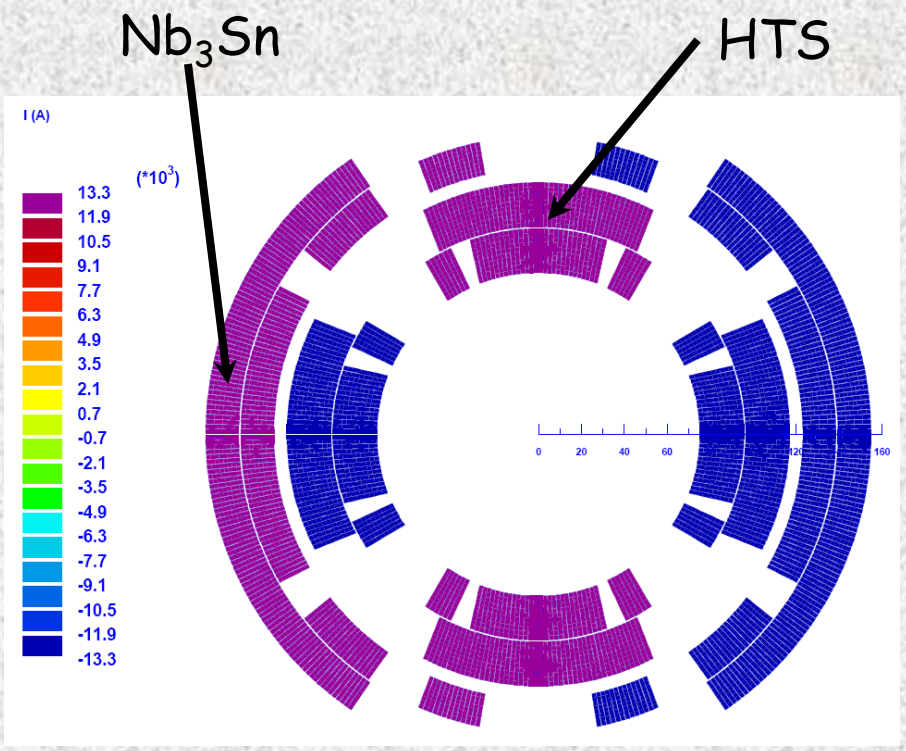


Expect background reduction!

Combined-Function IR Quadrupoles



D_{bore} = 150 mm, B_q = 9.9 T, G_q = 70.1 T/m



D_{bore} = 150 mm, B_q = 10.3 T, G_q = 89.8 T/m

2-T dipole field to facilitate chromaticity correction and dilute decay electron fluxes on the detector with large aperture to accommodate tungsten absorber

Expect background reduction!

MDI Plans

- Arrive at consistent cos-theta designs for IR dipoles and combined-function quadrupoles (mid-January 2012).
- Implement them in MARS model, perform test runs and first optimizations of inner absorbers and masks (mid-February).
- Complete implementation in MARS of new low-energy (1-keV) electromagnetic physics modules (02/01/12).
- Test MARS runs for backgrounds at the MDI interface (late February).
- Agree on a "full-bunch" model and launch production runs with first results by mid-March.
- 3-TeV activity in parallel, with first results a couple of months later.