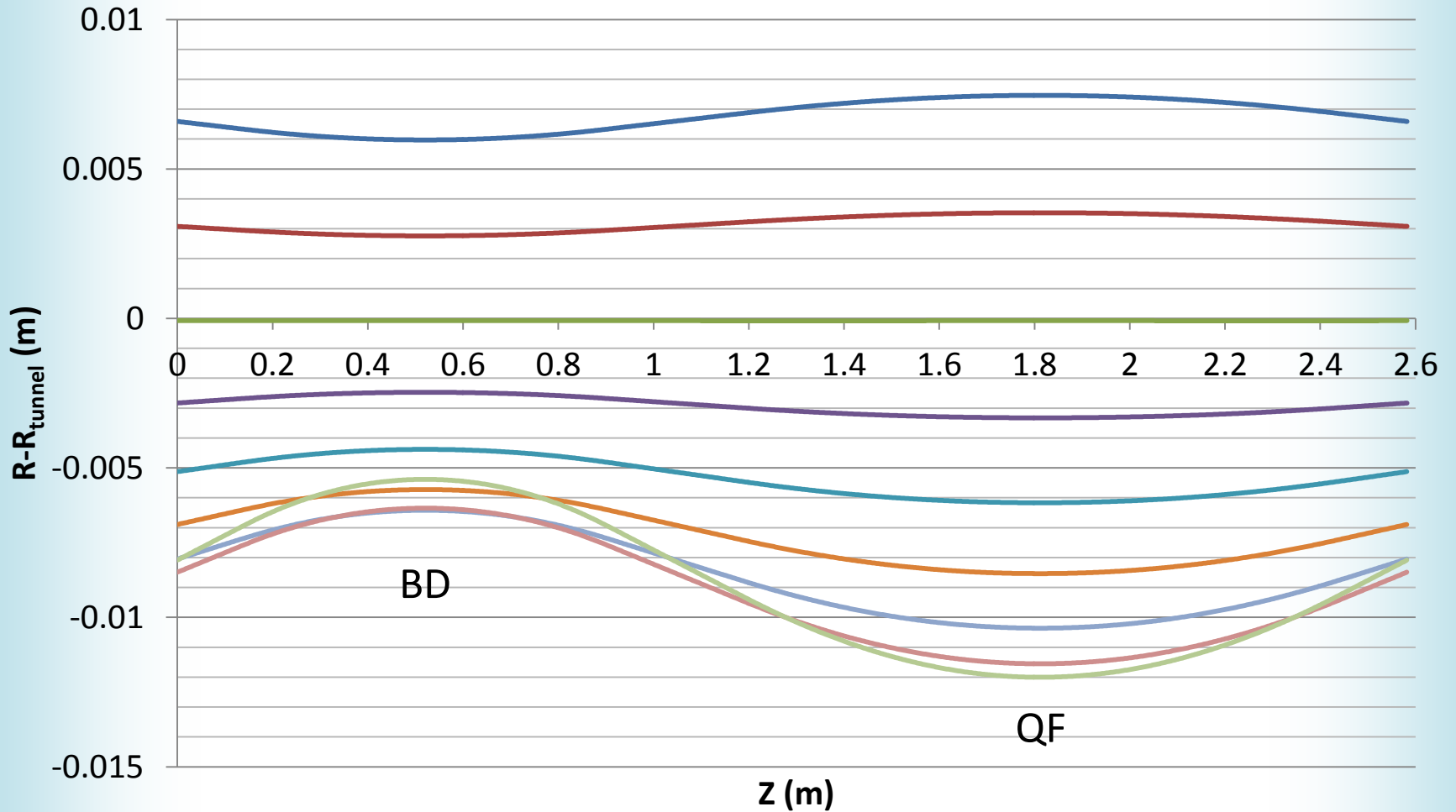


Discussion on eRHIC 10GeV Septums (four of them?)

Introduction

- eRHIC's ERL design nearly eliminates injection and extraction components entirely
- The 10GeV beam needs to be separated to go through the detector(s) with $\frac{1}{2}$ RF path length difference (about 36cm)
- Luckily* we don't need a kicker, just a septum
 - * see neutrino factory FFAGs
- Beam separation to next turn is 3-4mm

eRHIC Main FFAG Arc Cell in Tunnel Coordinates



— 10000MeV
 — 9092MeV
 — 8184MeV
 — 7276MeV
 — 6368MeV
— 5460MeV
 — 4552MeV
 — 3644MeV
 — 2736MeV

Problems

- The synchrotron radiation always comes out on the high-energy side in the current lattice
 - That's where we want to put an iron septum plate
- Any stray field is nonlinear and uncorrectable except in splitters (error will go around ring)
- Our periods are short (magnets 1.25, 0.75m) so septum would hit two or more magnets
 - 10GeV, 0.3T \rightarrow 111.2m radius \rightarrow Δx 11.2cm in 5m

Beam parameters: 305.1 ns
Beam parameters: 0.000% Otherwise lost: 100.00% Wrong way: 0.00%

eRHIC
Autosave to 4m00s

Results database: 6 e

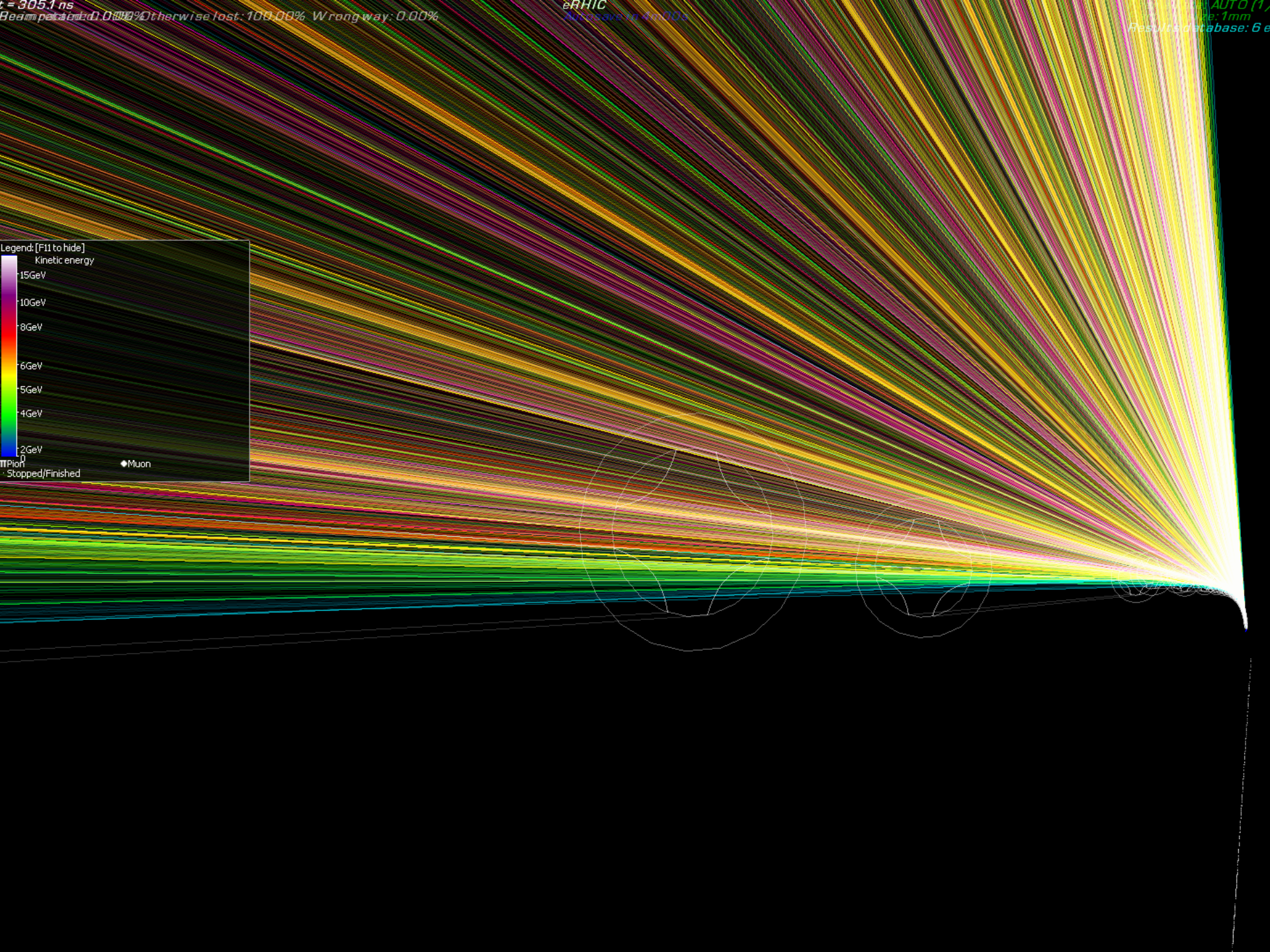
Legend: [F11 to hide]

Kinetic energy

- 15GeV
- 10GeV
- 8GeV
- 6GeV
- 5GeV
- 4GeV
- 2GeV

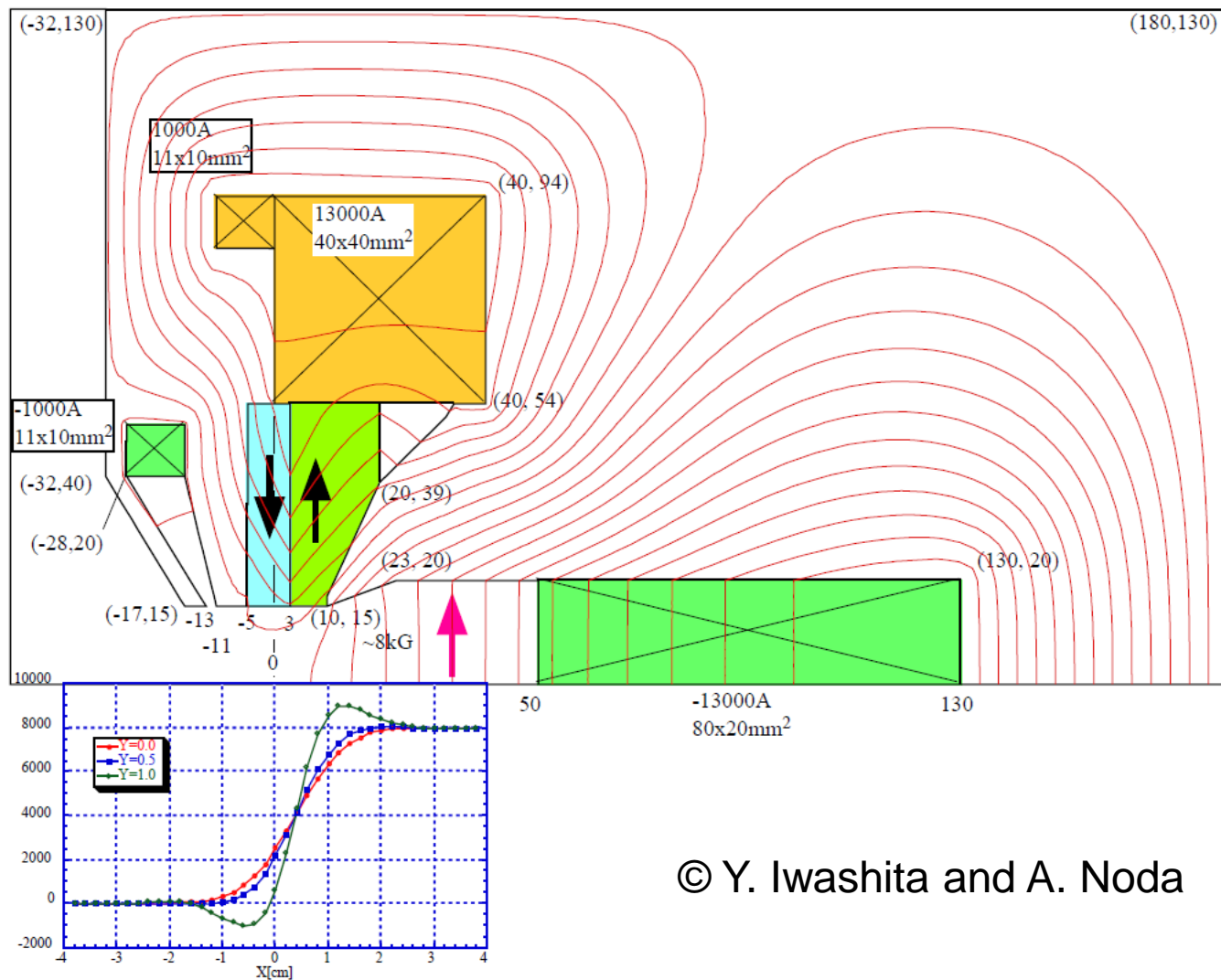
Stopped/Finished

◆ Muon



Options

- Brute force, conventional septum with (water?) cooled iron plate
- Septum with slot in iron plate for radiation
- “Massless” septum with bucking coils etc.
 - Y. Iwashita and A. Noda, Proc. EPAC 1998
- Create oscillations in 10GeV orbit optically and
 - One of the horizontally open septums above...
 - Or take it out on the **inner** side with no radiation?



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Figure 3: Hybrid Massless Septum Magnet