

# A short update on the RFOFO Helix (formerly known as the “Guggenheim”)

Amit Klier, UC Riverside



A Reminder:



# Why ~~“Guggenheim”~~ Helix?

- Injection/extraction – not a problem!
- Unlimited bunch train length
- Less heating in the absorbers
- Tapering → more efficient cooling, cheaper(?)

BUT –

- massive, expensive (many RF cavities)
- Magnetic shielding of some sort is needed

# What's been done so far

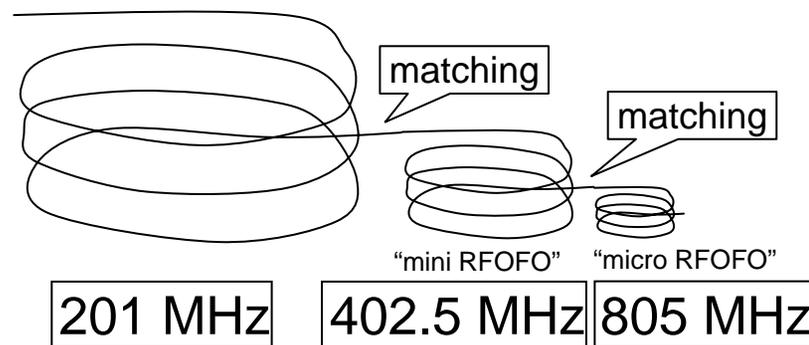
- Turning the ring into helix was simulated with geometric manipulations of field map (not necessarily realistic/Maxwellian)
- Some “shielding” simulations
  - Conclusion – no need to worry too much
- Preliminary “tapering” studies
  - From 200 to 400 to 800 MHz **rings**
  - Same geometry as original, smaller sizes

# What's new

- Unfortunately, not much since the NFMCC meeting last month
- Still, no actual helix simulation
- Continued “tapering” work, with more realistic RFOFO rings (not helix yet)
  - “realistic” = windows

# “Tapering” studies (preliminary)

- Actually, it’s a 3-stage scheme:

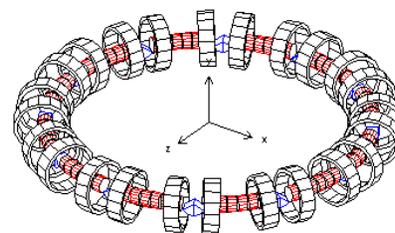
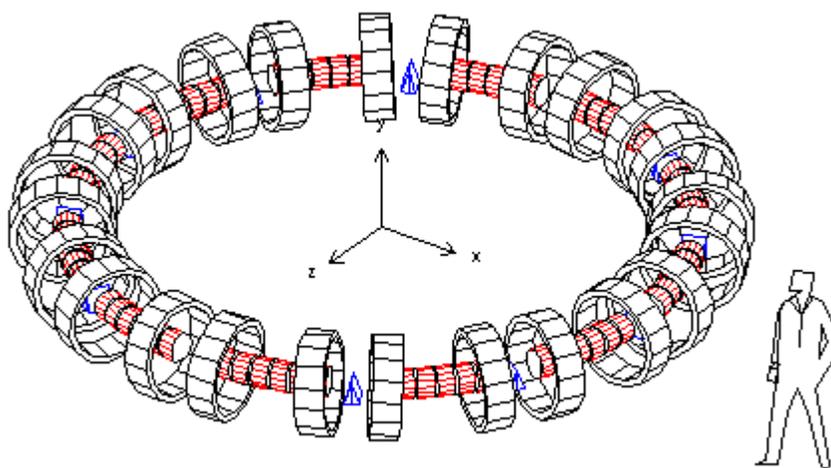


- The way I simulate (for now):
  - Use existing RFOFO (not “Guggenheim”) field
  - Scale geometry (1/2, 1/4), field, RF frequency
  - RF Gradient scales by about 1.5 at each step

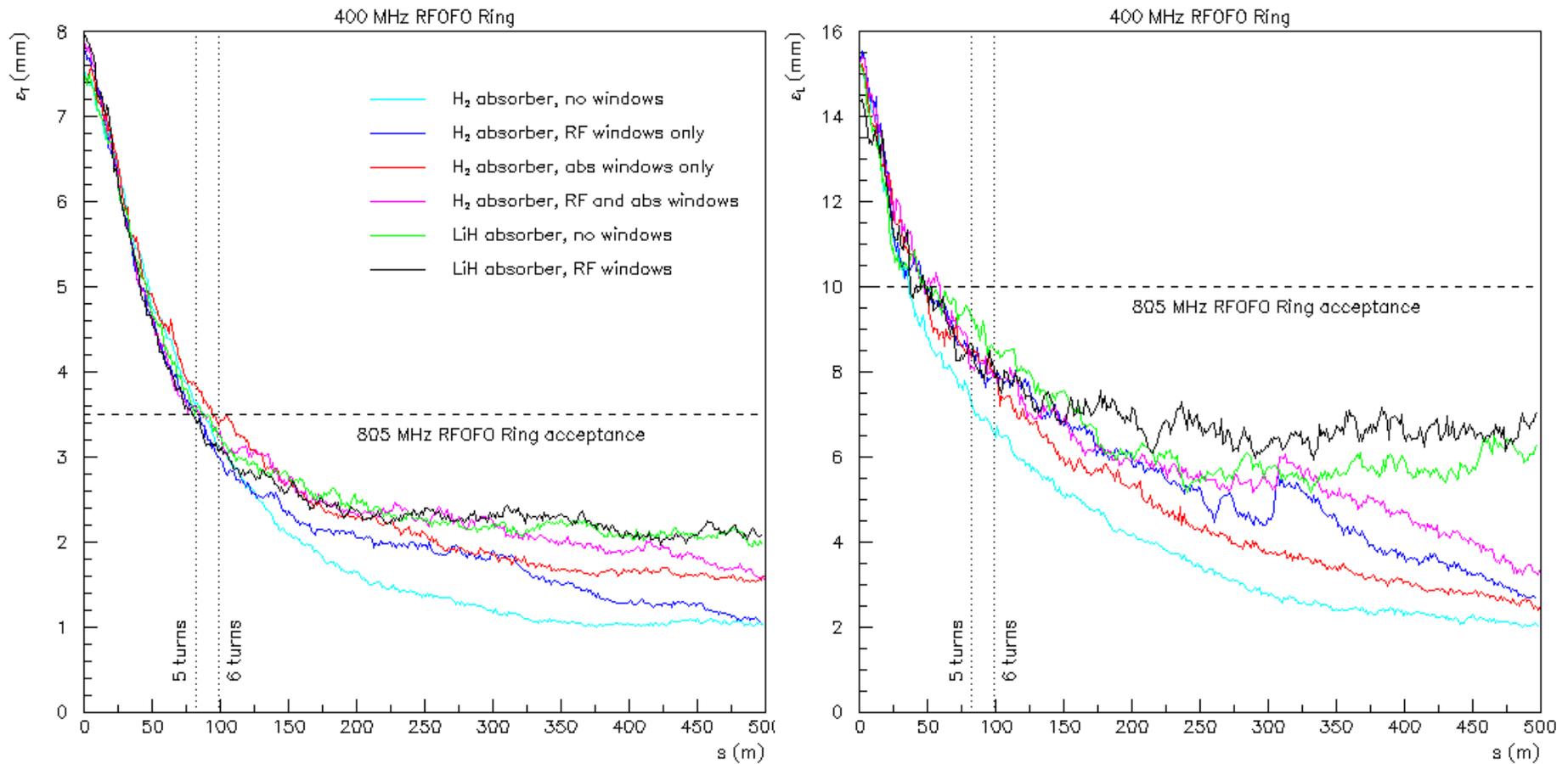
# Geometry

402.5 MHz ring

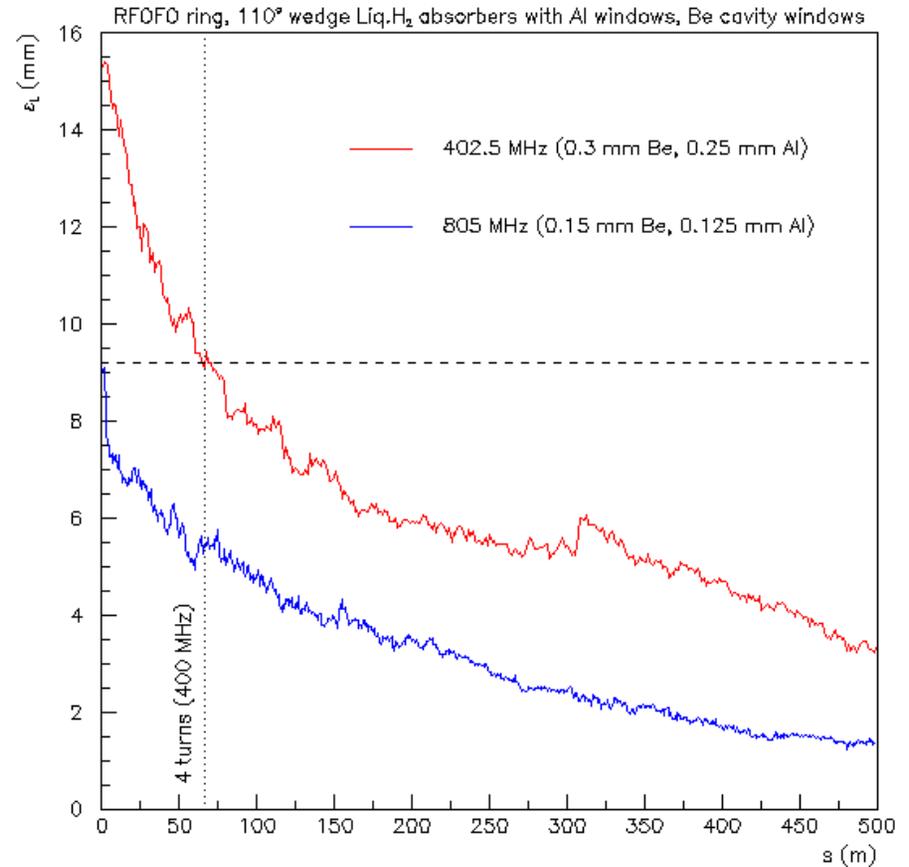
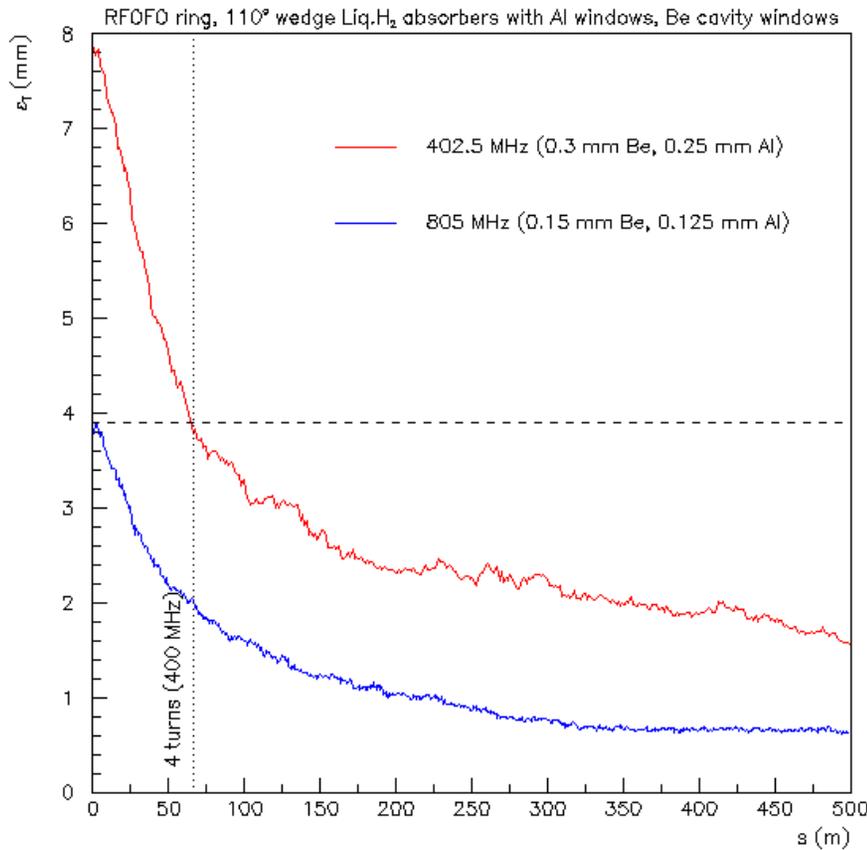
805 MHz ring



# Results shown at NFMCCM

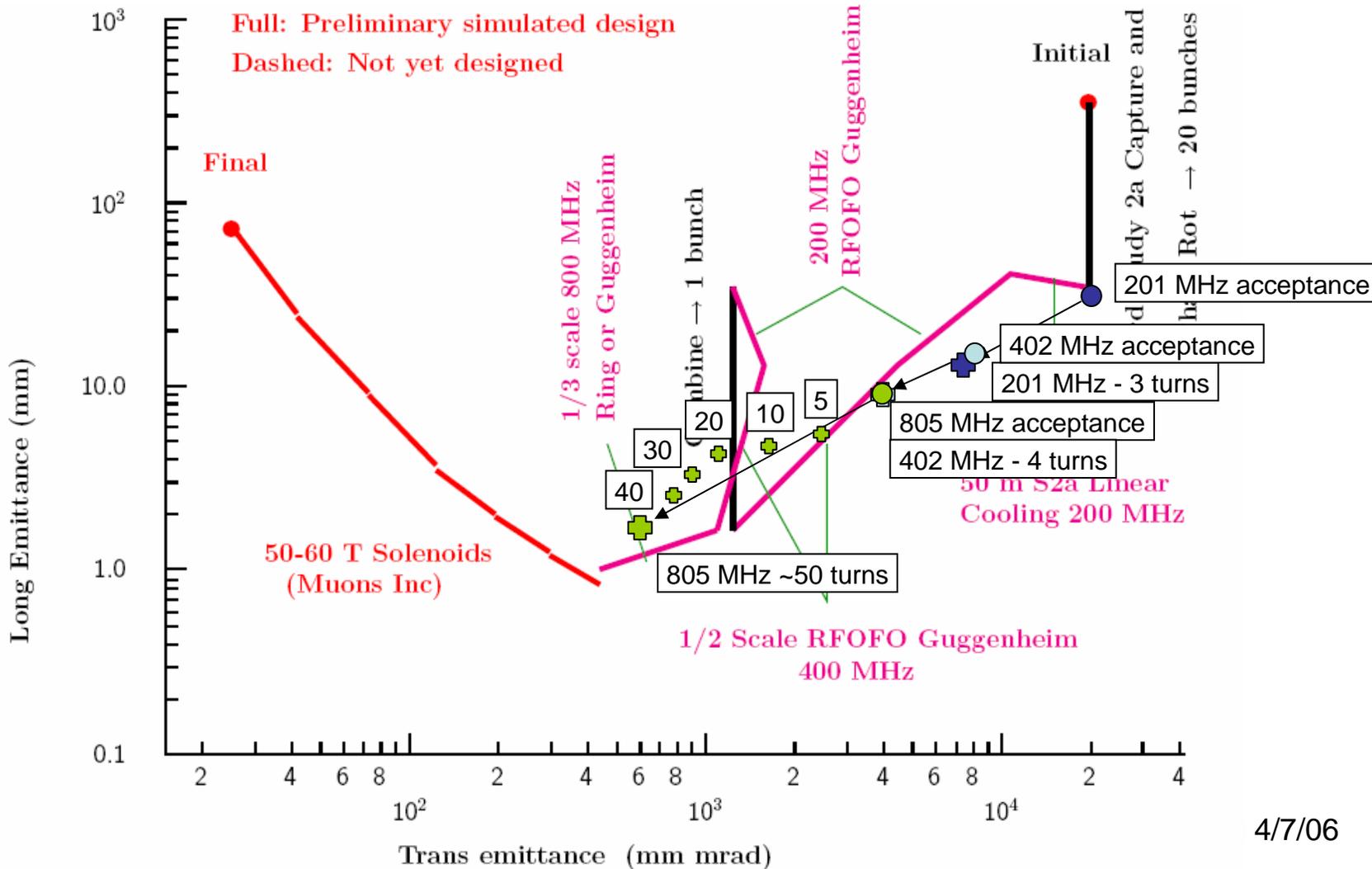


# New results – “realistic” only

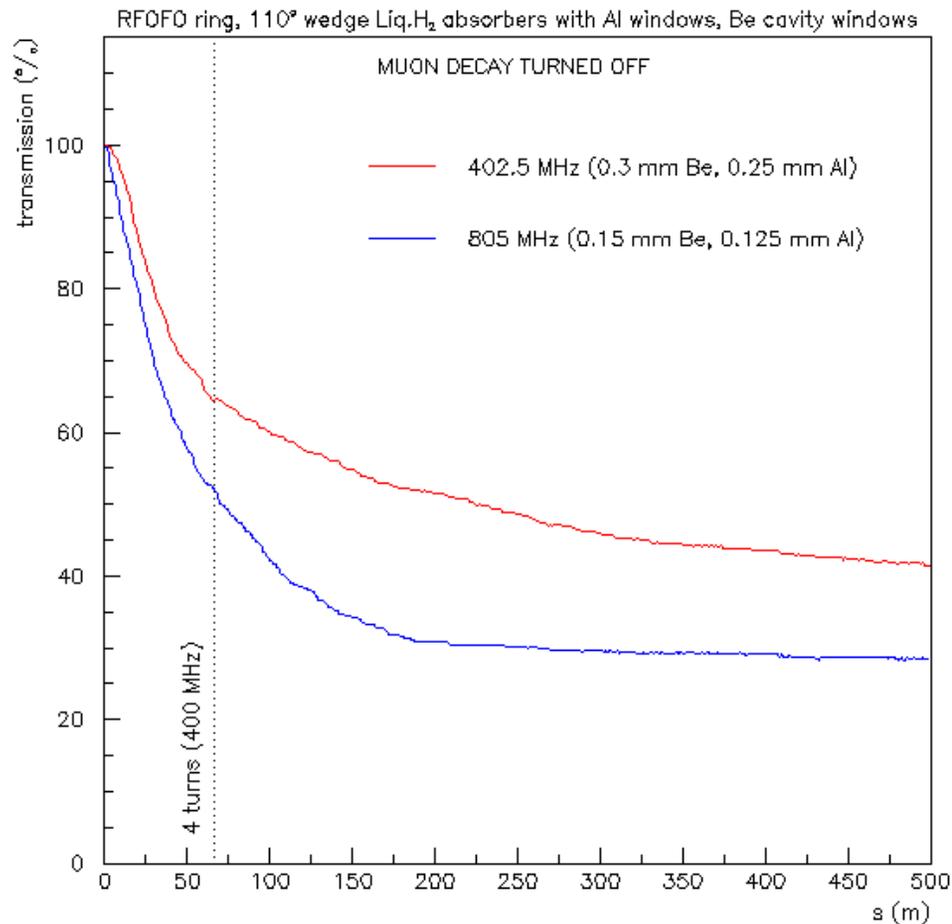


# Roadmap to muon collider

Bob Palmer's "grand scheme" (NFMCC meeting, 3/14/06)



# Transmission...



With LiH absorbers  
it's even worse.

# To do

- Simulate with helix instead of rings
  - need realistic fields (!!!)
- Other improvements
  - Absorber shape/material, magnet arrangement
    - Tilting the absorber changes  $\varepsilon_L/\varepsilon_T$  ratio
    - How about adding wedge absorbers between RF cavities #3 and #4 ?
  - Matching → complete cooling channel...
- Concerns, questions
  - Why are my acceptances different than Bob Palmer's?
  - Smallest ring could be too small, B too high (peak ~15T)
    - Geometry may need to change
  - **Losses**
    - **transmission ~15% (without decays!)**