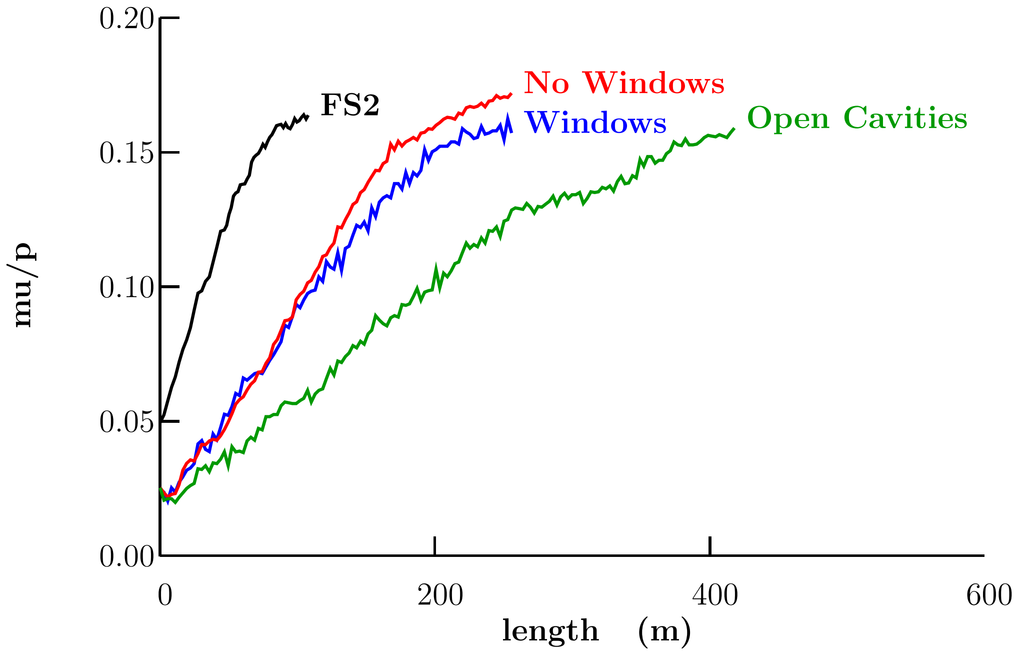
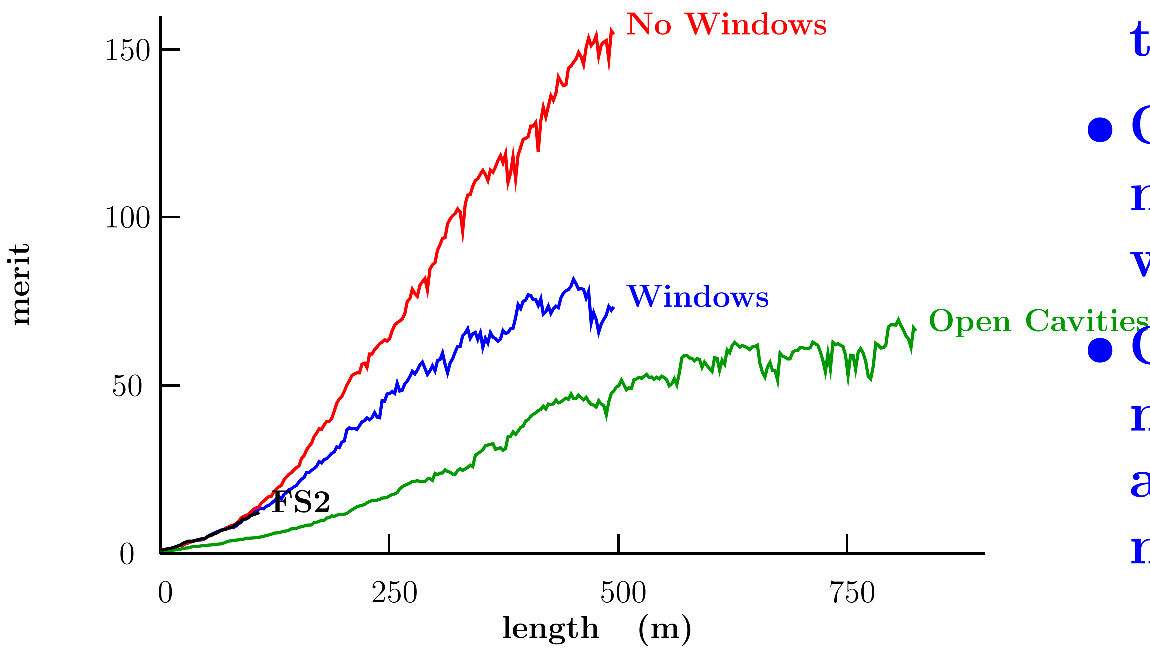
Cooling Rings

Assumptions

1. Input: as in Study 2, but compresed in time to fit ring
2. RFOFO Ring as described in MC Note (Maxwellian but not quite realistic)
3. 100 degree wedge with apex at 12 cm from axis
4. Absorber windows 125 micron of Albemet
5. RF Windows 50 micron Be (assuming 70 degree operation)
6. 6×33 cm cells 12 MV/m with windows
7. 3×66 cm cells at 10 MV/m for open cavities



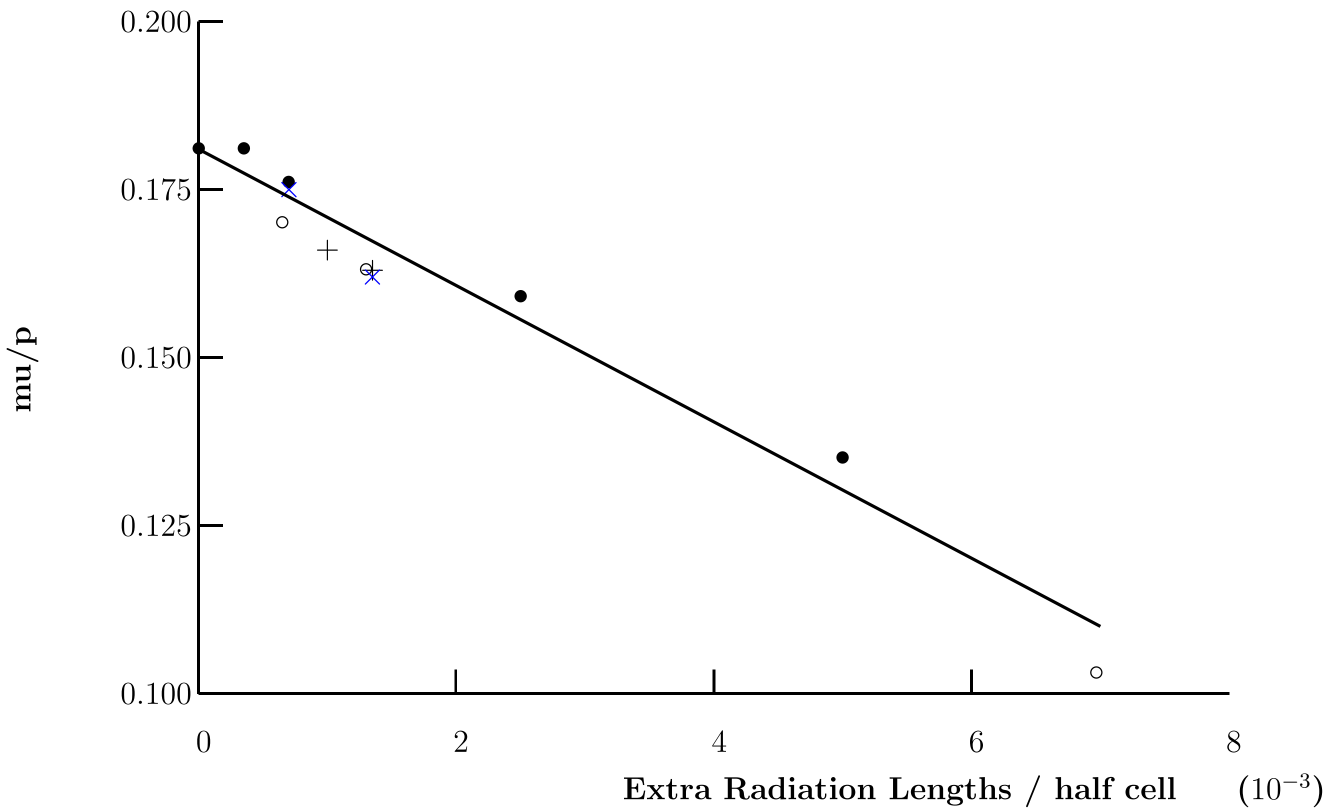


FS2 into 150 mm Long Acceptance
Ring into 35 mm Long Acceptance

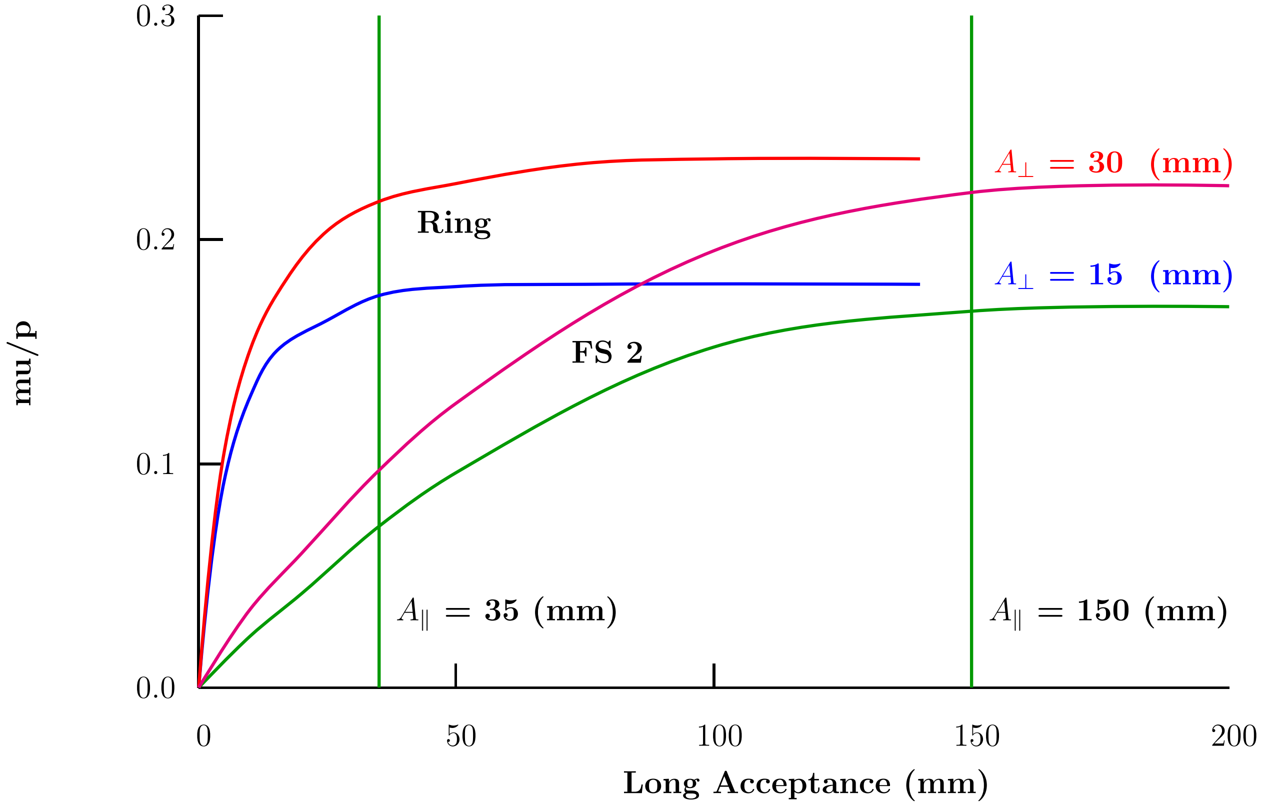
- mu/p Insensitive to windows
- even though Merit is very sensitive
- Mu/p maximum after fewer turns than Merit maximum
- Open cavity has same performance as closed with 50 micron windows
- Open Cavity has better performance than 350 micron windows at room temperature, but needs more RF power

Merit and mu/p vs Radiation Lengths

- **Other absorber and rf window thicknesses tried**
- **Good correlation between Total Radiation Length and mu/p**
- **Table of examples in the works**



- Ring Final Trans Emittance: Ring = FS2
- For 150 mm Long Acceptance: Performance of Ring = FS2
- But Final Ring Long Emittance << FS2
- So Long Acceptance can be reduced: 150 → 35 mm



Absorber Heating Calculations

- **Max Merit requires 20 turns**
- **But Max mu/p reached after 8 turns**
- **Use FS2 Bunch parameters**

  6 bunches with 20 ms separation at 2.5 Hz for 1 MW
  continuous bunches with 33 ms separation fo 4 MW

Driver Power	MW	1	4
Protons/bunch	10^{13}	1.7	3.4
Bunches/sec	s^{-1}	6×2.5	30
Ave. Muons/Proton		0.27	0.27
Muons/bunch	10^{12}	4.6	9.2
Absorber Length	cm	28.6	28.6
Turns in Ring		8	8
Energy Deposited/Bunch	J	94	189
Ave. Beam Radius	cm	4	4
Temp Rise/Bunch	Deg	0.21	0.42
Temp Rise/train of 6	Deg	1.26	-
Ave Power Disipated/Absorber	kW	1.42	5.67
Flow for Δt=2 deg	litres/sec	1.45	5.8
Vel in 5 cm pipe	m/s	0.74	2.95