



To Cool, or not to Cool

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Subjects I will discuss

1. For fixed ν flux: cooling vs aperture
2. For fixed ν events: cooling vs detector

WARNING THIS REPORT HAS ERRORS

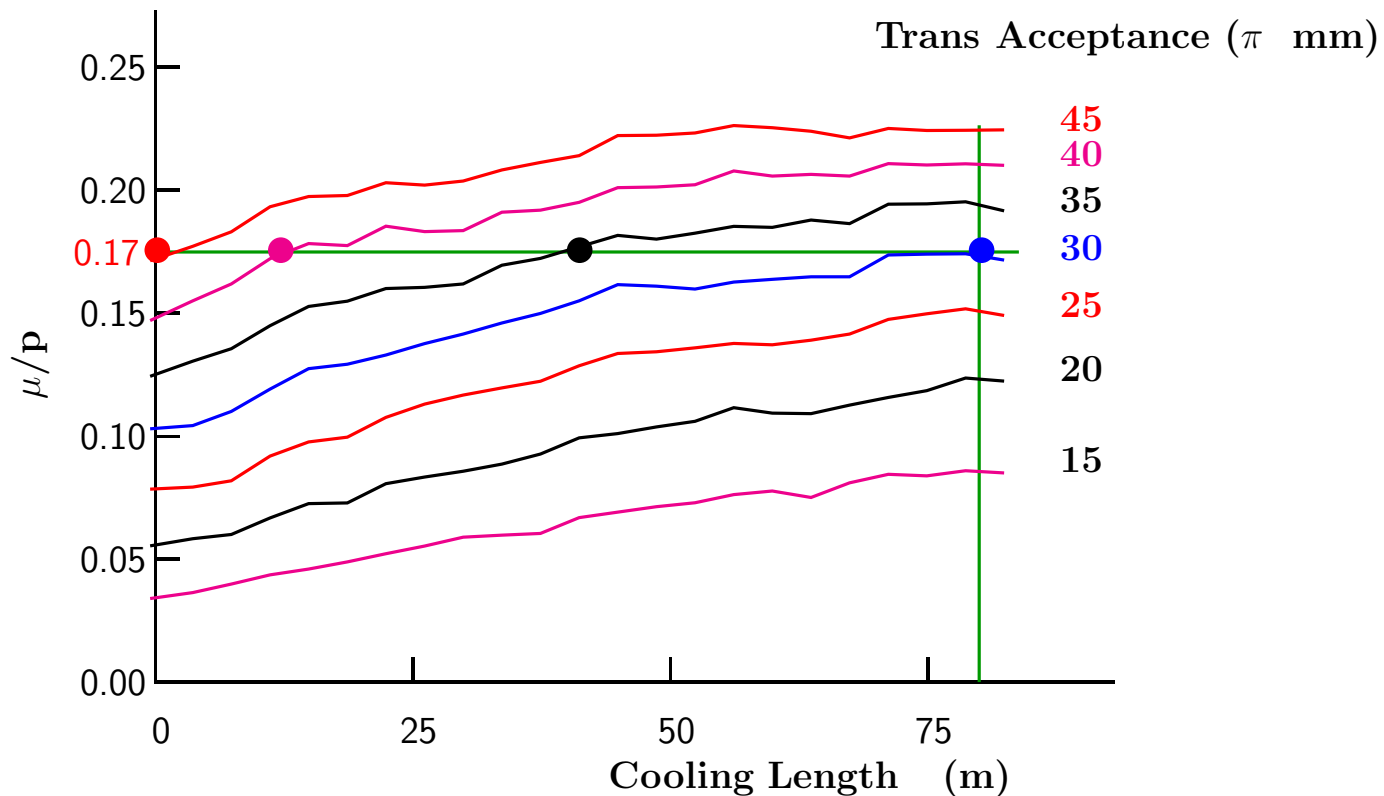
John Cobb and Marco are trying to do it right

Optimized Cooling

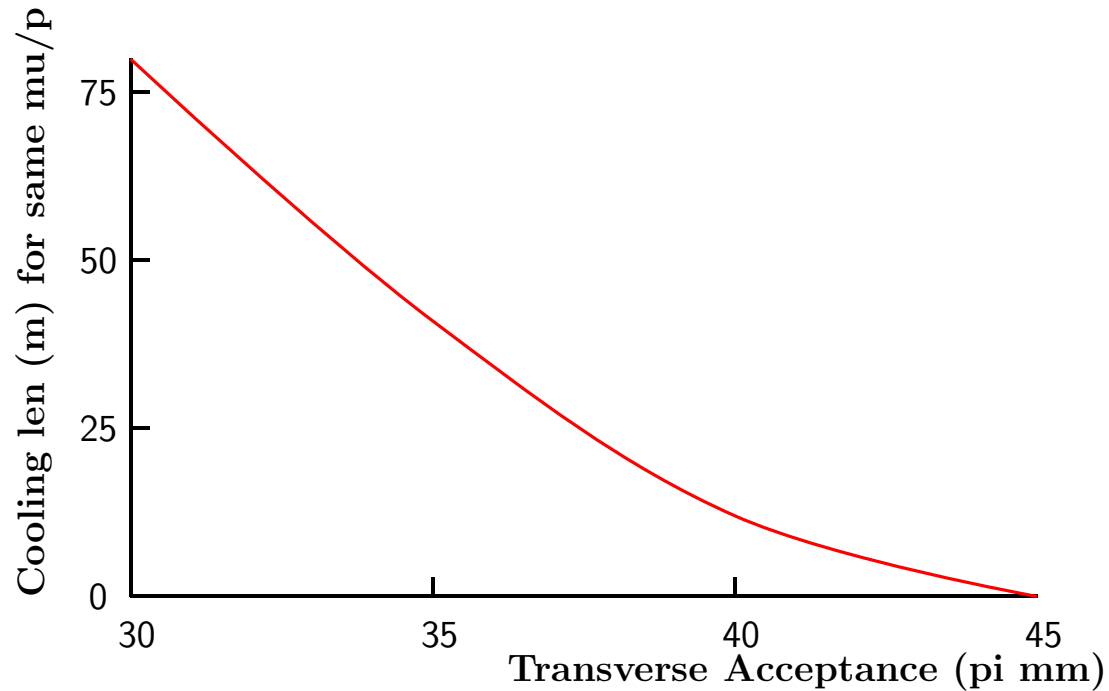
• Cooling vs Accelerator Acceptance

- Using US Study 2a (APS Neutrino Matrix) as example
- Use ICOOL for performance simulation

Muons per proton for different Cooling length and acceleration Acceptances



- Cooling needed for same 0.17 Muons per proton vs Acceleration aperture

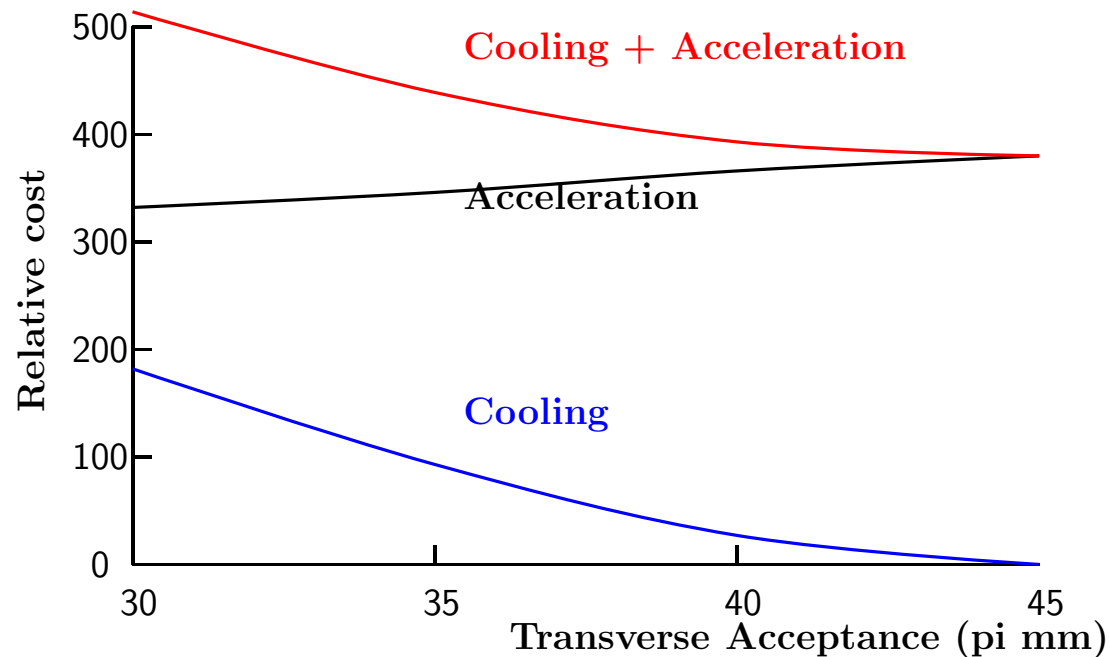


- Estimating Costs

- Hard
- Mostly scale from study 2
- Needs much more work

- (Acc + Cooling) Costs for same μ/p vs. acceptances

- Accelerator costs for two FFAG's from Berg
- Linac and RLA costs scaled from relative FFAG costs

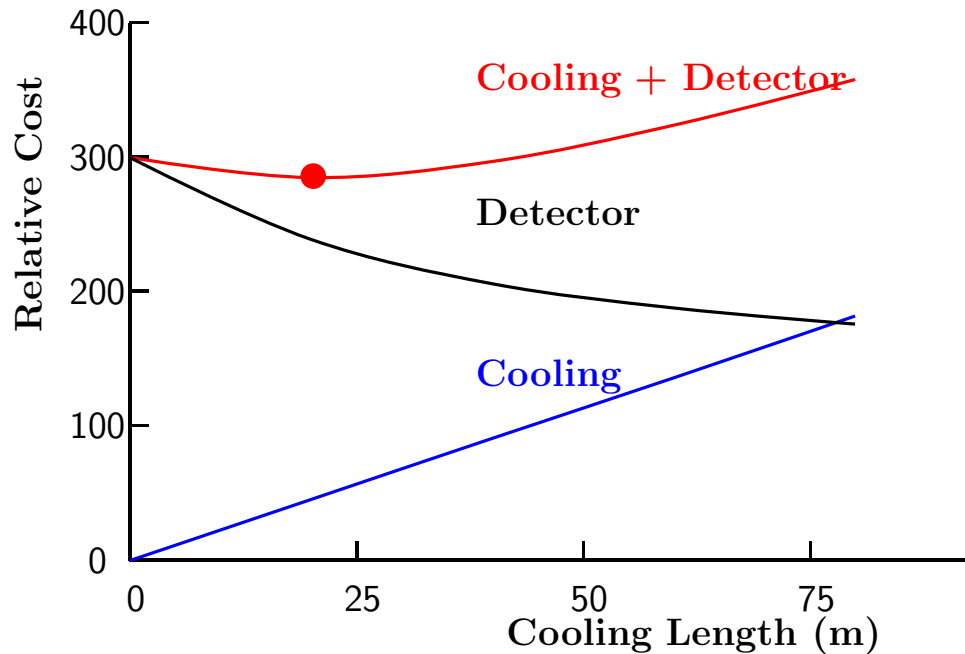


- Minimum cost appears to be with NO cooling
- Not known if lower energy > 30 pi mm accelerations are practical
- Certainly their costs are not really known
- But the case for cooling is not obvious

• Cooling vs Detector Size

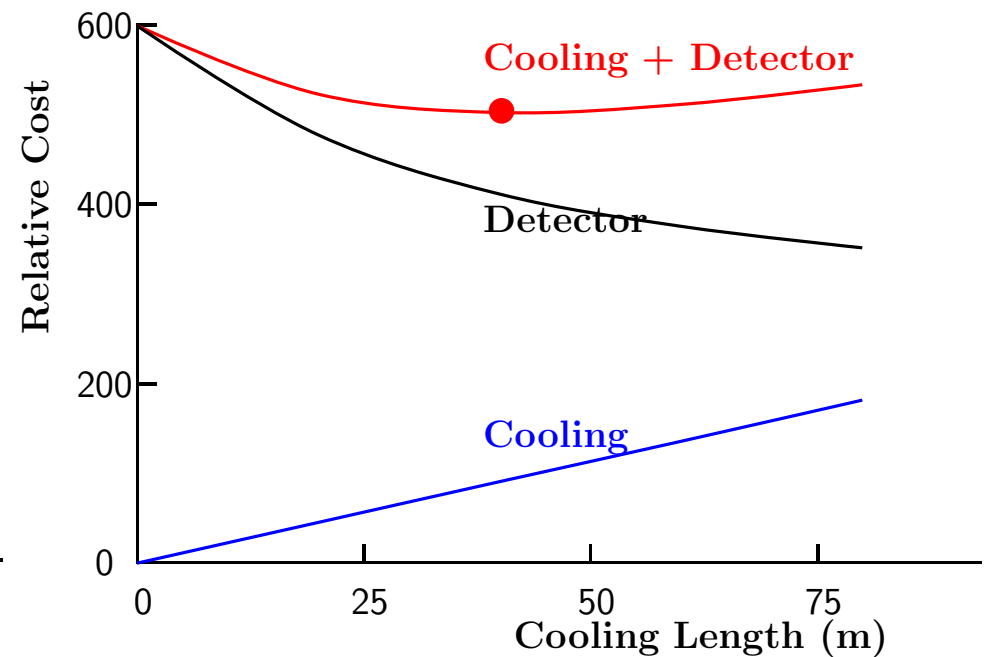
- Pick base detector cost in very approximate unloaded M\$
- Scale detector size (and cost) to achieve same number of events with different cooling lengths

For 300 M\$ base detector cost



≈ 300 M\$ Detector (Blondel)

For 500M\$ Detector



≈ 500 M\$ Detector (Berg)

- Resulting minimum depends on chosen detector cost
- But minima are with relatively little cooling

- **Other advantages of minimal Cooling**

- Even if some cooling is included, its success is not essential
- Factory CDR can be produced before MICE completed

- **Advantages of using no cooling**

- Less R&D Required we have little time before Alain's "window"
- No field "flips"
- Reduced Requirement on capture acceptance
 - Smaller aperture phase rotation RF
 - Smaller or lower field focusing in drift
 - Lower Capture Field
- Less dependence on use of RF in magnetic fields
- **MICE still important for Muon Collider (Next)**