MUCOOL R&D

Problem	Experimental Test
1. Inadequate scattering &/or straggling models	Scattering/straggling expt with a simple geometry no field and also with a solenoid ? Need simulation study to determine whether existing uncertainties are important.
2. Absorber density gradients	Absorber beam test ... use proton or electron beam ?
3. RF gradient not achieved in radiation environment and magnetic field environment	RF Bench test ... & in an appropriate magnet and appropriate beam environment
4. Magnetic field quality not achieved	Measure prototype on bench
5. Inadequate radiation hardness of one or more components	Prototype all components and test in appropriate radiation environment
6. Inadequate instrumentation to debug and operate channel	Needs paper study ... possibly an experiment with hot proton or electron beam ?
7. Accumulation of small effects limits final emittance	Beam test long cooling channel ... how much is affordable ?
8. Space charge or other collective effects	Need the full muon source ... catch 22

MUCOOL R&D Sub–Projects

1. RF development

✓ 805 MHz advanced –> high power tests in Lab G. Push vigorously to conclusion.

✓ 200 MHz goals well defined. Push vigorously on cavity design. Aim for high power tests in ~ 2 years.

✗ Power source development. Need to know how this fits into the big picture. If its on the critical path must make the case to MUTAC.

2. Absorber development

✓ Absorber design issues well defined. Push vigorously on design studies, prototyping and bench–testing of absorbers + windows. Plan beam test: survivability, density fluctu–ations. Aim for fully tested absorber in 2 yrs.

MUCOOL R&D Sub–Projects

3. Engineering design

✓ Initial design studies have proven to be essential. Continue to pursue these studies vigorously. Rough cost estimate of one of the existing designs will help establish required scale of support.

✗ More advanced engineering design work requires a viable design ... we dont have this yet !

4. Initial cooling experiment

✗ We need to know the uncertainty on cooling channel performance arising from the uncer–tainty on scattering & straggling models. If the cooling uncertainty is significant we need a precise scattering/straggling experiment. If it is not significant we should not mount this experiment. The MUCOOL beam–tests can–not be defined until we know this !

MUCOOL R&D Sub–Projects

5. Cooling channel beam test

   Eventually we will need to demonstrate the performance of a cooling section in a beam ... this is a very big deal.

✗ We cannot begin to design this experiment until we know (i) the cooling channel design, (ii) what sensitivity we need to really test the relevant features of the cool–ing performance, and (iii) the big picture within which a cooling experiment must fit.