MICE Status and Plans

Rikard Sandström
Université de Geneve
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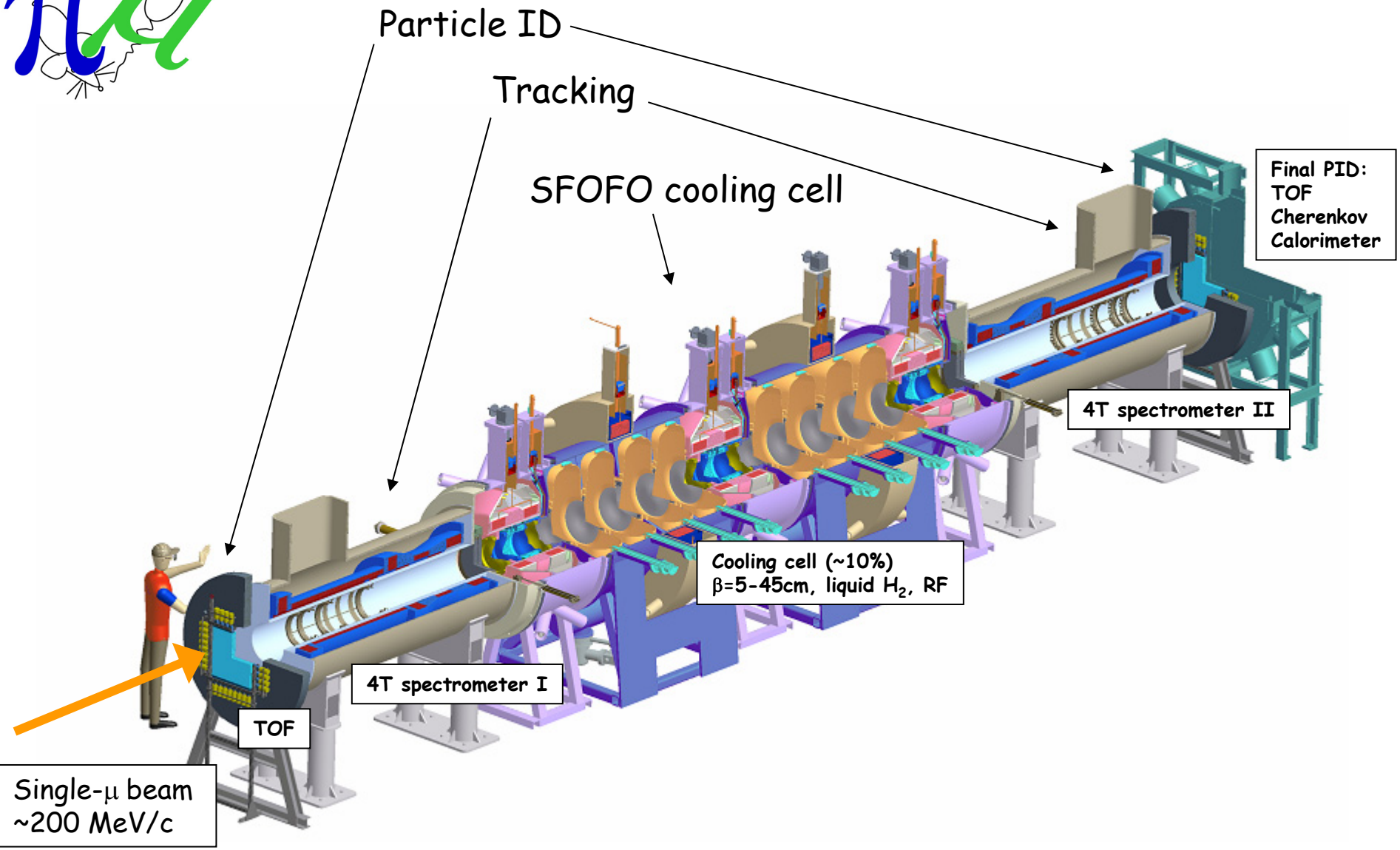
The experiment - Introduction

Aims:
demonstrate feasibility
and performance
of a section of cooling
channel

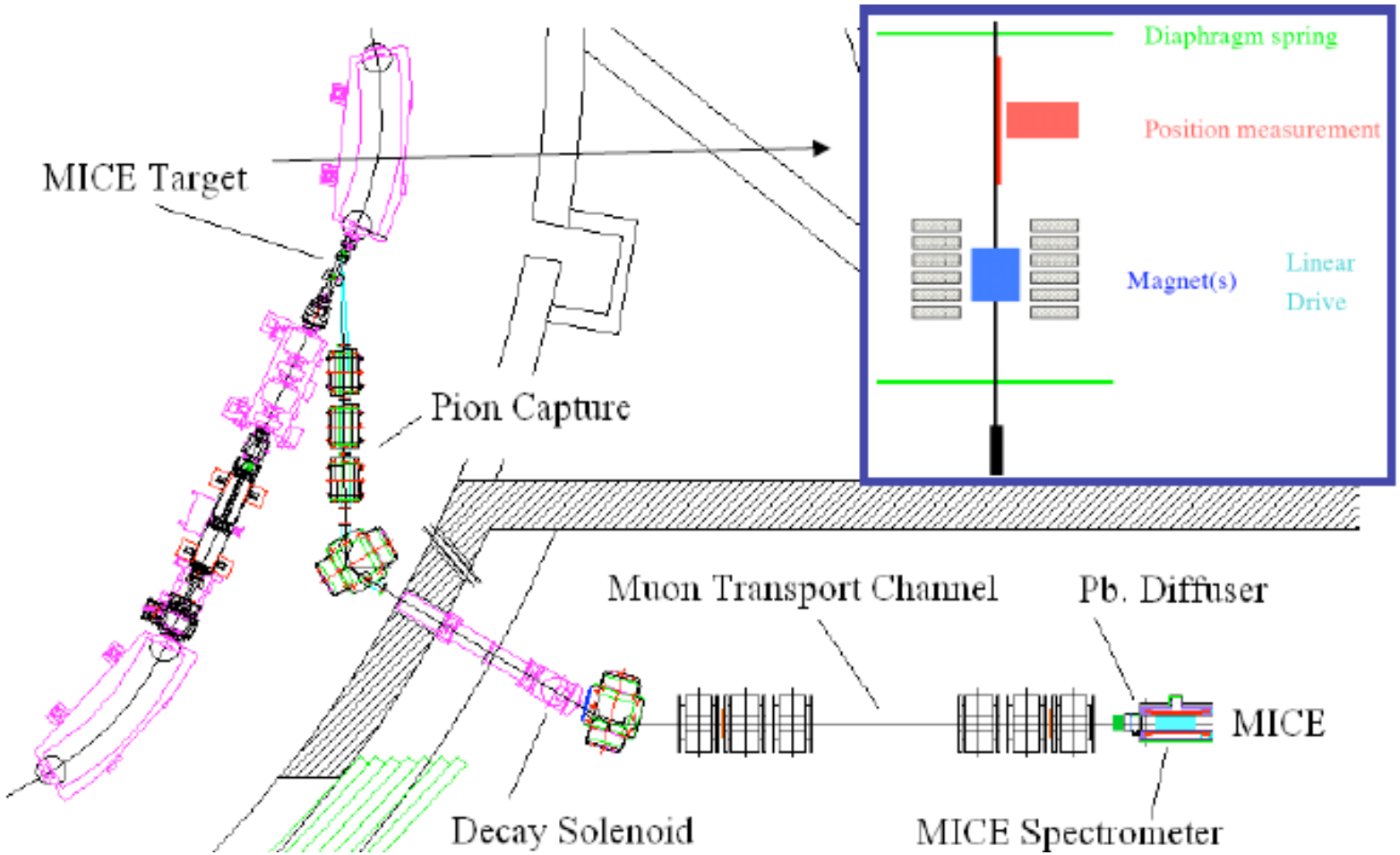
Main challenges:
- RF in magnetic field
- 10^{-3} meas. of emittance
- Safety issues

Status:
Approved at RAL(UK)
First beam: 04-2007
Funded in: UK,CH,JP,NL,US.It
Further requests: CH,JP,UK

Muon Ionization Cooling Experiment

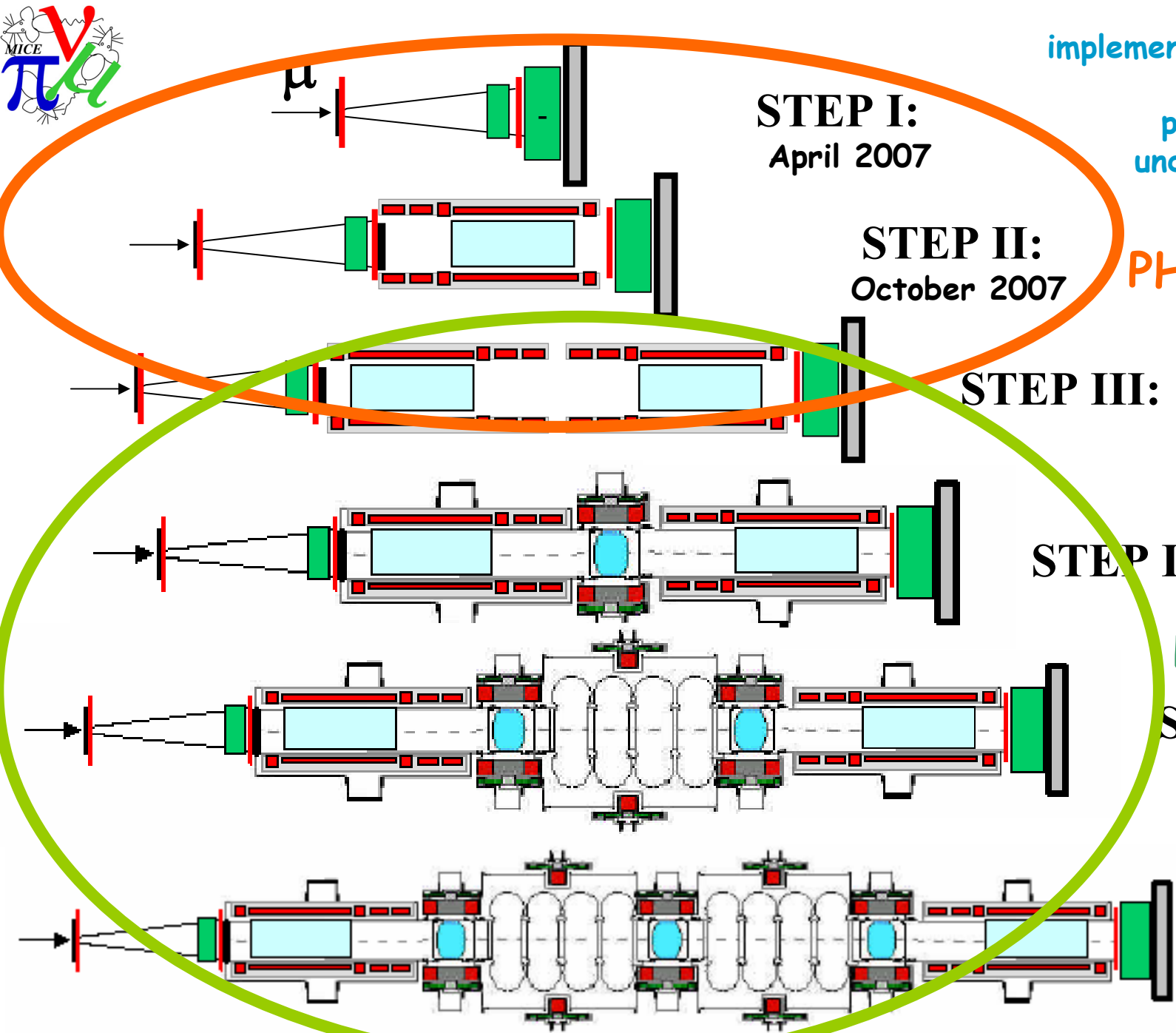


MICE beam line at RAL

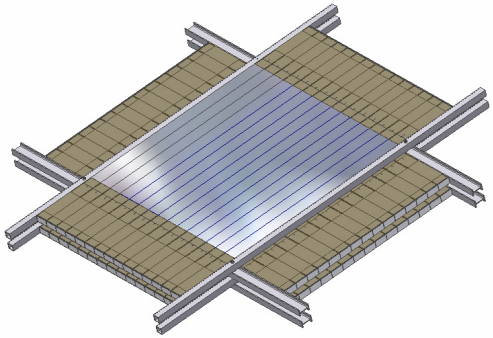


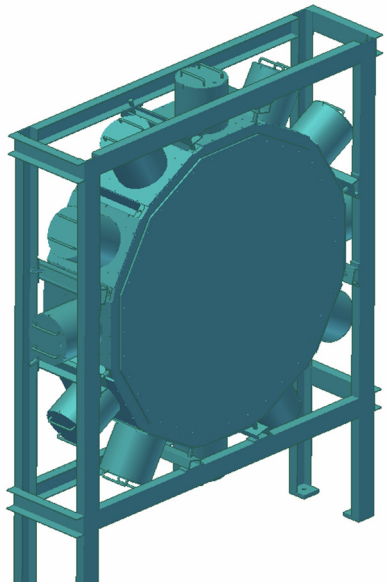
implementation in steps

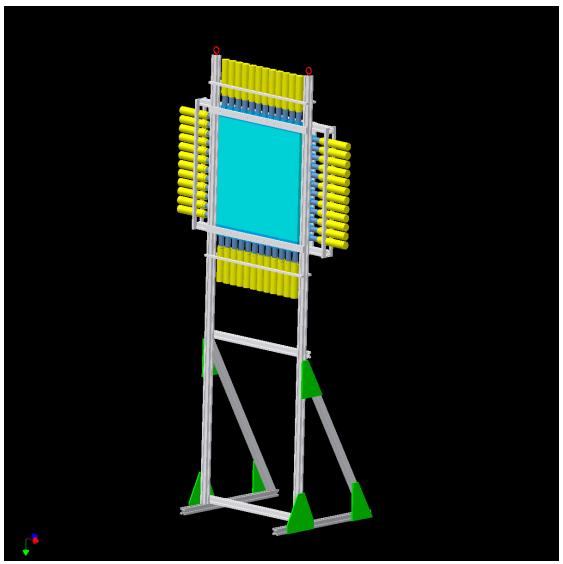
physics-based: understanding of systematics

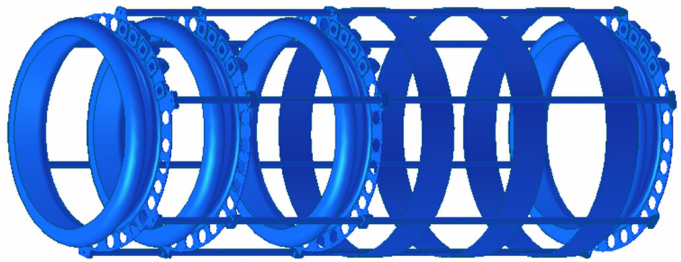


Detectors









Detectors

Calorimeter:

Approved. Prototype funded for test.
Completion money awarded after test.

TOF:

Approved. TOF0 prototype funded for test.
Completion money awarded after test.
Questions on TOFII need to be answered

CKOV1:

Being redesigned for lower momenta.

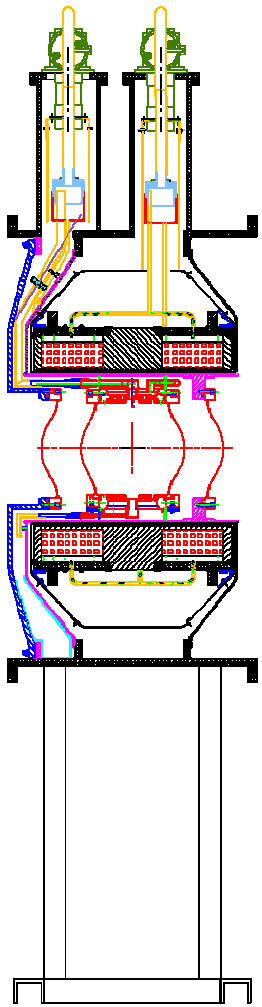
CKOV2:

Designed but not funded.
A problem to be solved.

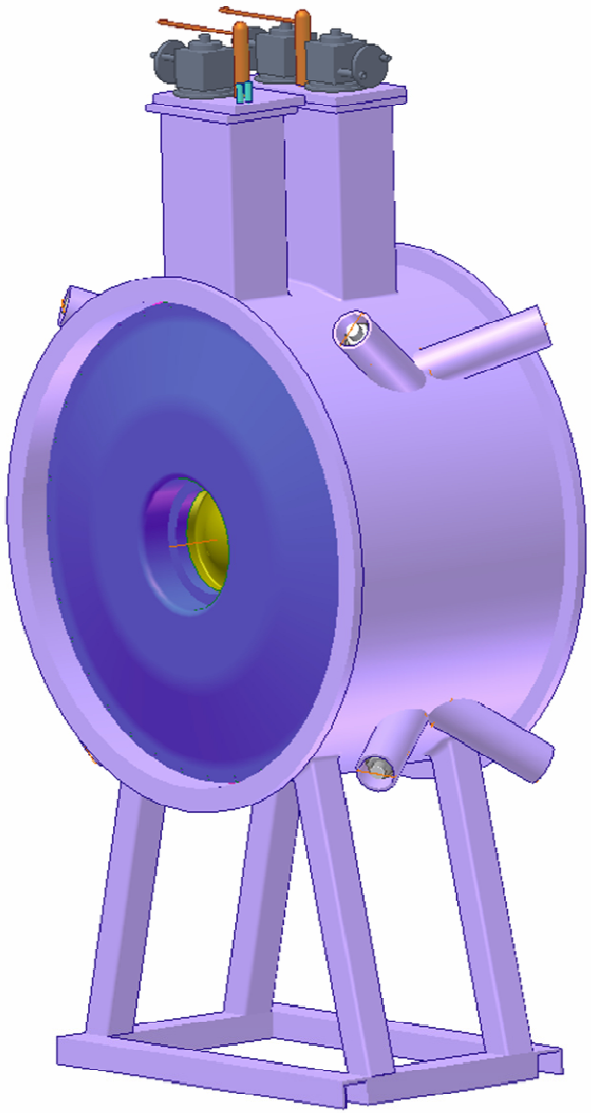
SciFi tracker:

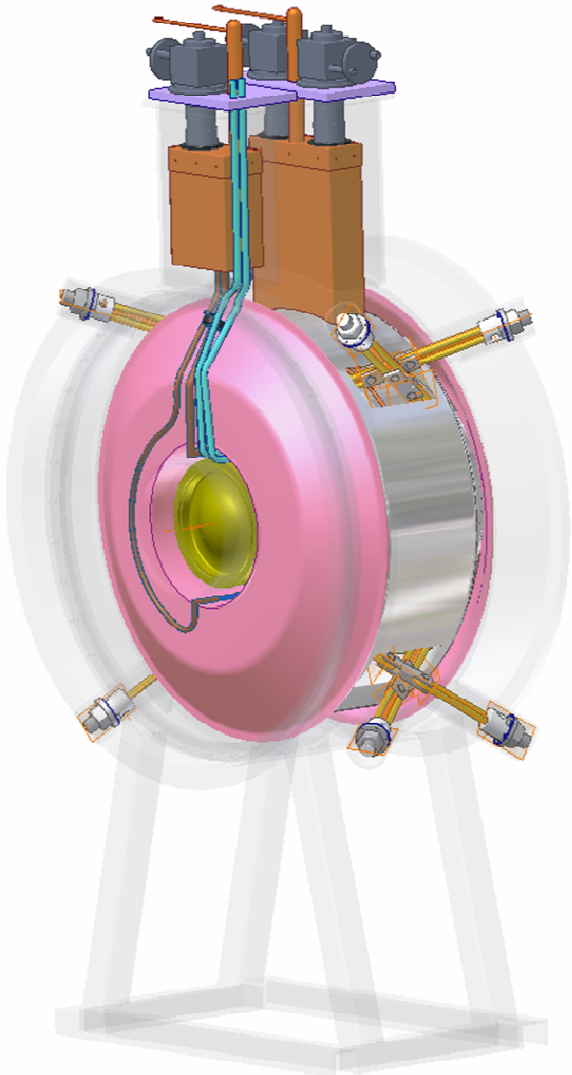
Prototype at test beam in Japan right now.
Simulation shows flat pt resolution, pz resolution very pt depending.

Absorbers



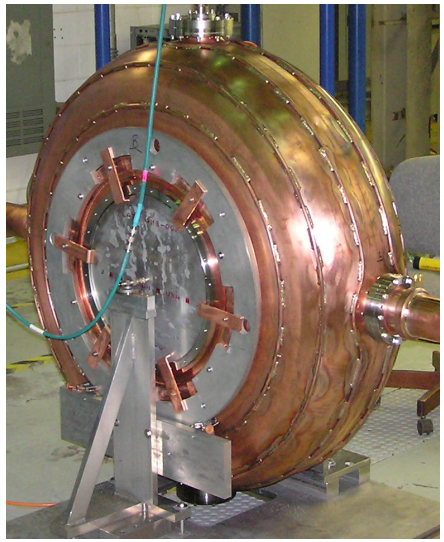
AFC 2D&3D





Prototypes, absorbers and RF

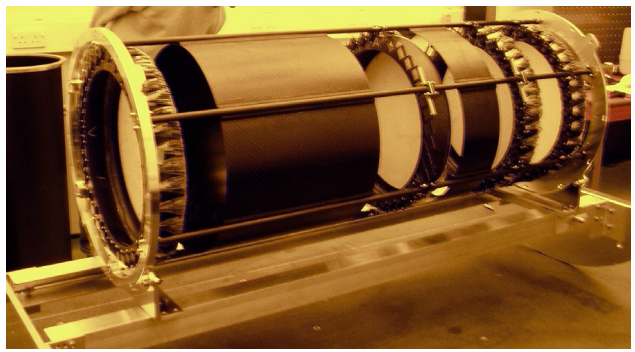
RF R&D
- 805MHz program to resume next month
  - Will start with curved Be windows
  - Buttons of different materials and grids will also be tested
- 201MHz will start up shortly afterward
- GH2 pressurized cavity tests also starting (Muons Inc)
  - Absorber
- Another instrumented LH2 fill test in the Fall
- New windows available, dedicated test area at Fermilab



201MHz RF cavity with beryllium windows

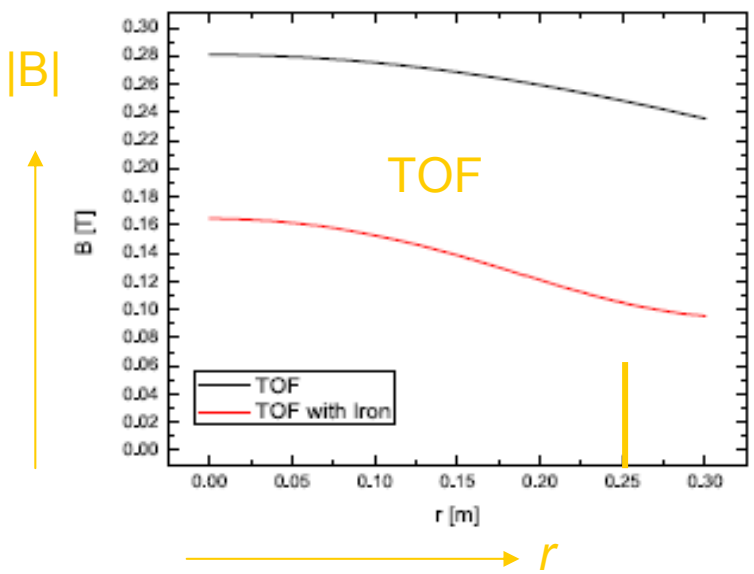
From NuFact'05

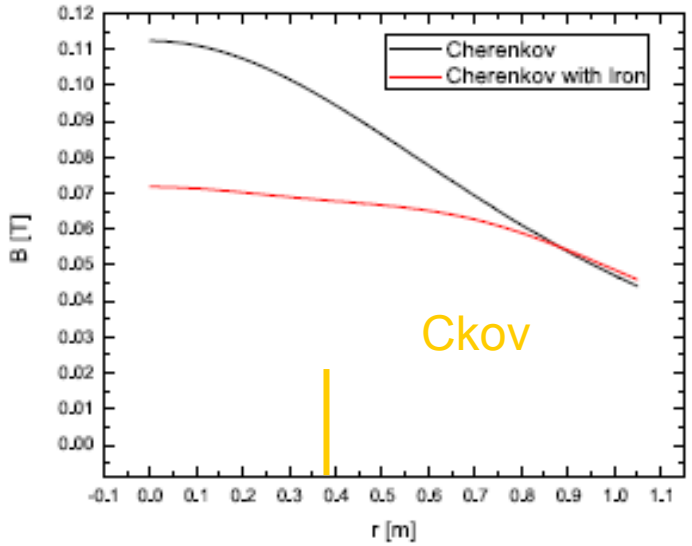
Liquid-hydrogen absorbers



Scintillating-fiber tracker

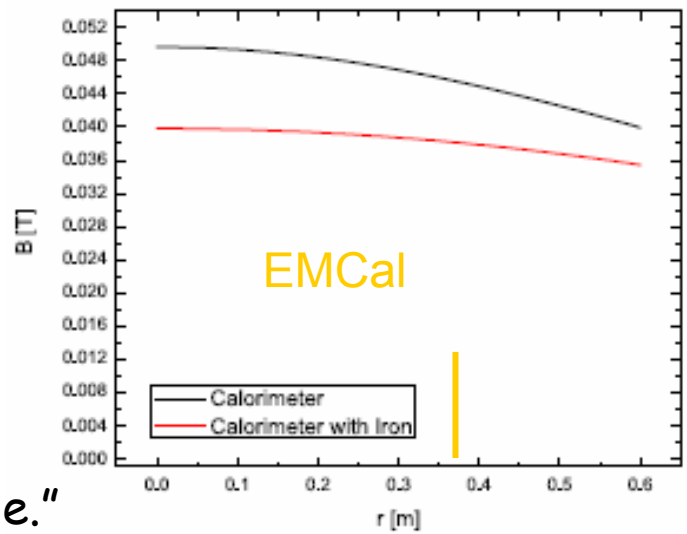
Magnetic shield efficiency





Black = No Iron

Red = with Iron



Residual B @ EMCAL ~2x higher than shown in TDR ~ 38mT

"Scraping not a problem for 25 cm hole."

DAQ

- Detector data Readout must be performed at the end of the spill
  - Data has to be buffered in the FEE
- There is an ADC problem
  - Conversion time for conventional ADC does not allow 600 muons/1ms spill
  - Critical for EmCal
- The Particle-trigger scheme is not well defined
  - Particle trigger = Digitisation trigger ≠ Readout trigger
  - Should be flexible (allow calibration, cosmic events, etc…)
- Data Volume:
  - 25 kB/μ (2 kB/μ if zero suppression in the tracker)
  - ~10 MB/spill or 25 GB/run
  - ~ 60 TB/year (2500 runs)

Outcome of DAQ meeting one month ago:

Decisions:

- CM will be based on Epics
- DAQ will be based on VME bus
- We'll PC under Linux Easier if all VME have the same interface

To be done:

- Specifications for DDAQ, including trigger system
  - -> Choose the DAQ software
- Finalise discussion on DDAQ/CM interconnection
- Design an Ethernet Network Infrastructure
- Start Testing

(From Graulich Sept 14)

G4MICE

G4MICE is the main software tool for MICE

1. Geant4 simulations
2. Simulated detector response
3. Reconstruction of events
4. Analysis

In a stable state, now used for various background simulations, emittance calculations, PID, effects of scraping etc.

To do:

Single particle emittance

Simulation of full spill structure

Persistency

Funding

at this point MICE (PhaseI) is an approved and funded project in 5 countries

-- UK: 9.7M£ (+ phase II penciled)
Beam, Infrastructure, fiber tracker .. Focus coils
-- USA: funding from the NFMCC(DOE) + NSF
Absorber windows, fiber tracker, RF CC modules, spectrometer solenoids
-- Japan fiber tracker, absorbers
-- Switzerland: PSI beam solenoid, DAQ
+CERN used RF (2X2MW)
-- Netherlands magnetic probes
-- Italy: TOF, Calorimeter