

MICE



TECHNICAL UPDATE &
ISIS/RAL PLANS



Belgium

Italy

Japan

The Netherlands

Russian Federation

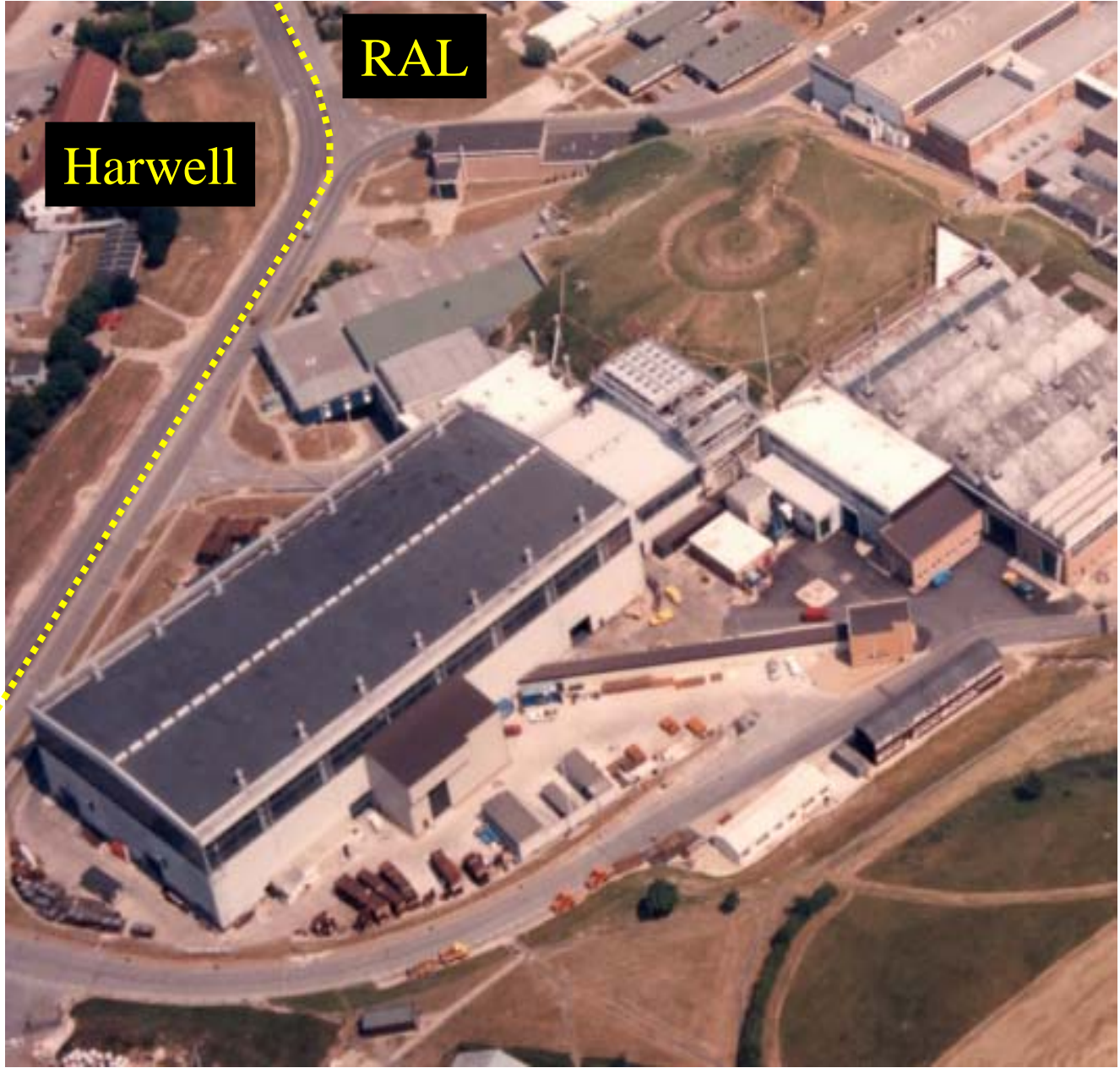
Switzerland

UK

USA

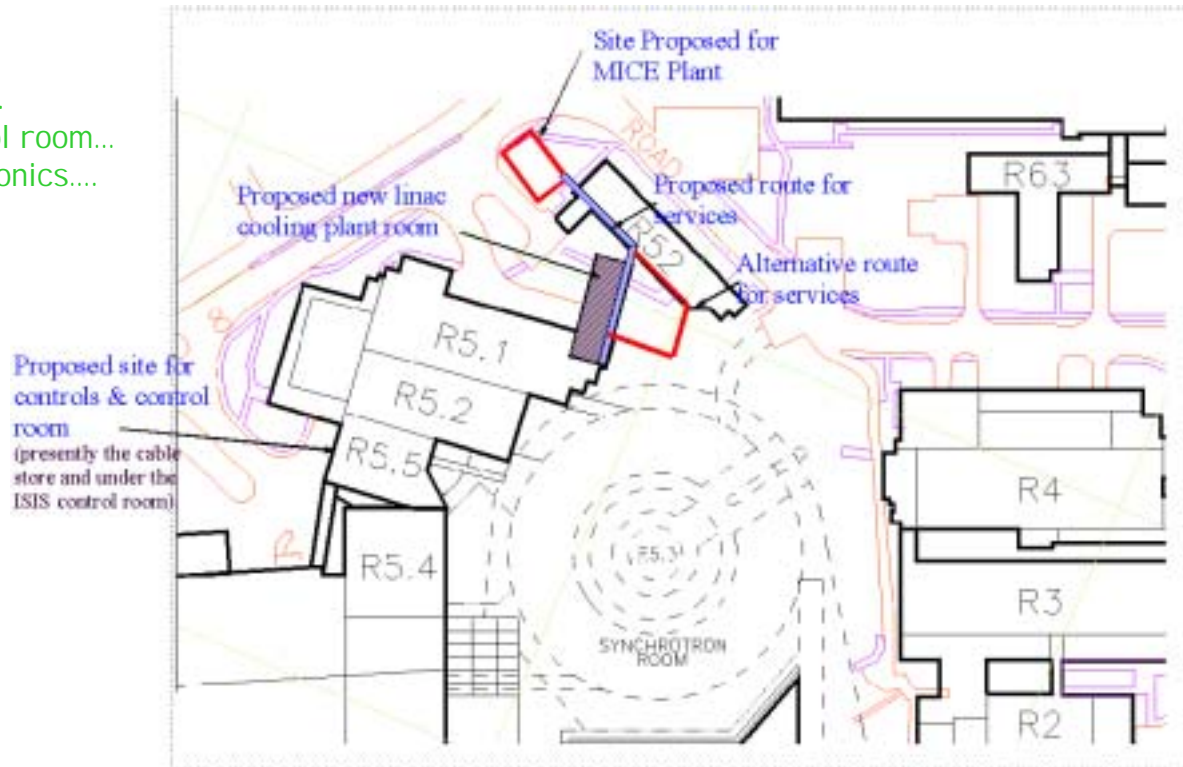


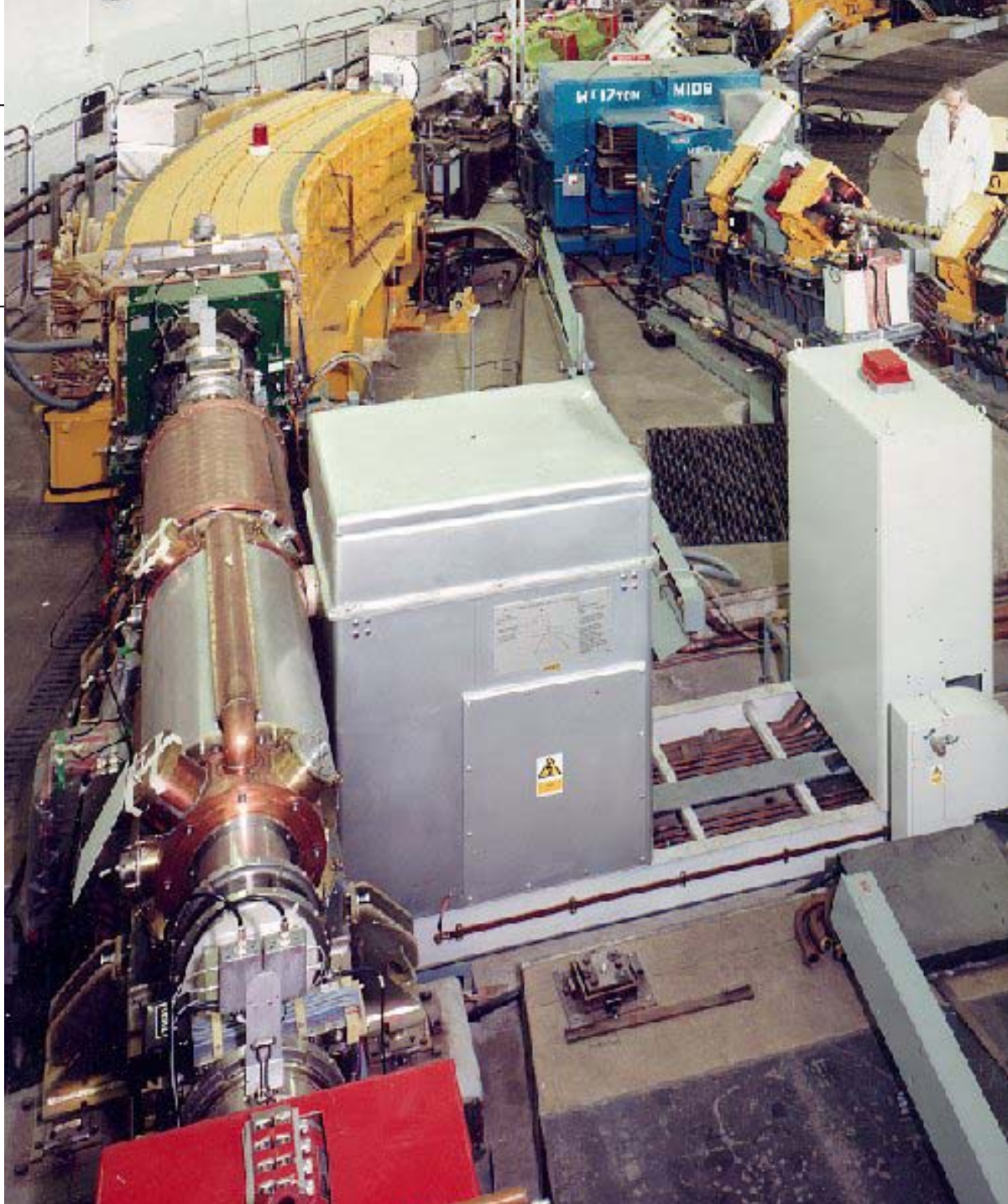
ISIS

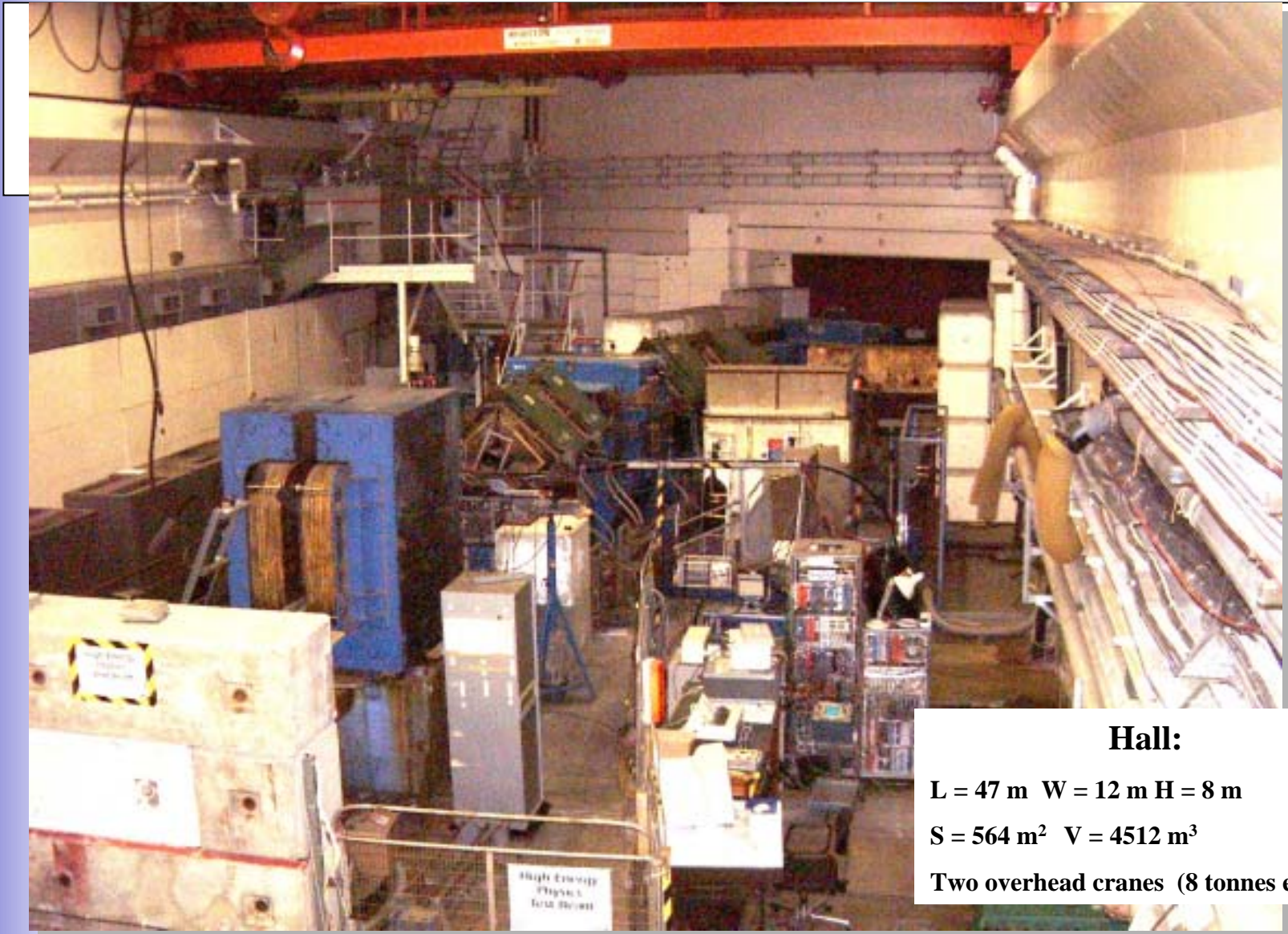


Location

Plant...
Control room...
Electronics...







Hall:

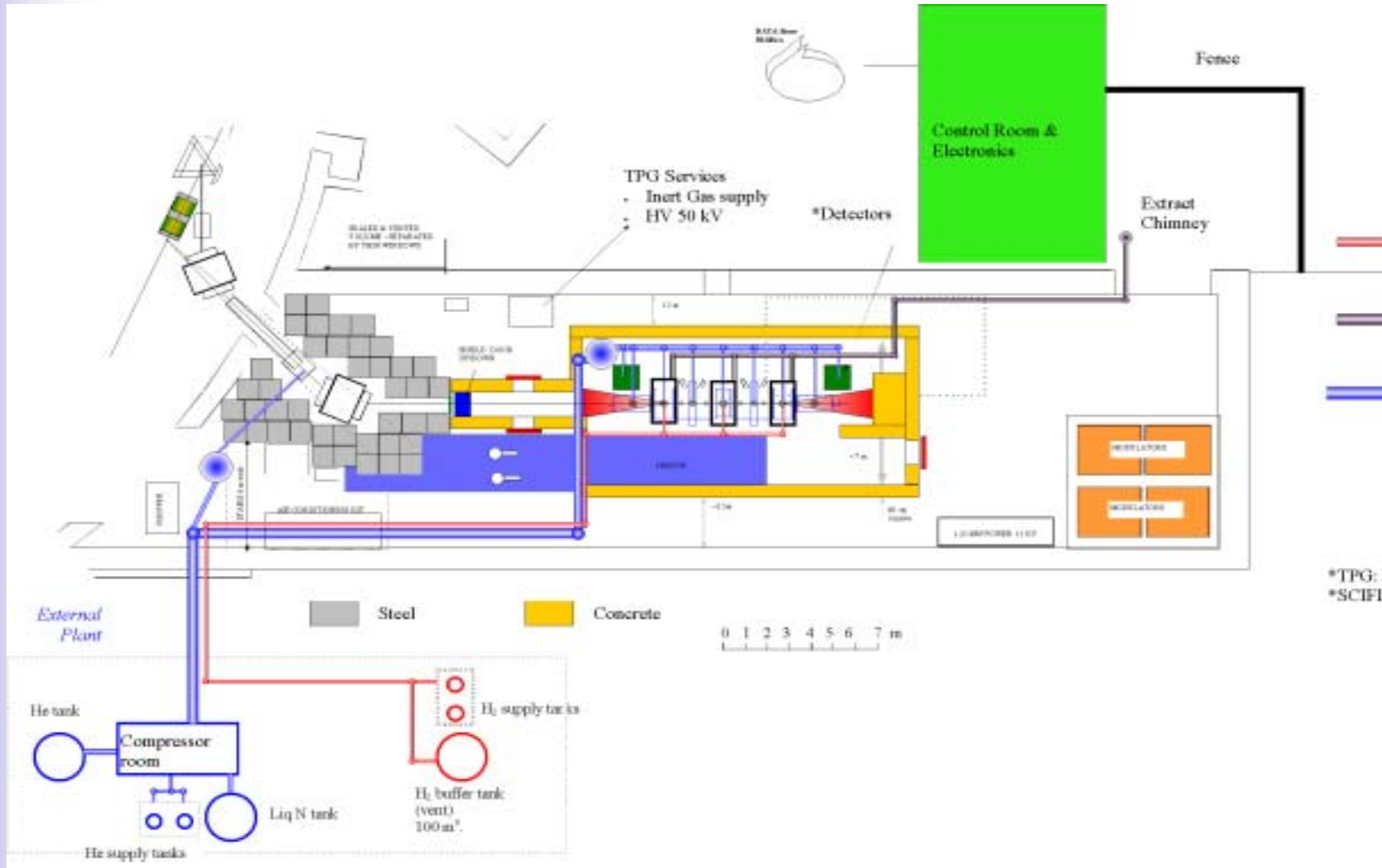
L = 47 m W = 12 m H = 8 m

S = 564 m² V = 4512 m³

Two overhead cranes (8 tonnes each)



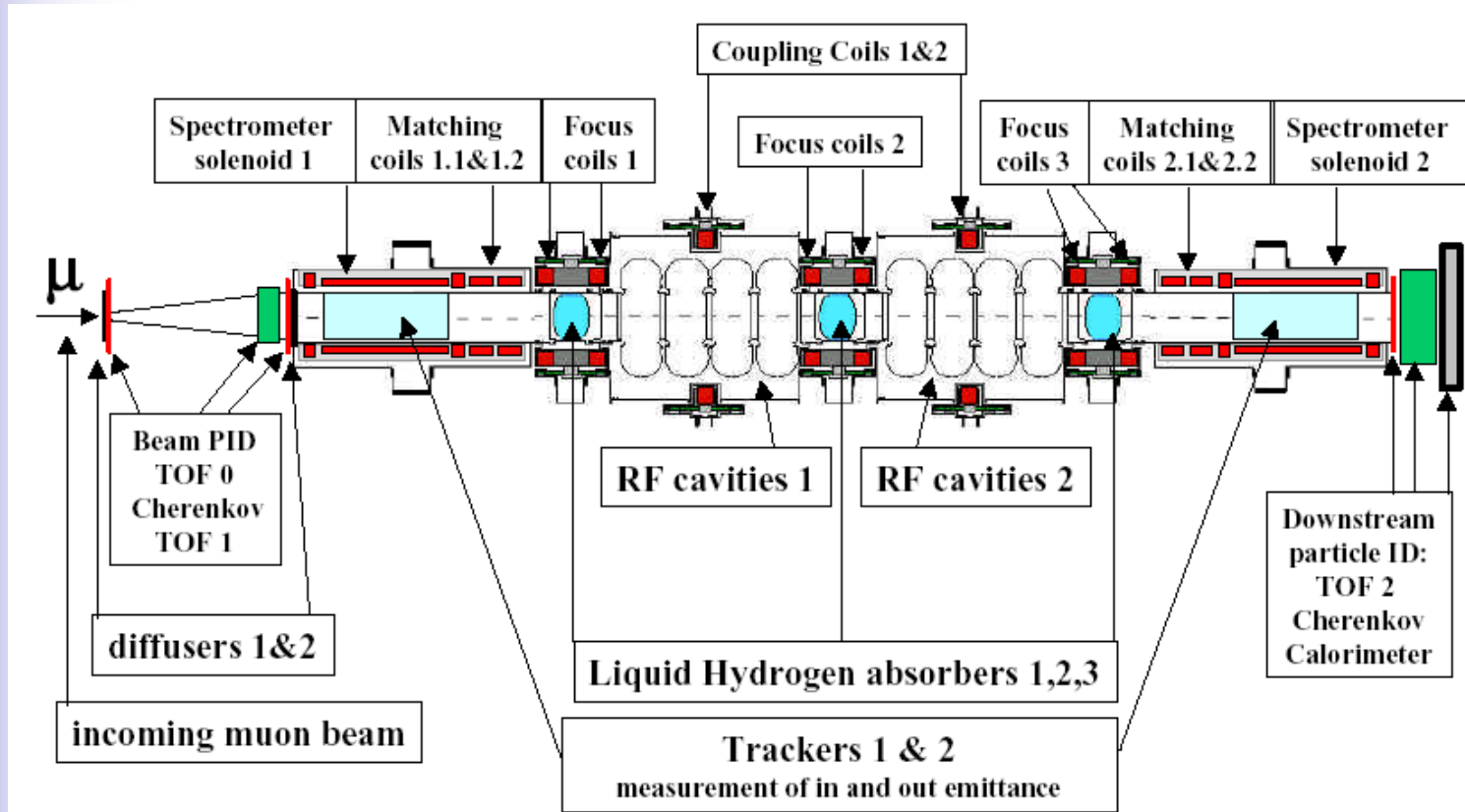
Mice Layout



Technical Update & Issues

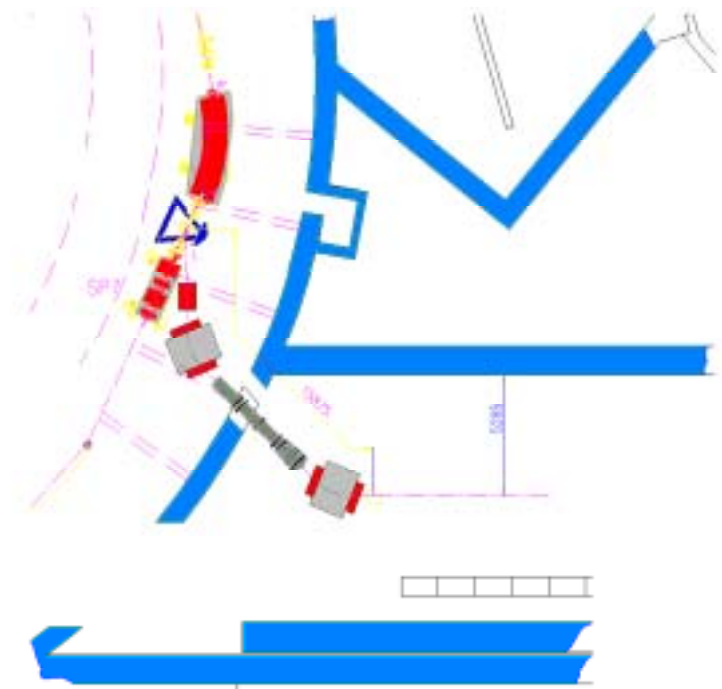
- Beam Line
 - RF System
 - Absorbers
 - Magnets & Cryogenics
 - Detectors
-
- Infrastructure & Layout
-
- RAL & ISIS Perspectives
 - Programme
 - Expected Progress

MICE Layout

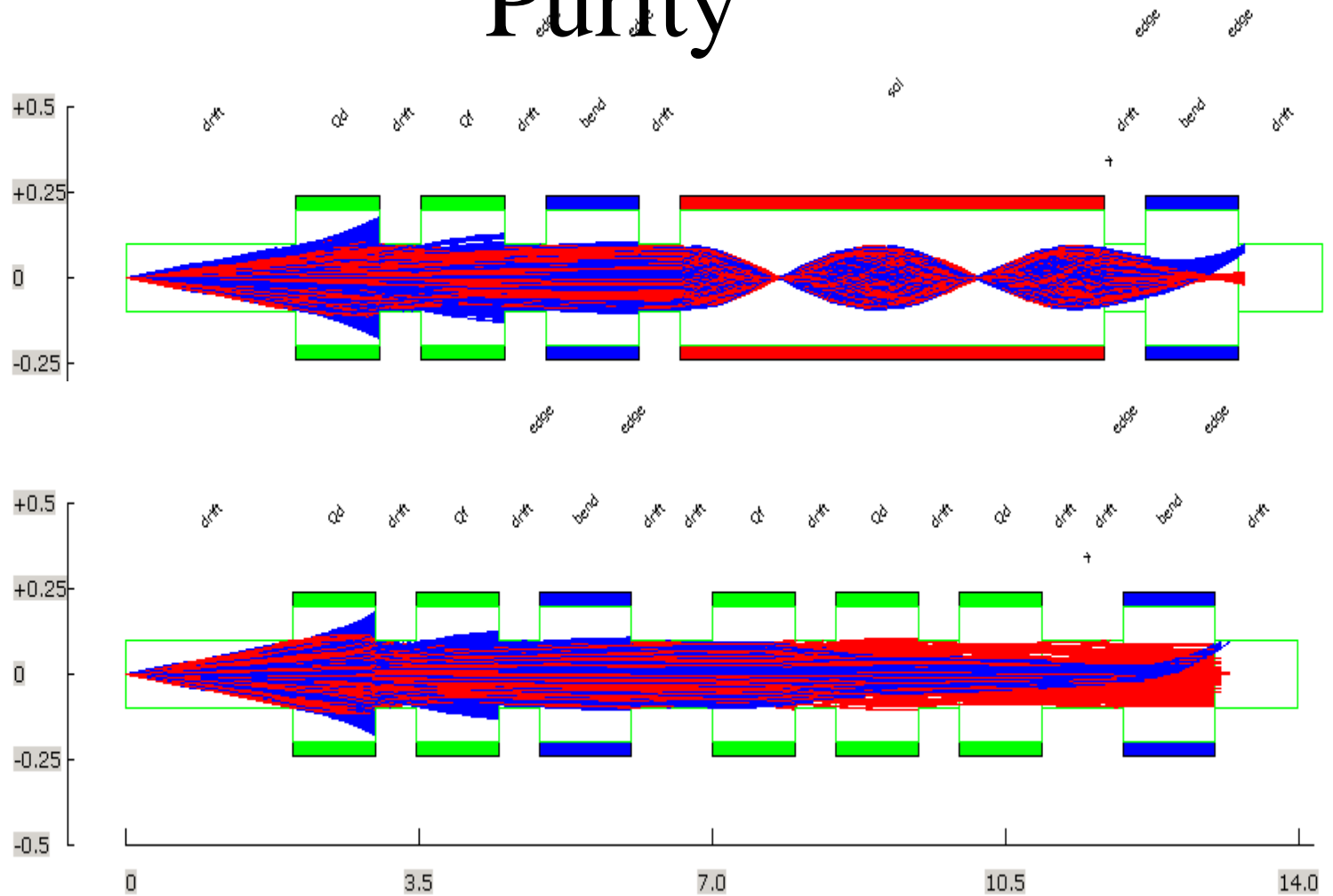


Beam Line

- $P_\mu < 400 \text{ MeV}/c$
- Rejection of protons and pions $< 10\%$
- few muons per μs
- Two solutions:
 - solenoid
 - » cryogenics ava
 - » release by PSI
 - quadrupoles



Purity



Performance

Rate depends on muon momentum:

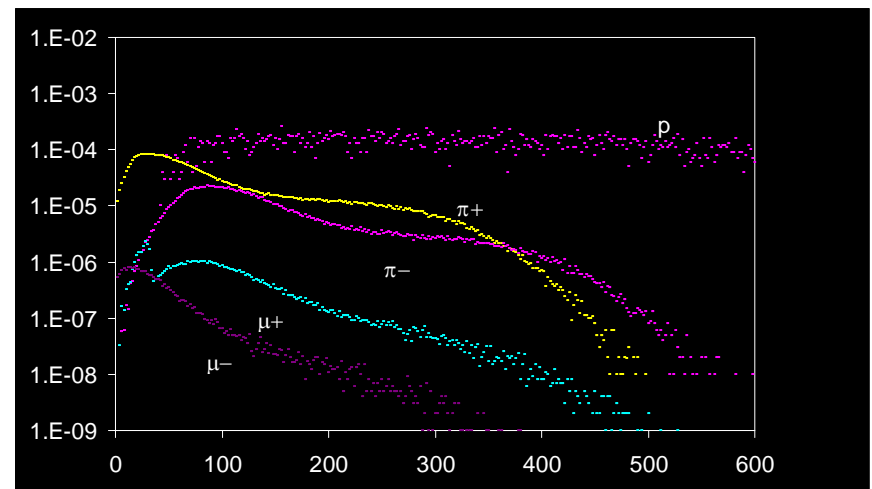
e.g. at 200 MeV/c

3000 / ms for solenoid

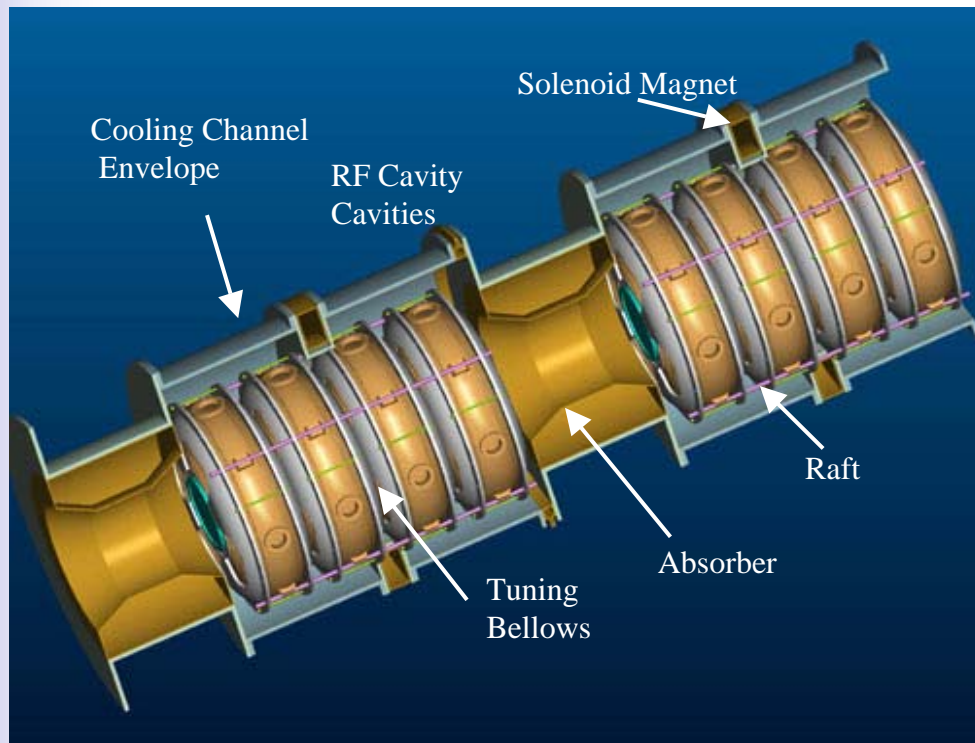
~300 /ms in quadrupole

(assumed a Ti wire target: 1cm long and 4mm \emptyset)

Purity should be better
than 90% against
scattered protons



RF System



1 MW per cavity

8MW total

Low Duty Factor

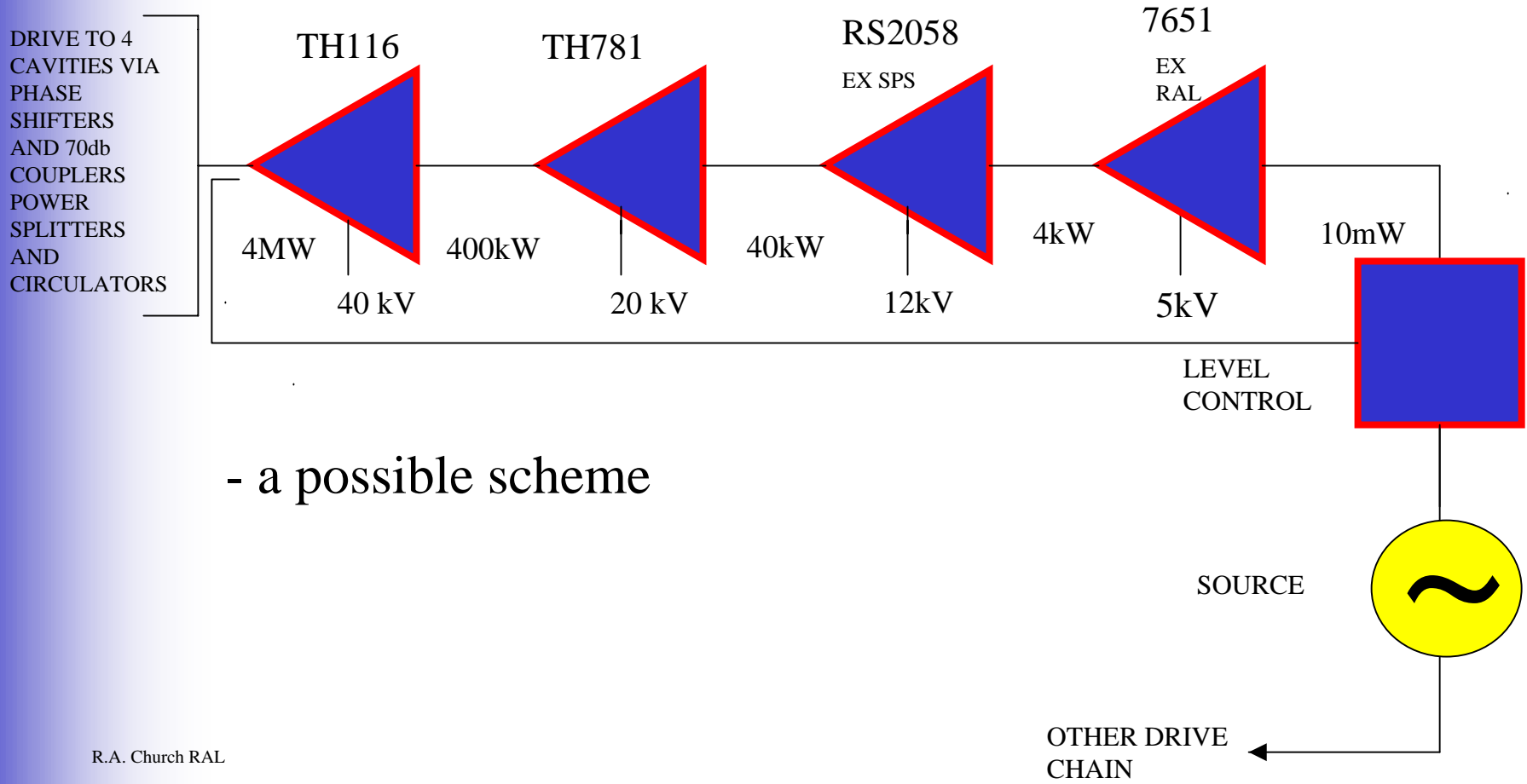
1-2 ms

1-10 Hz

average power

$\sim 1\text{kW/Hz}$

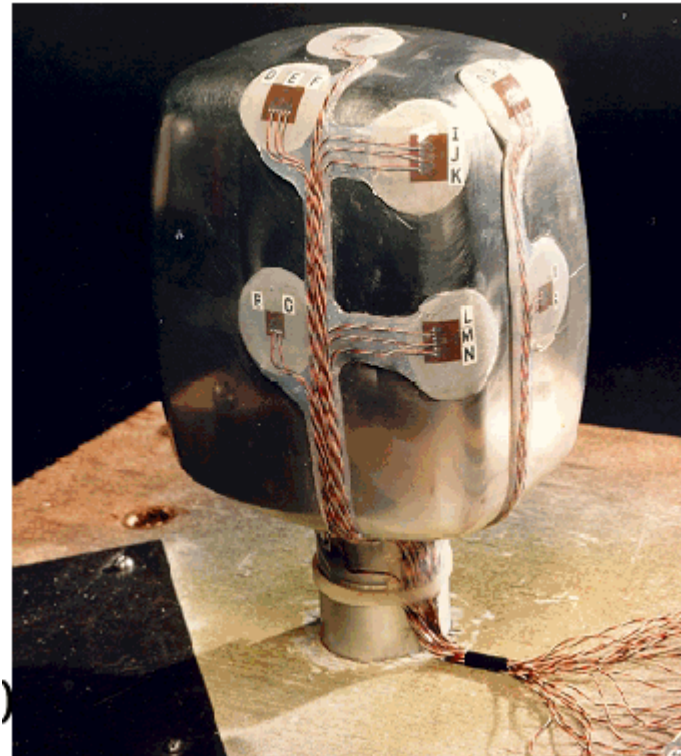
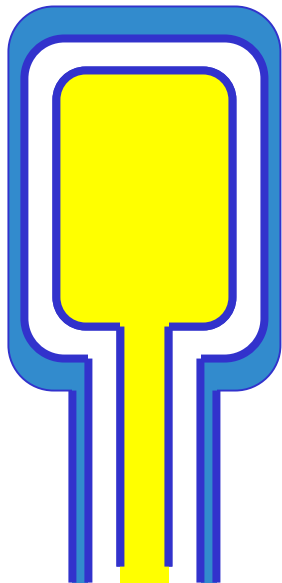
RF Drive

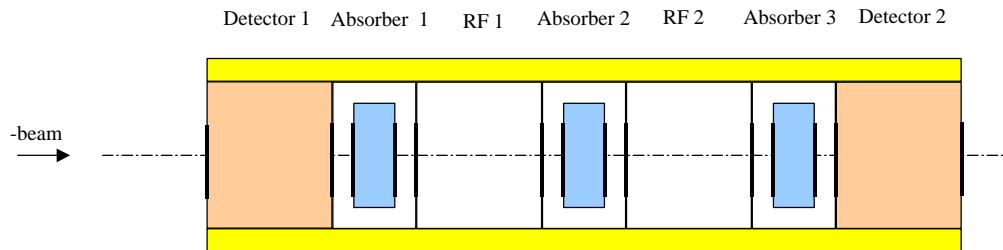
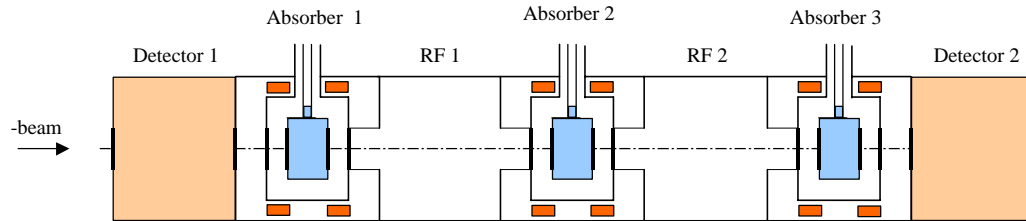
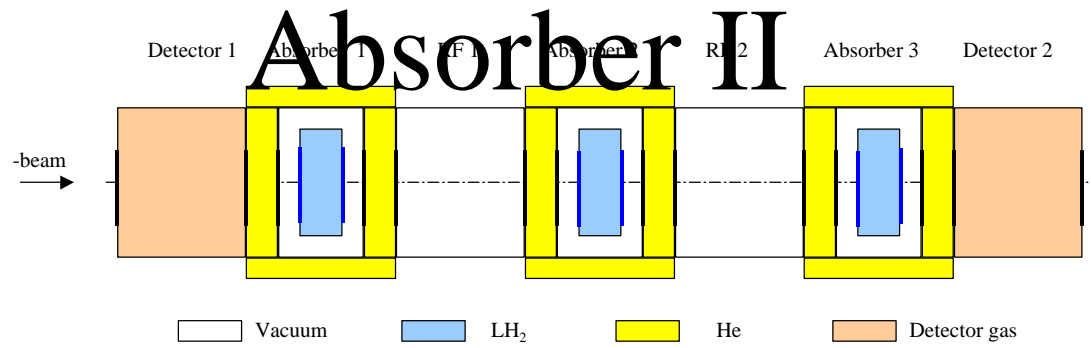


- a possible scheme

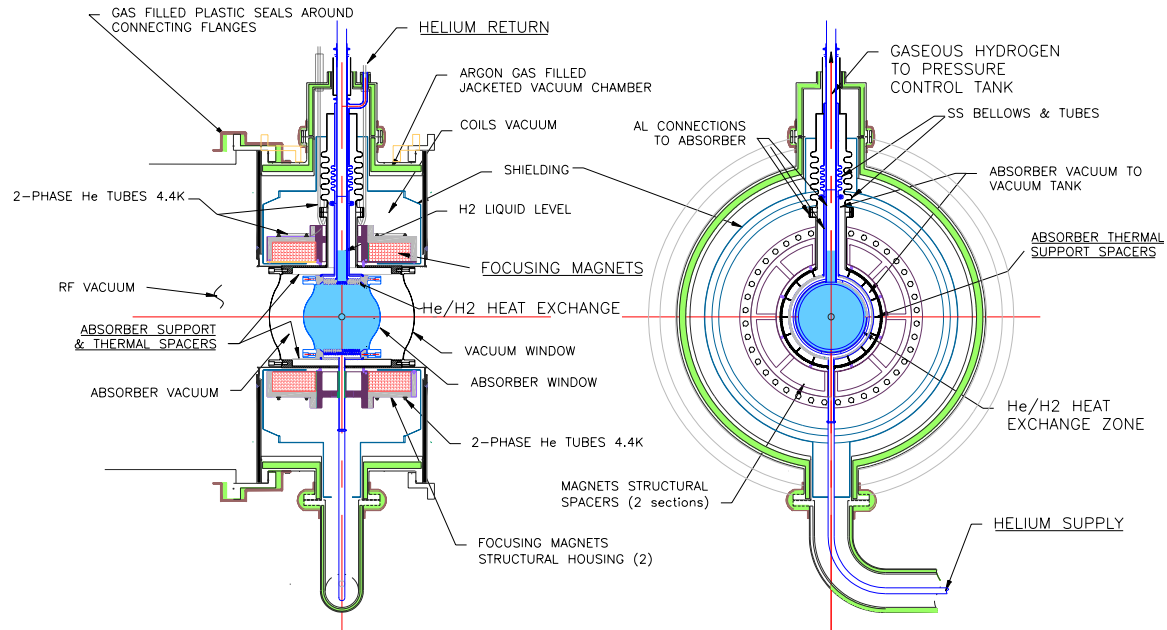
Absorber I

- Liquid Hydrogen – Major safety issue
 - ISIS Liquid Hydrogen Moderator

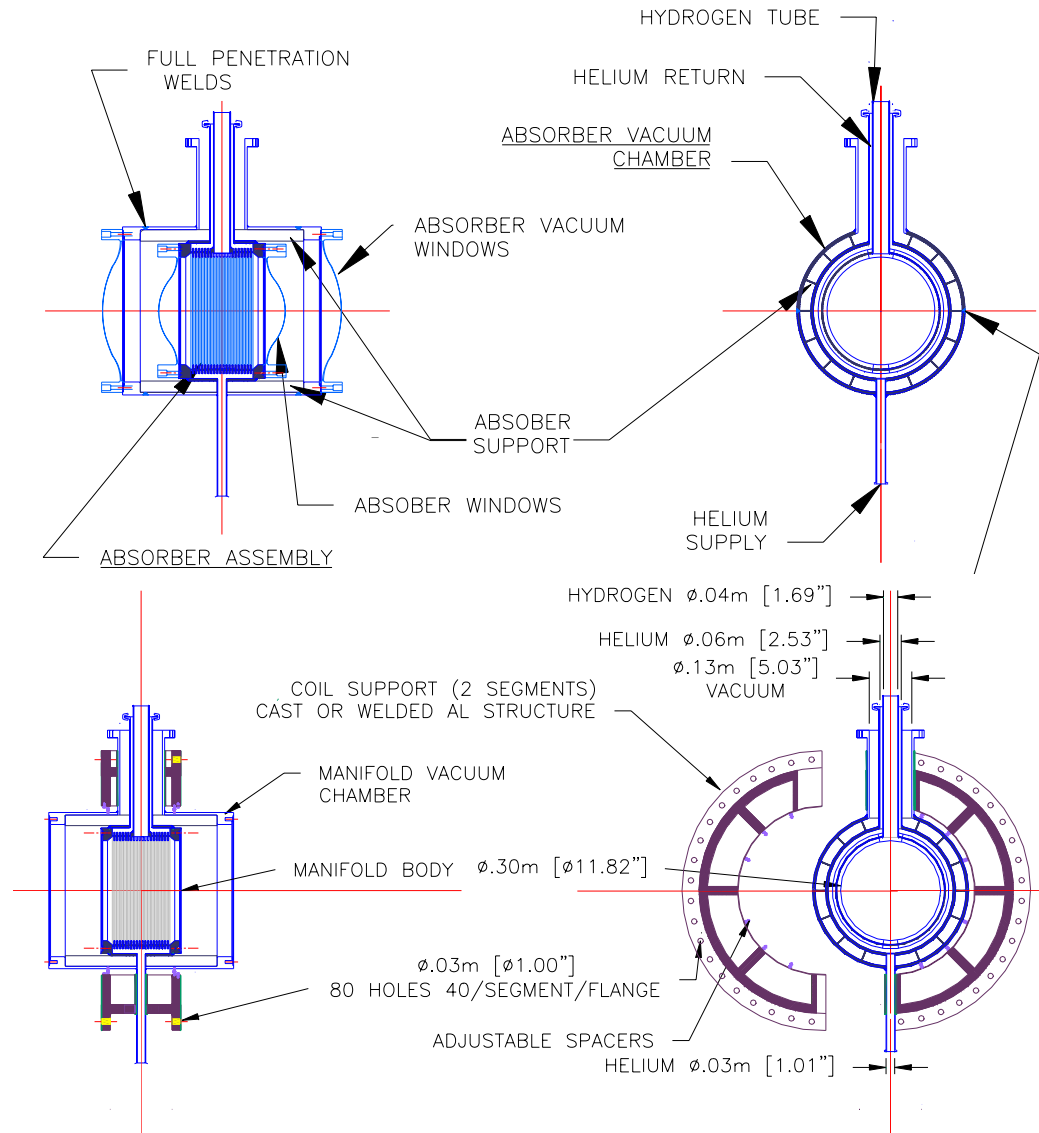




Absorber III



Absorber IV



Magnets & Cryogenics

Principle Issues

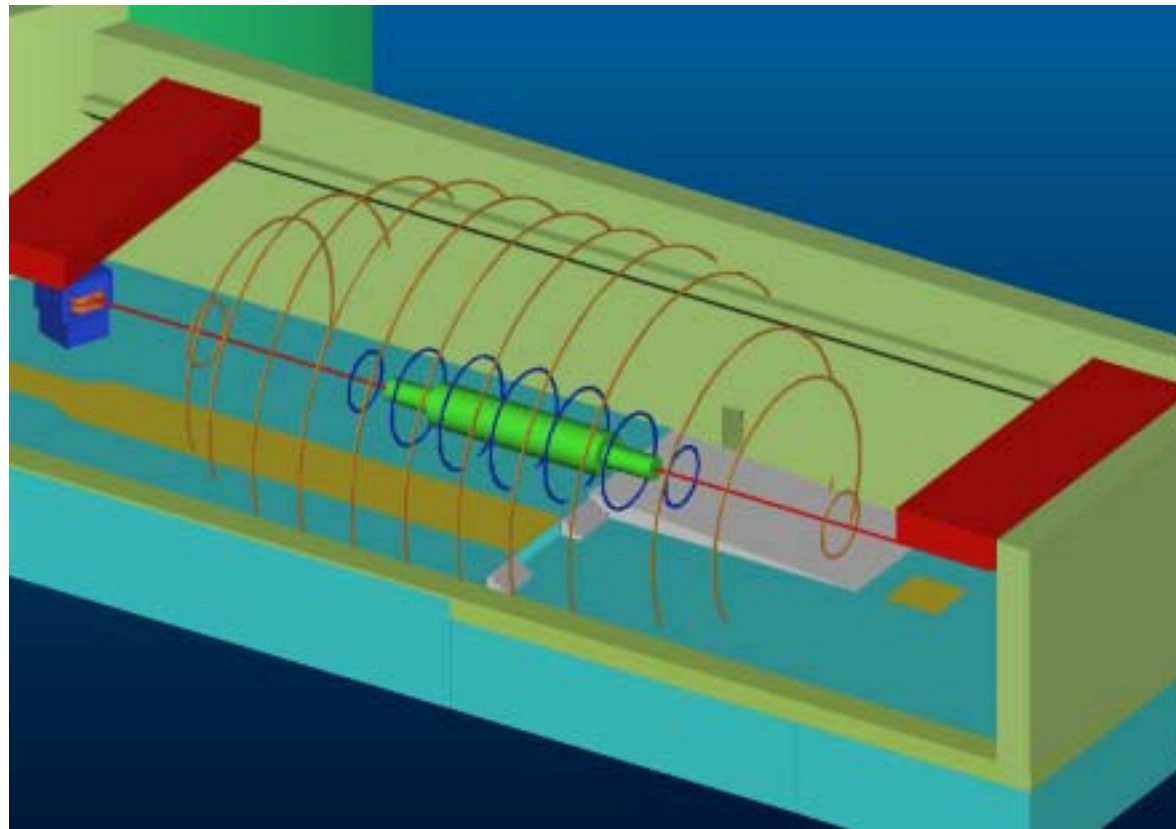
- Fringe Fields
- Cryogenic Requirements

Blue contours:

10 mT

Orange:

0.5 mT



Detectors

Issues:

SiFi - Large cyro cooling needed for VLPCs

TPG – HV & flammable gas (next to Lig.H cell)

Infrastructure

Plant: Electrical Power
Cooling Power
Cryogenic System
Hydrogen Delivery & Handling

Installation
phased build of the experiment

ISIS Perspective

Critical Issues: Beam Line

Long Shutdown

Break into ISIS Synchrotron from MICE Hall

Have Shielding available+

Have Stands available

Competes with other ISIS projects

- 300 μA upgrade*
- Second Target Station*
- RFQ Installation
- delivery of contracted neutron amp.hours

* work in synch. vault

+2nd target station – friend or foe?

ISIS Schedule

Expected Progress

Proposal submitted ✓

expect the review to take place Mid Feb till May (?)

- international review panel

MICE is part of the UK's Science road map

- but funds are not yet allocated

Internal Review \Rightarrow green light following international rp

Management & Oversight Structure(s) need to be in place