

MICE at RAL

- **People currently involved**
- **Politics**
- **ISIS**
- **Target**
- **Beam line**
- **Hall**
- **Experiment**

MICE “project team” in the UK

Paul Drumm (ISIS)
Rob Edgecock (PPD)

- **Project leader**
- **Project leader**

Ian Gardner (ISIS)
Harry Jones (ISIS)
Adrian Morris (ISIS)
Paul Wright (ISIS)

- **ISIS**
- **Head of Engineering**
- **ISIS ring, controls**
- **Radiation safety**

Elwyn Baynham (ED)
Tom Bradshaw (ED)
Iouri Ivaniouchenkov (ED)
Tony Jones (ED)
Jim Lidbury (ED)

- **Solenoids**
- **Cryogenics**
- **Project engineer**
- **LH2, LiH safety**

Ken Long (IC)
Ed McKigney (IC)

- **Detectors (motivation)**
- **Detectors, X-rays**

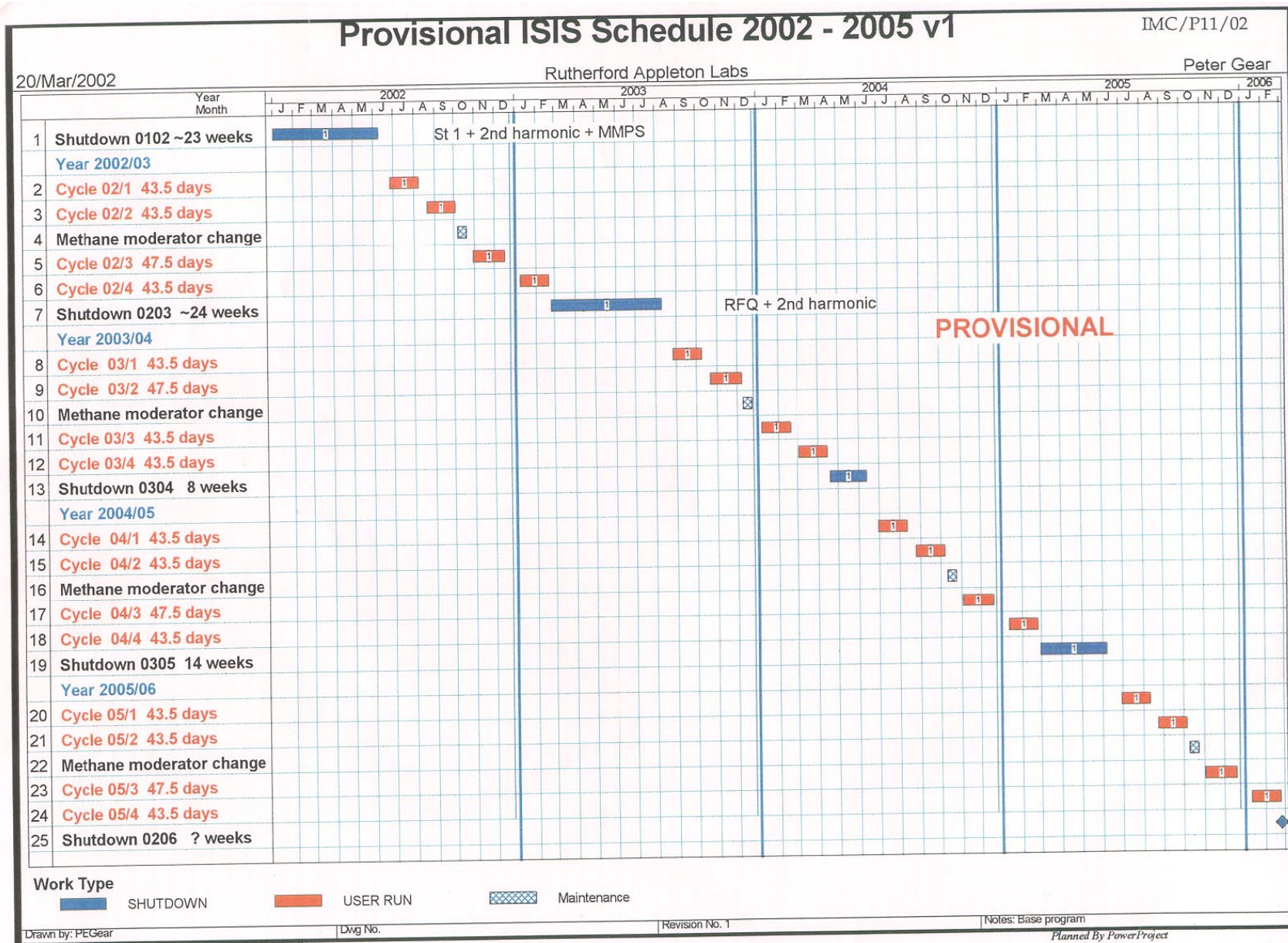
Giles Barr (Oxford)
Wing Lau (Oxford)

- **LH2, solenoids**

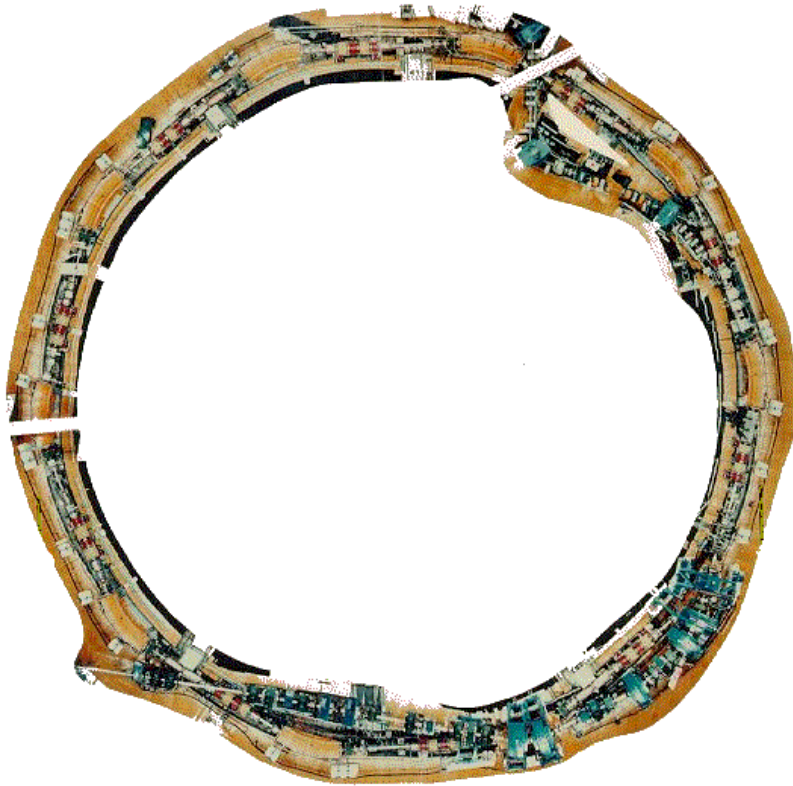
Politics

- **MICE LOI presented at RAL on 25th March to panel
International + PPRP core + RAL**
- **Received positively**
- **Final wording of report (still) not fully agreed but
UK - design and costing for beam
MICE - full proposal**
- **Very useful if this could be by the end of 2002
- beam by 2004/5
- fit in ISIS shutdown schedule**
- **Funding: probably too small this year
(hopefully) OK for 2003/5**

(Out of date) ISIS Schedule

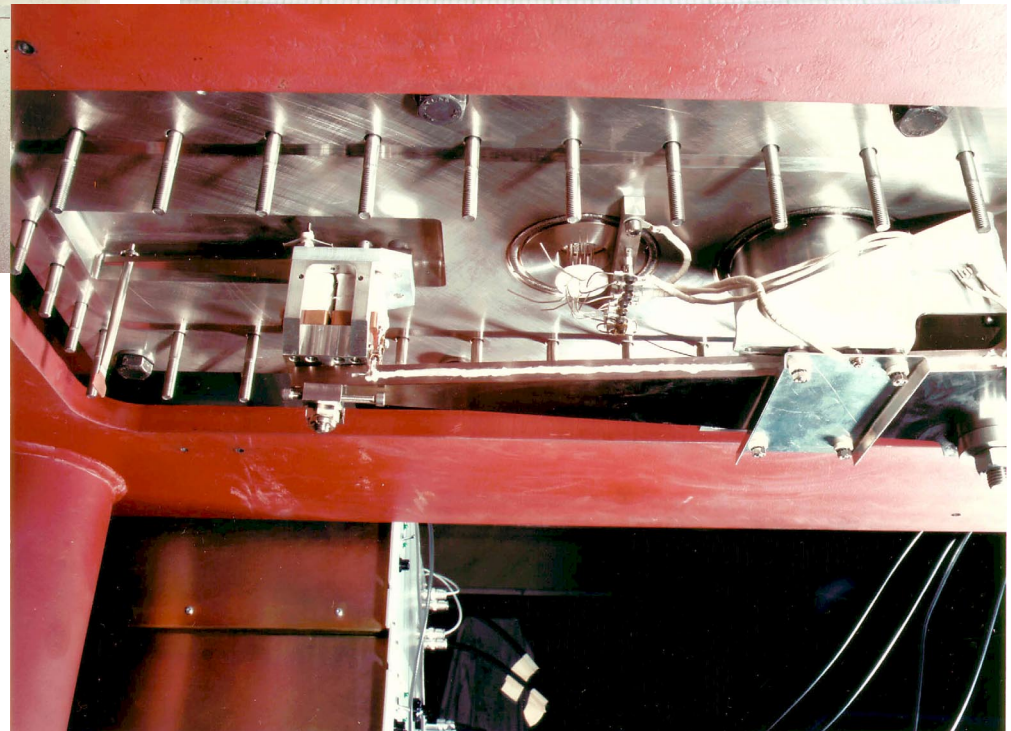
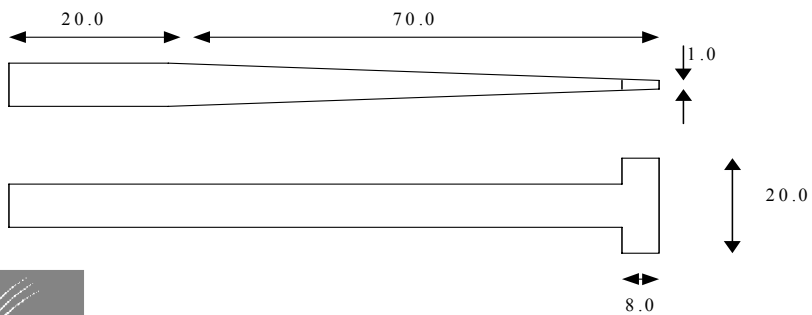
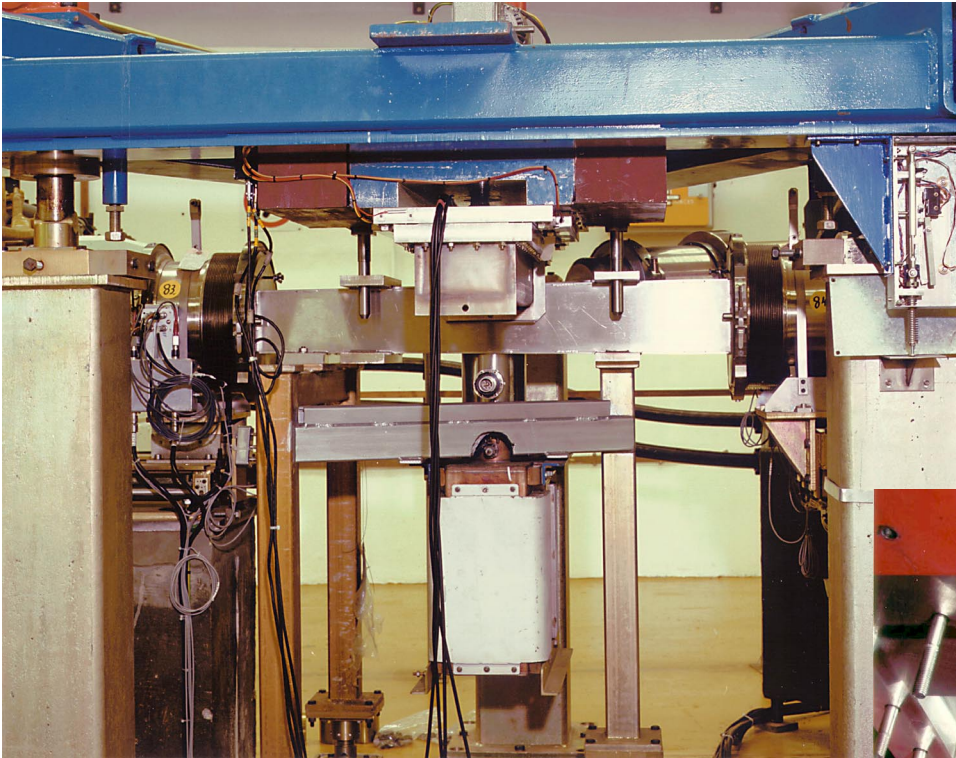


ISIS



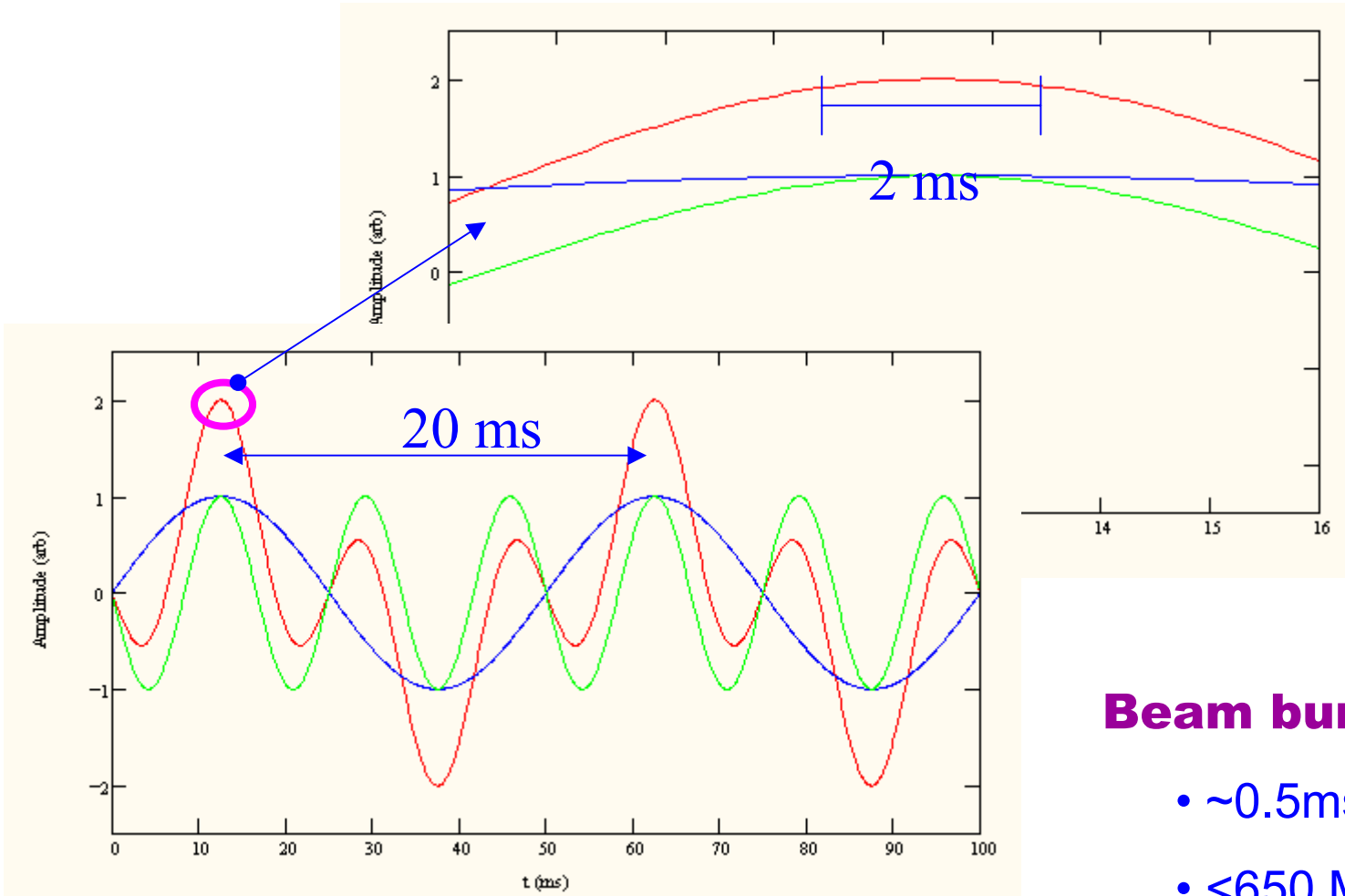
- 800 MeV synchrotron; 240kW
- 50 Hz, $>100\mu\text{s}$ at close to maximum energy, 800 MeV
⇒ ISIS is cw for cooling experiment!
- 2 bunches, each 100ns long, separated by 230ns
- Each makes 200 turns during $100\mu\text{s}$
- Target in ring could see 50MW for cooling experiment!

Target



Target

Target: 50 Hz + 150 Hz motion:

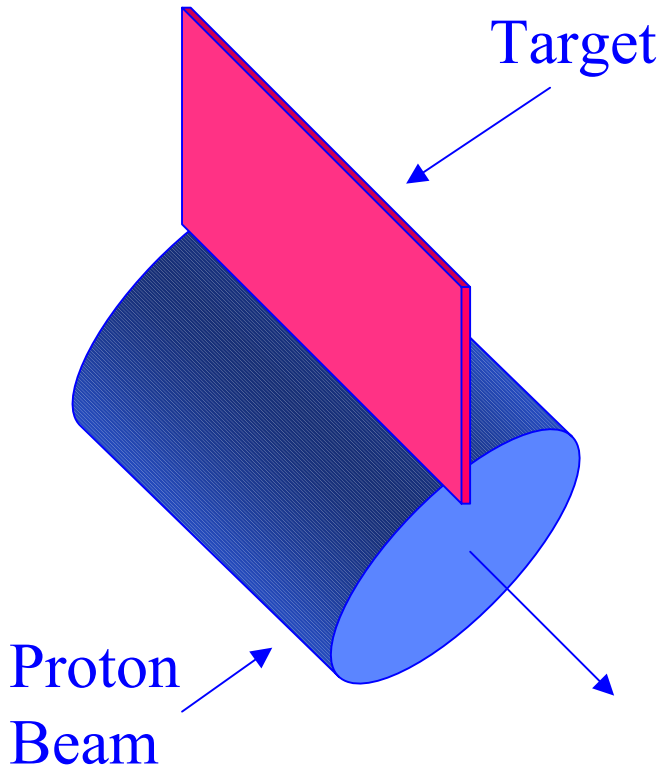


Beam bump:

- ~0.5ms
- <650 MeV

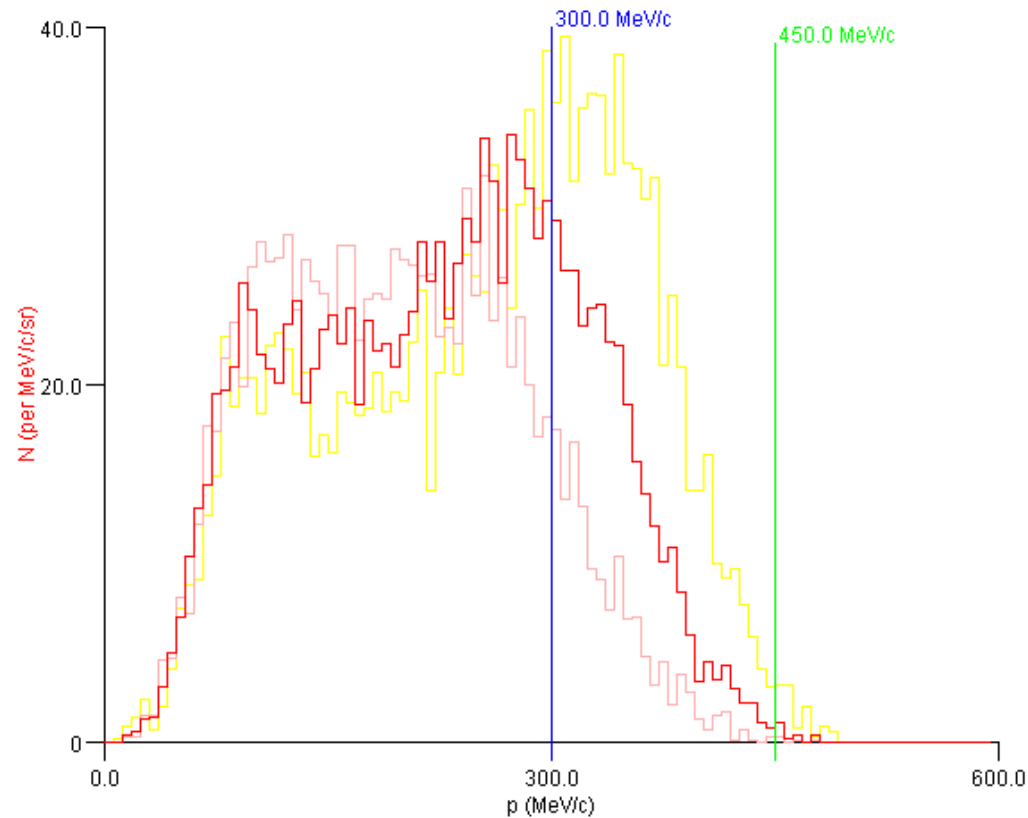
Target

LAHET - 626 MeV protons



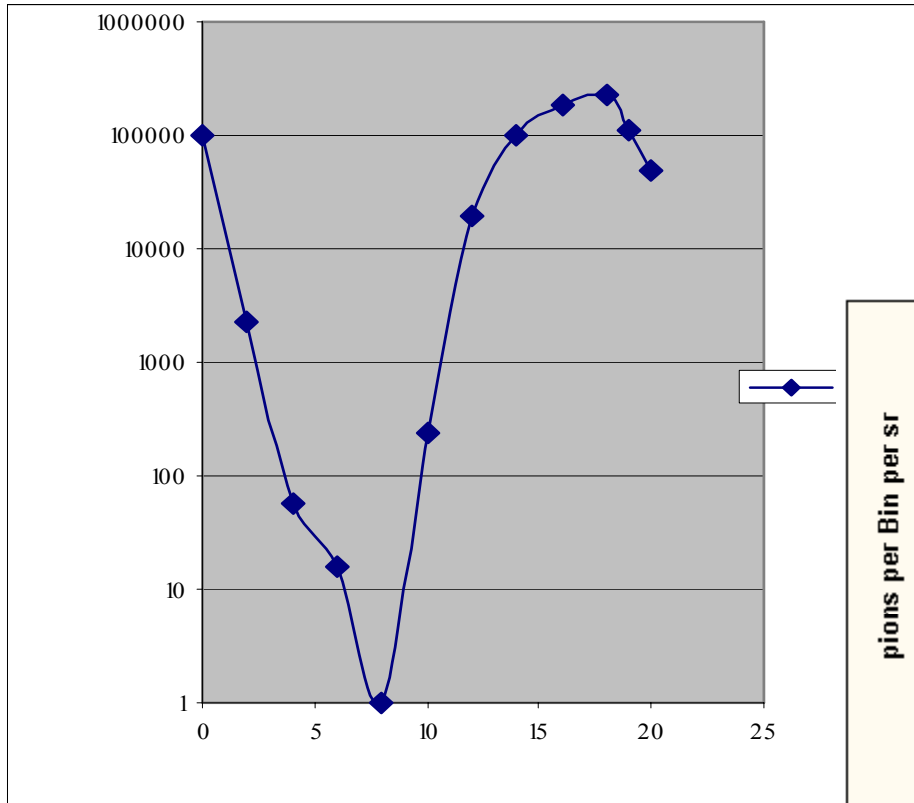
**0.0001% of beam
= 10^7 protons/bunch/turn**

25 to 35 degrees
35 to 45 degrees
45 to 55 degrees

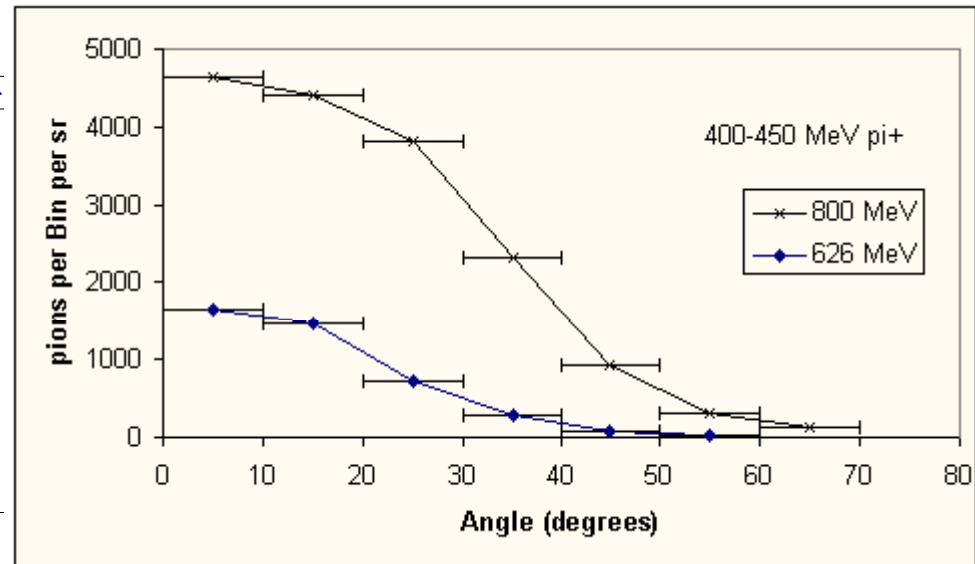


Target Improvements

500 MeV/c - mainly protons

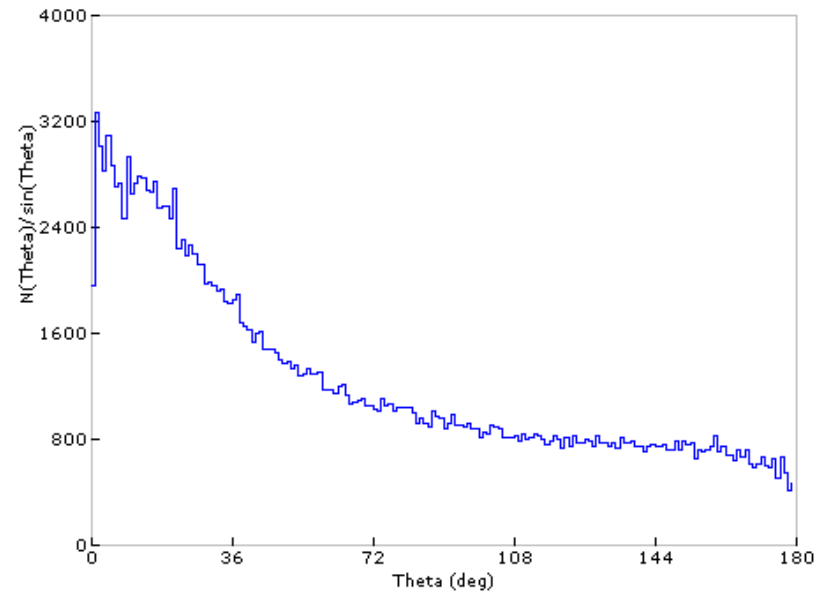
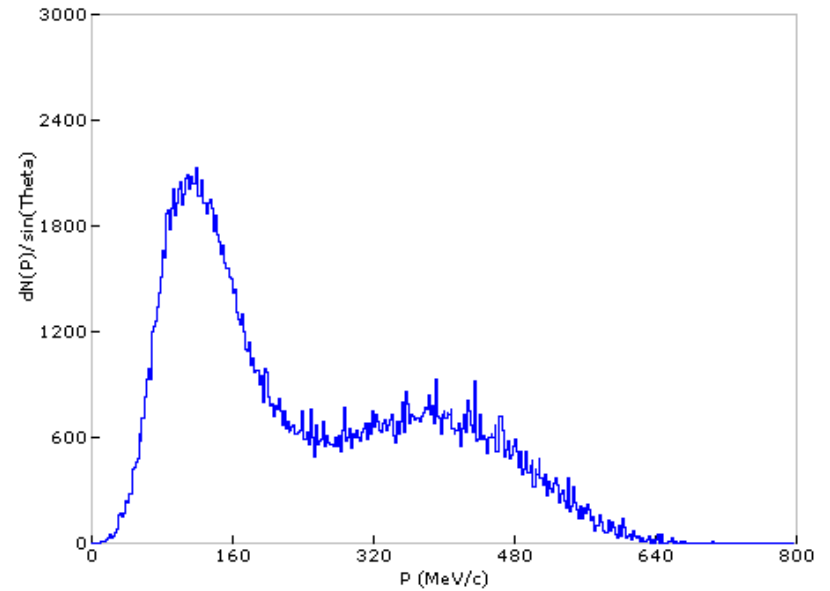
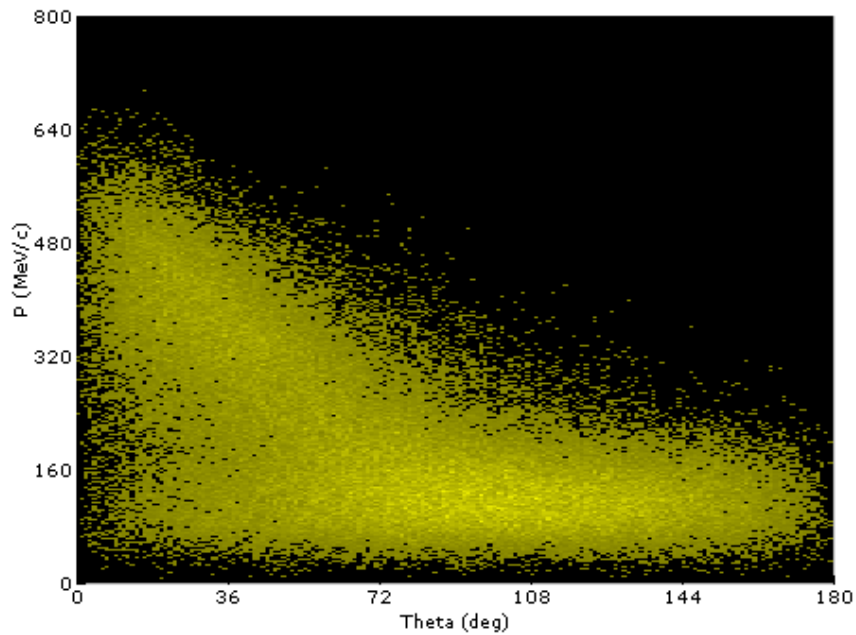


Goto higher energy & lower angle



Target Improvements

Pion production from 800 MeV protons on Ti



Existing beamline

- Capture at 40°
- 25m long
- Uses **NIMROD** beamline magnets: 7 GeV synchrotron
- Transmission poor at low momentum
- Closed in 1978: magnets and power supplies ~40 years old!

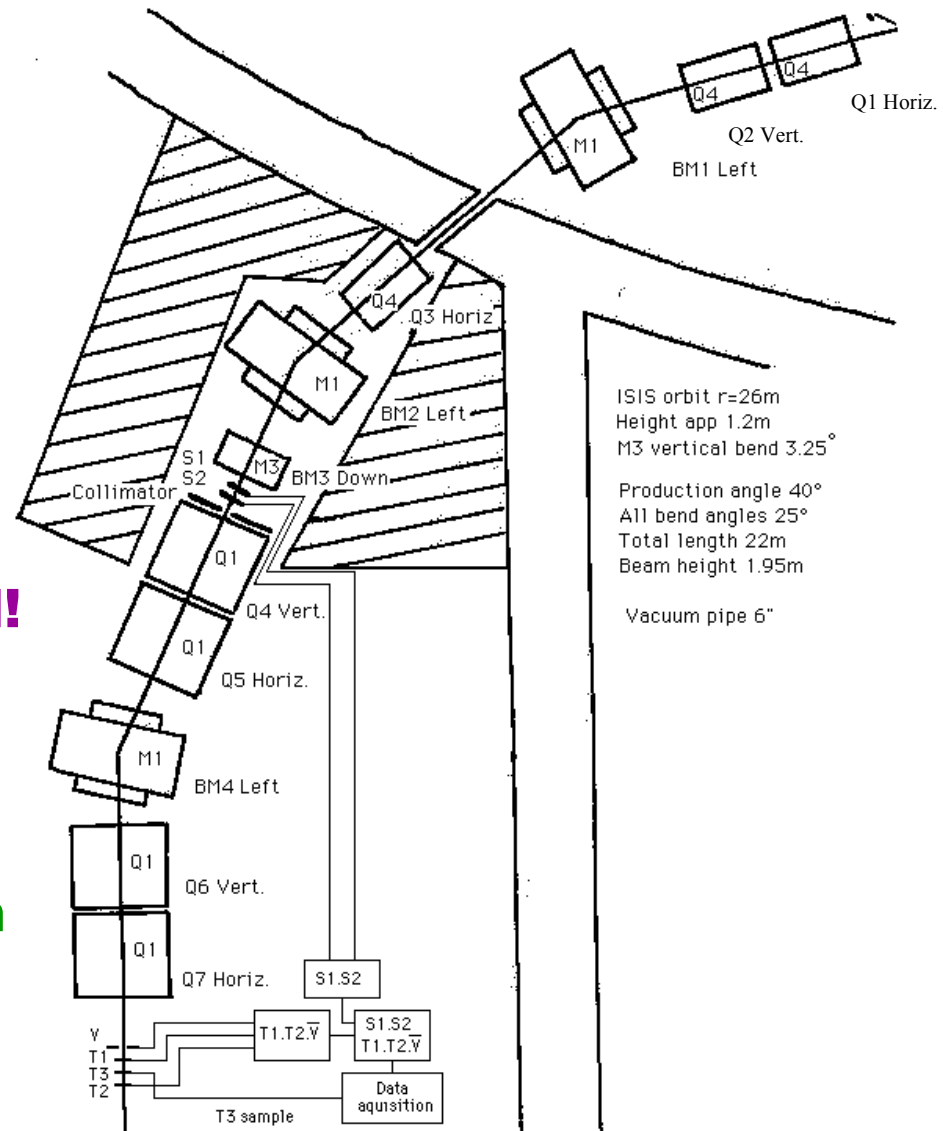
Simulations

For 10^7 protons at 626 MeV:

α ~0.05 muons/bunch/turn

α background 50 times

at 300 MeV/c



New beamline

- Capture at 20/30°
- 15-20m long
- Main change: 5T, 5m, 10cm SC solenoid
- Muon transmission ~2%
- Pion transmission <0.1%

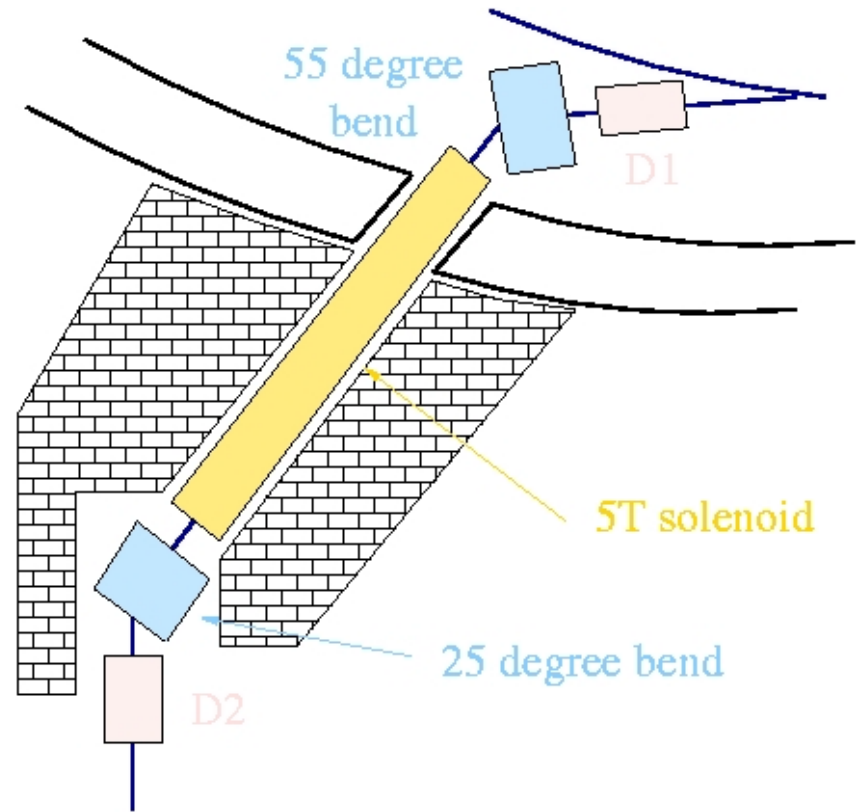
Simulations

For 10^7 protons at 800 MeV:

α ~50 muons/bunch/turn

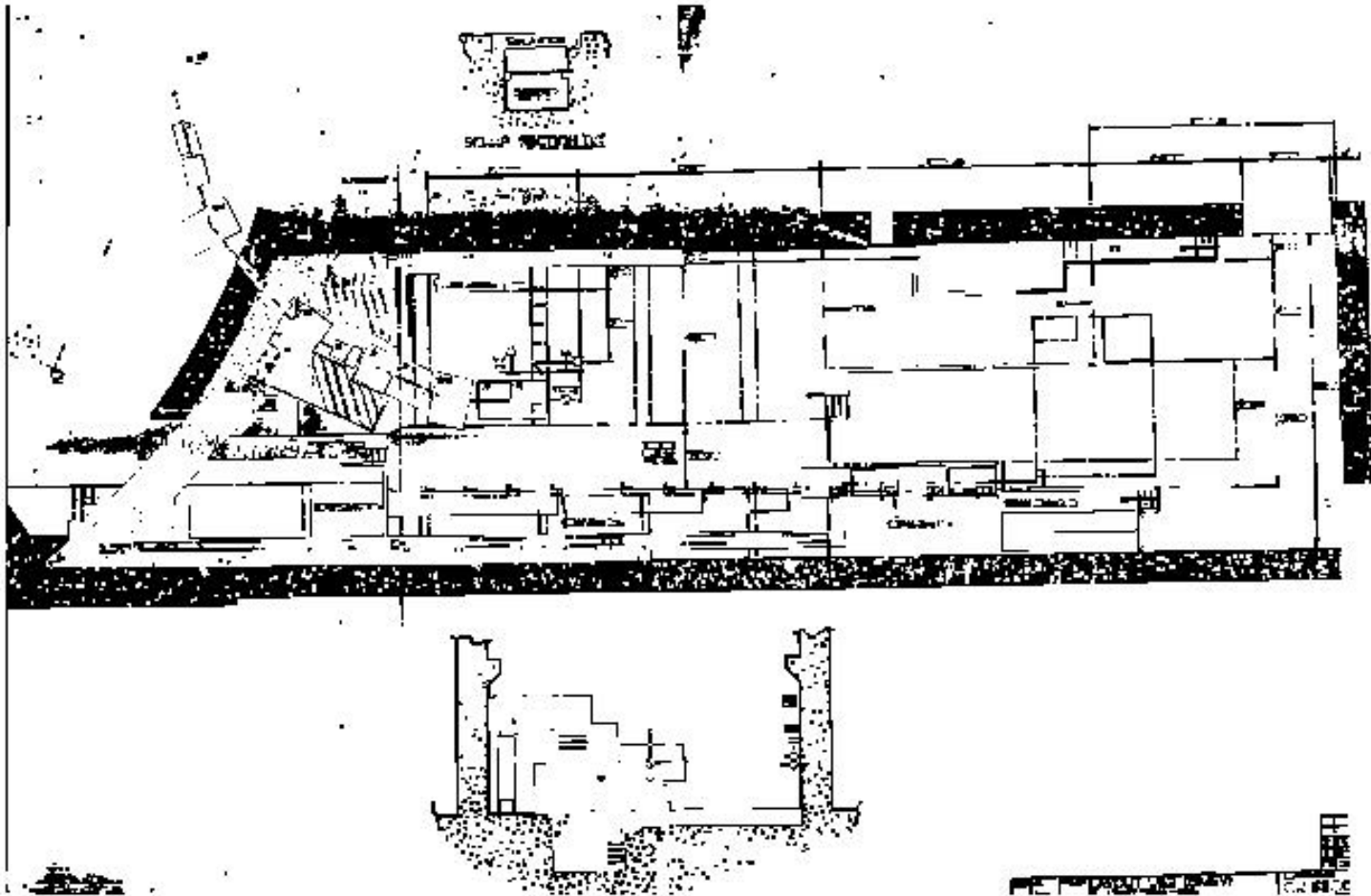
α background ~2.5 pions

at 300 MeV/c

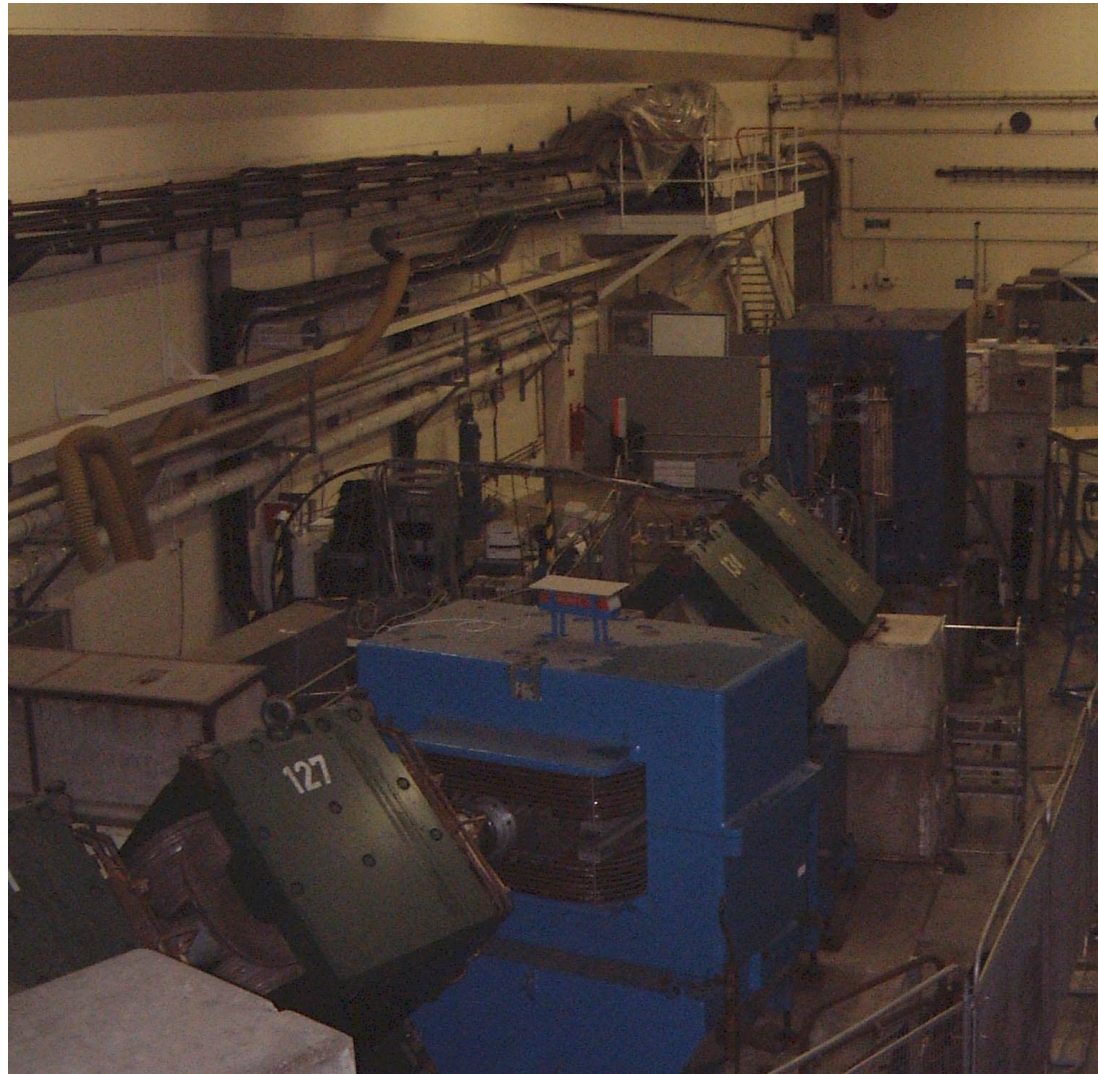


⇒ ~ 10^6 muon/s

Hall



Hall



Current status and plans - beam

Current beam line:

- **Fix target mechanism**
- **Low current power supplies for downstream**
- **Check rates**

New beam line:

- **Layout new beam design**
 - **new hole in ISIS wall**
 - **location of the experiment**
 - **magnet requirements**
- **Determine collection angle**
- **Get decay solenoid parameters**
- **Draw up new beam**

Current status and plans - experiment

- **Start safety case for LH2 (and LiH)**
- **Estimate cost!**
- **Obtain drawings of MICE components**
- **“ infrastructure, services, etc, requirements**
- **Investigate mods required to hall and surroundings**
- **Experimental contributions**

Conclusions

- **UK “project team” being formed**
- **MICE asked to submit proposal by end 2002**
- **New beam under development**
- **Evaluation of hosting MICE started**
- **Safety case will be tricky**
- **Much work to be done at RAL/by MICE!**
- **UK funding will (hopefully) be OK**