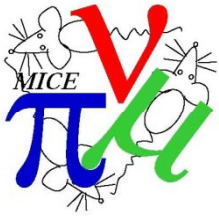




MICE, a facility for precision beams and muon cooling

Jean-Sebastien Graulich, Geneva

- o MICE in EuCARD
- o MICE Facility: Beam, Infrastructure and Services
- o MICE at RAL
- o Summary



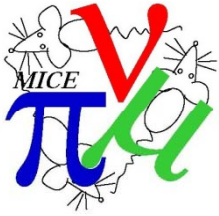
EuCARD and Trans-National Access

◆ MICE is part of EuCARD

- **EuCARD: European Coordination for Accelerator Research and Development**
- EU project supporting R&D in **accelerator science** and strengthening collaboration between European partners
- EuCARD is funded for **10 MEUR over 4 years**
- Starts in **April 2009**

◆ MICE is funded as a Trans-National Access project

- Gives users access to beams and advanced test facilities
- Funded for **220 kEUR over 3 years (2009-2012)**
 - **Access management:** 18 kEUR (Admin. Costs - liaison officer)
 - **Access cost :** 23 kEUR (Contribution to running cost)
 - **User support :** 180 kEUR (Travel and accomodation for MICE and non-MICE users)



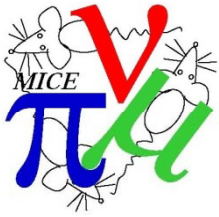
MICE in EuCARD

◆ MICE is Work Package 6 inside EuCARD

WP no.	Activity	WP short title	Total cost (k€)	EC request (k€)
1	MGT	Project Management	831	22
2	NA	DCO	273	137
3	NA	NEU2012	548	278
4	NA	AccNet	998	594
5	TA	HiRadMat@SPS	941	59
6	TA	MICE	1,635	222
7	RTD	HFM	6,438	2,057
8	RTD	ColMat	4,090	1,279
9	RTD	NCLinac	6,551	2,001
10	RTD	SRF	7,730	2,416
11	RTD	ANAC	3,018	0,934
Total (k€)			33,053	10,000

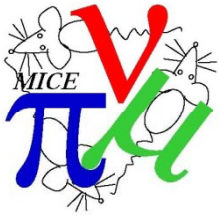
Further information: <http://www.cern.ch/EuCARD>

Relevant sections in EuCARD document : pp 32 – 33, 91 – 93)



MICE Facility

- ◆ **MICE provides**
 - **Particle Beams**
 - **Particle Detectors**
 - Spectrometer, Time of Flight, PID
 - **Super Conducting Solenoid Optics**
 - Including very large aperture Coils
 - **Liquid Hydrogen System (1m of liq H₂ along beam)**
 - **RF power station**
 - 8 MW peak power at 200 MHz
 - 23 MV of acceleration at 200 MHz
 - **And also:**
 - Local Control Room, DAQ and Data Storage Systems, Office Space



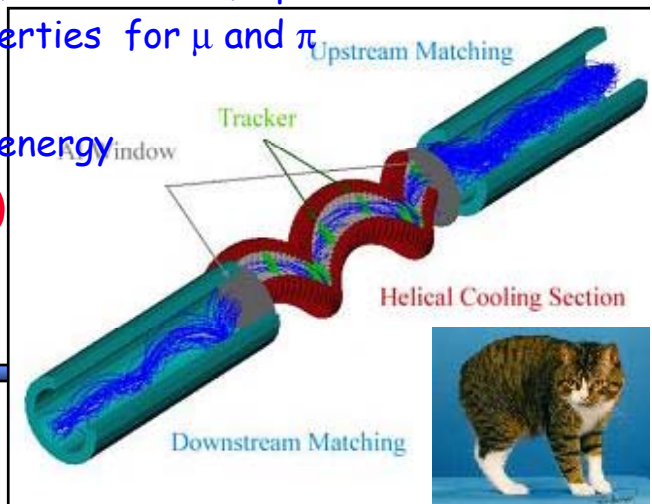
MICE Offers

- ◆ **Support for the presence at RAL of**
 - **MICE collaborators**
 - for equipment delivery and commissioning, data taking, experiments and analysis
 - Sofia, Milano, Trieste, Roma, Napoli, Pavia, NIKHEF, Geneva, Louvain... and CERN
 - **External Users**
 - New MICE collaborators (you are welcome..)
 - Detector development and tests in low energy beam
 - Como, ISS Detector groups: Poland, France, Switzerland, Spain
 - Precision determination of stopping properties for μ and π
 - e/μ PID optimization
 - μ Calorimetry or p measurement at low energy
 - **MICE "competitors" (or successors)**
 - Proponents of new cooling concepts
 - Studies, testbeam and experiment...

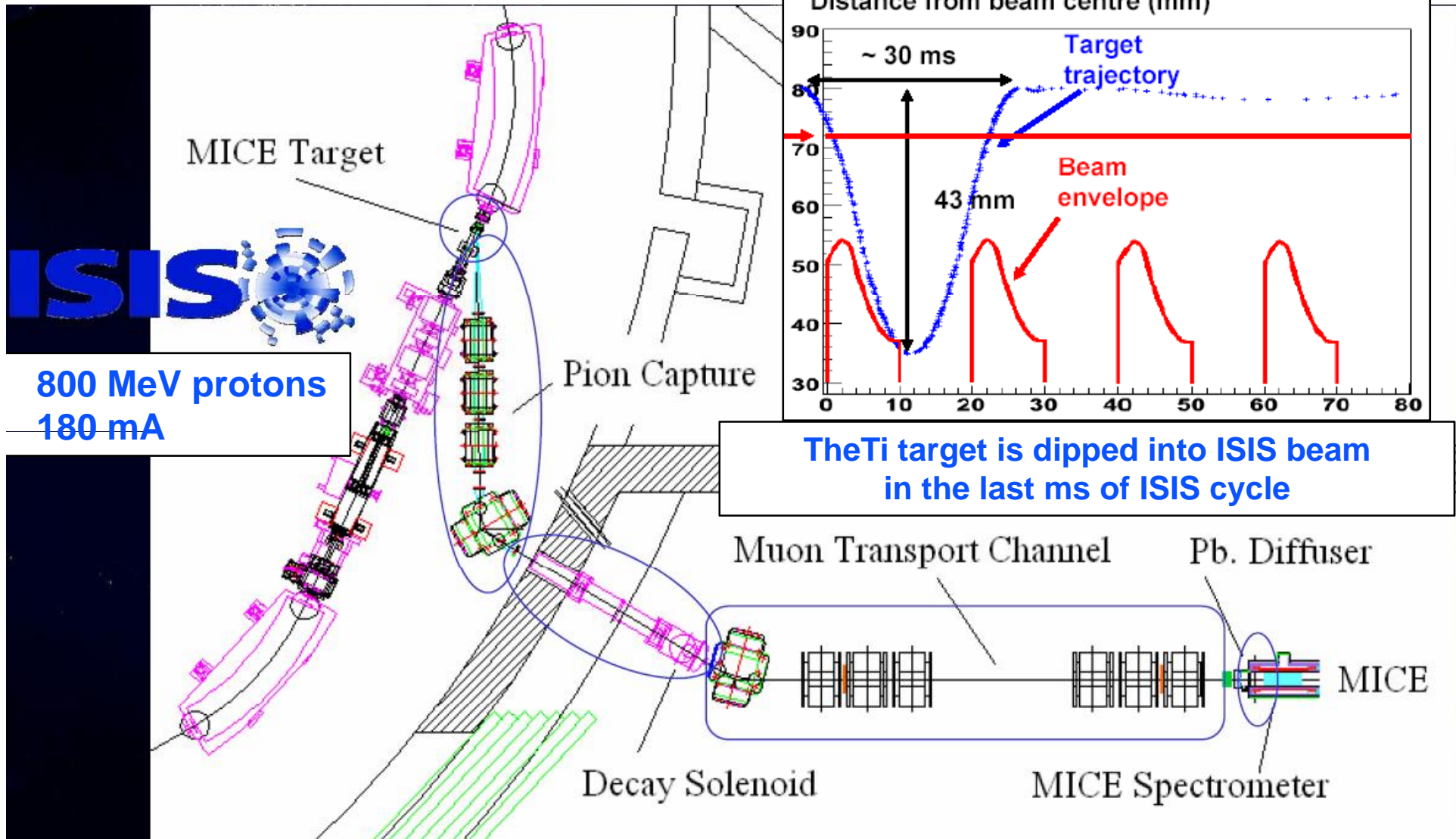
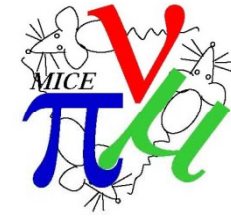
MANX or another bright idea

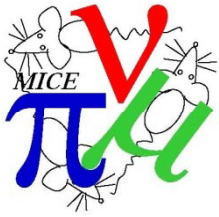
CARE08 Dec 2008

Jean-Sebastien Graulich



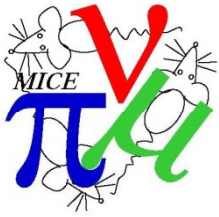
MICE Beam Line





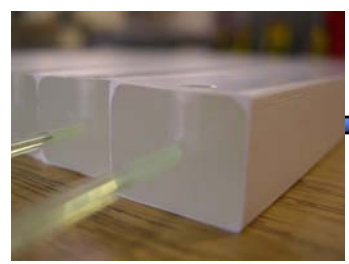
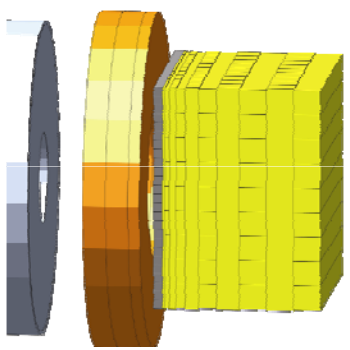
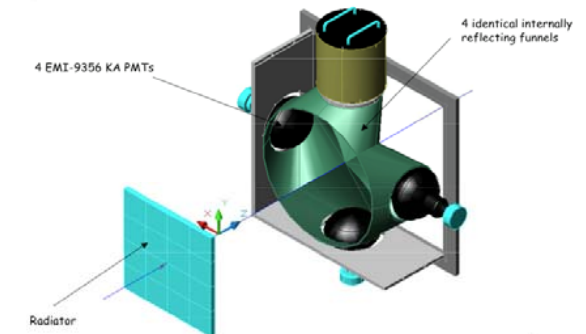
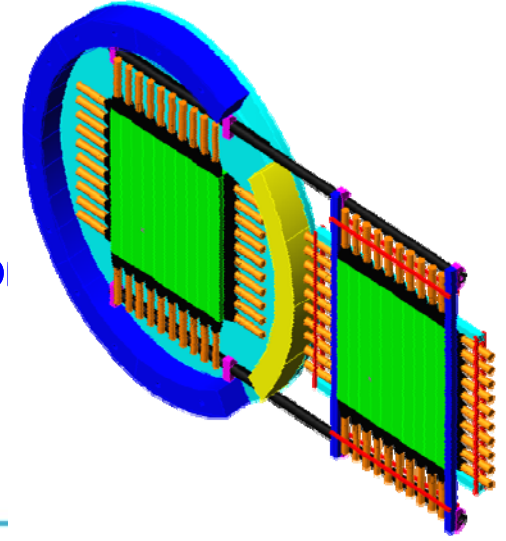
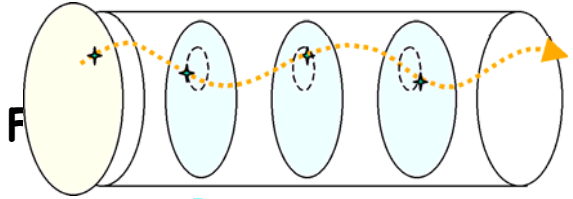
MICE Beams

- ◆ **All beams pulsed at ~1 Hz (target dip)**
 - Micro structure at 3 MHz (Bunching in ISIS)
- ◆ **Muons (either sign)**
 - Momentum from 120 MeV to 350 MeV/c
 - Up to 600 Muons/s
 - Expected for Spring 2009
- ◆ **Protons and pions**
 - Well separate by Time of Flight
 - Momentum up to 480 MeV/c
 - Thresholds: Protons @ 300 MeV/c, pions @ 150 MeV/c
 - Already > 5000 pps
- ◆ **Electrons**
 - ~ Pure beam @ 100 MeV/c
 - ~ 10 e⁺/s

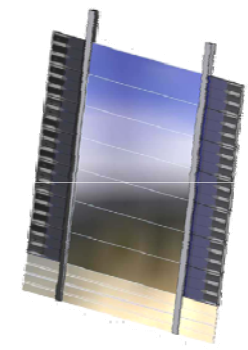


MICE Instrumentation

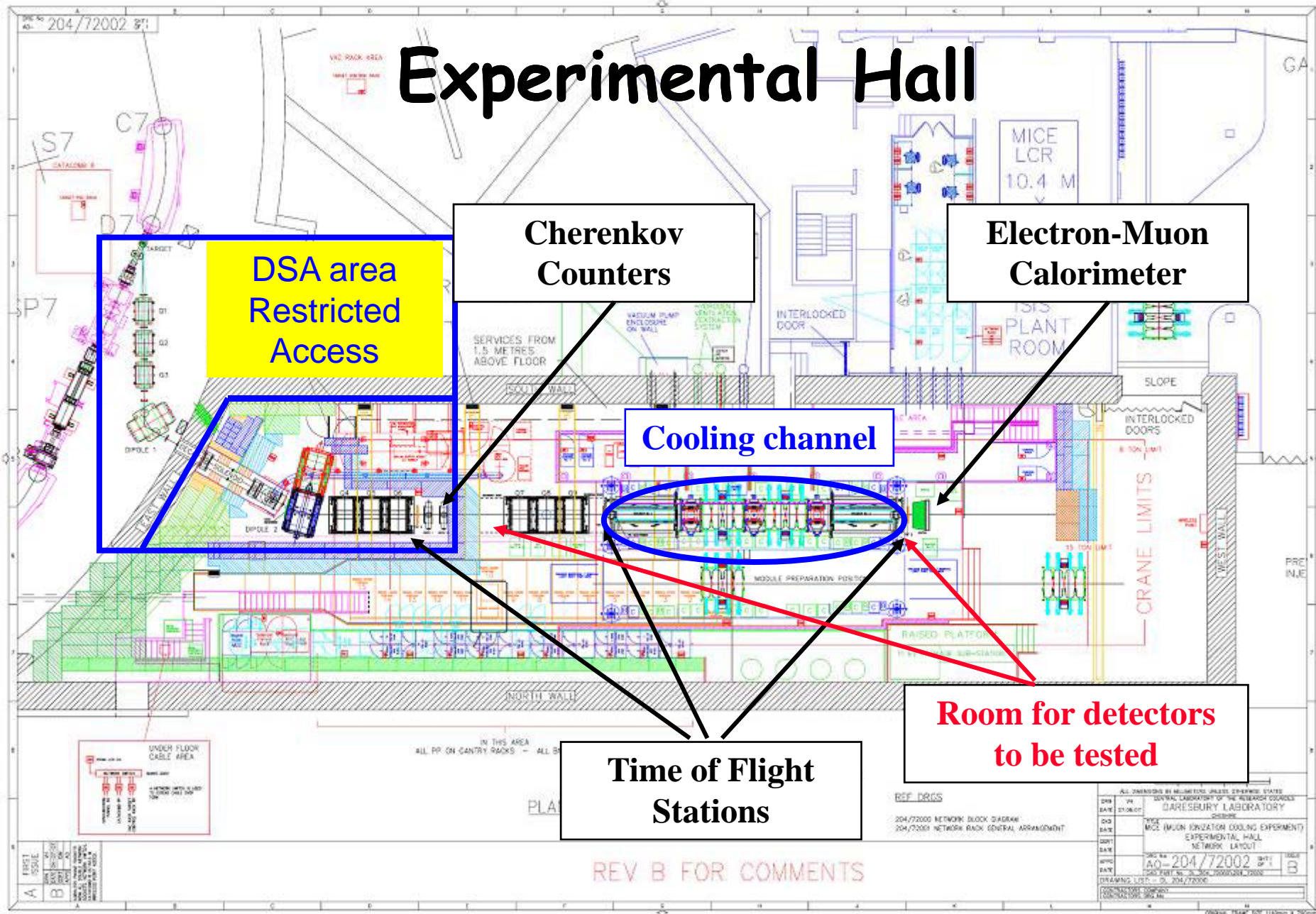
- ◆ **Tracker and Spectrometer (2 units)**
 - Scintillating fibres planes in $\sim 4T$ solenoid F
 - $\Delta P_T = 1.5 \text{ MeV}/c$ $\Delta P_Z = 3 \text{ MeV}/c$
- ◆ **Time of Flight (3 stations)**
 - High Precision: 50 ps per station
 - X-Y planes allow 2D profile
- ◆ **Additional Particle Identification Detectors**
 - Cherenkov
 - Aerogel, threshold counters
 - Calorimeter
 - Lead/SciFi EM-Module
 - + 1 ton fully active plastic scintil highly segmented (muon ranger)



Jean-Sebastien



Experimental Hall

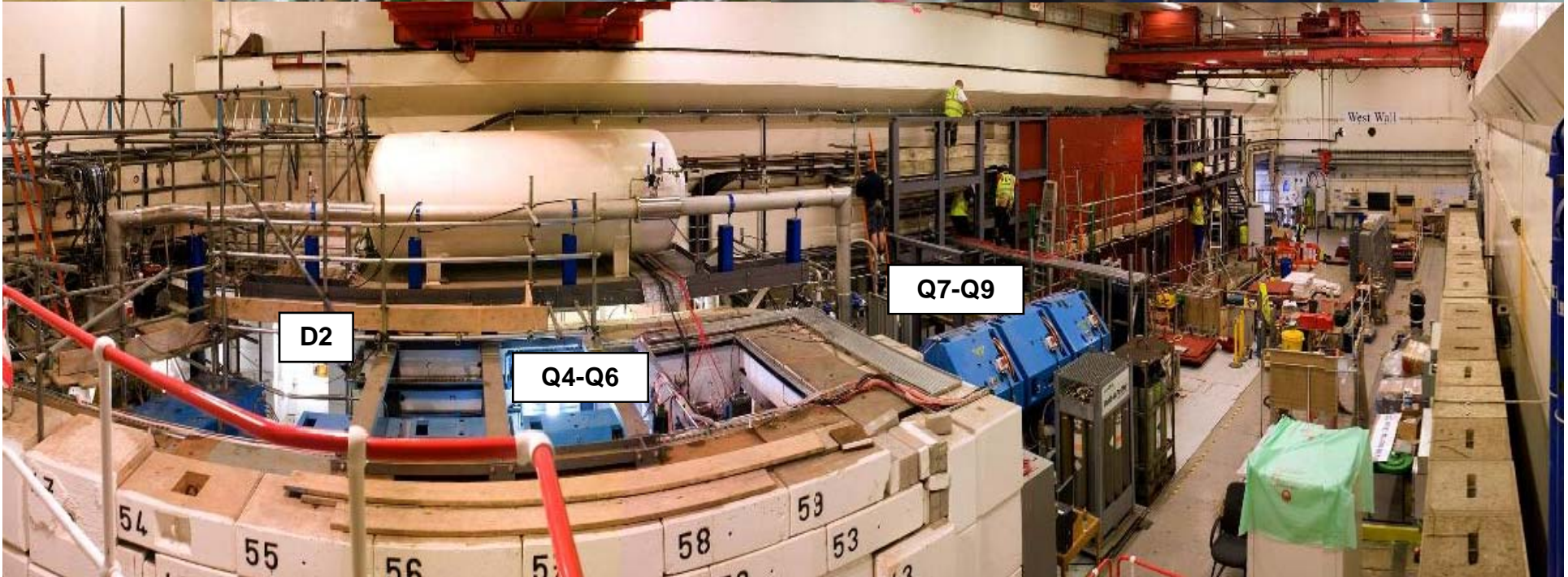




Q1-Q3 and D1
Inside the ISIS vault



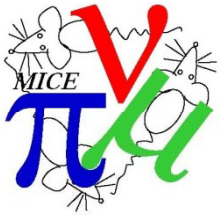
Pion decay solenoid installation



D2

Q4-Q6

Q7-Q9



MICE @ RAL

◆ Rutherford Appleton Laboratory

- Didcot, Oxfordshire, UK

◆ Access

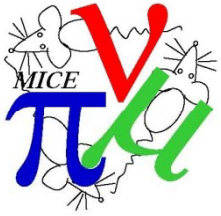
- Flight to London (LHR, LGW), Bristol, Birmingham
- ~ 2 hours in train/bus from these airports
- 15 mins drive from train station

◆ Accommodation

- Ridgeway house on site
- Cosener's House in Abingdon
- Many B&B around

◆ On site restaurant





Summary & Conclusion

- ◆ MICE is part of EuCARD
- ◆ MICE is funded as TA for 220 kEUR
- ◆ MICE offers support to users
- ◆ MICE provides
 - Beams
 - Detectors
 - Infrastructure
- ◆ All proposal to be submitted to **MICE**
CMPB c/o Ms Rose Hayes, STFC,
Rutherford Appleton Laboratory Didcot
OX11 0QX UK