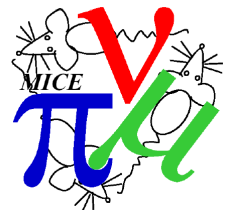


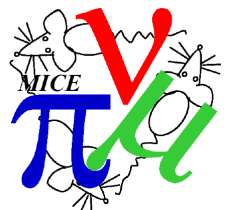
# Focus coils and LH2 system, Neon test

J Boehm (June 2017)



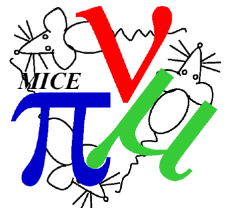
# Developments for LH2 operation

- During preparation for LH2 operation (this spring) serious concerns were raised regarding pressure build-up and subsequent gas escape
- Substantial changes have been made to the setup to remove these dangers
- A Hazard Assessment has been performed in May
- Results: no major obstacles, minor procedures and documentation will have to be adjusted
- Absorber within magnet bore has been cooled down with neon gas and neon has been liquefied – this proved for the second time the liquefaction process
- Focus coil has been quenched with cold absorber and liquid in bore – no effect on absorber integrity
- System is now being made ready for a third neon test and subsequent operation with hydrogen gas and liquid



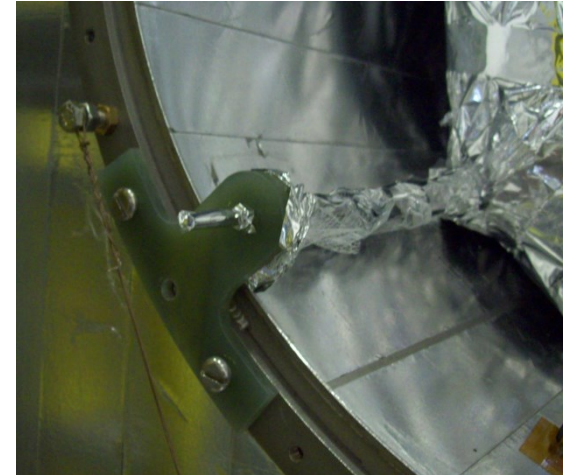
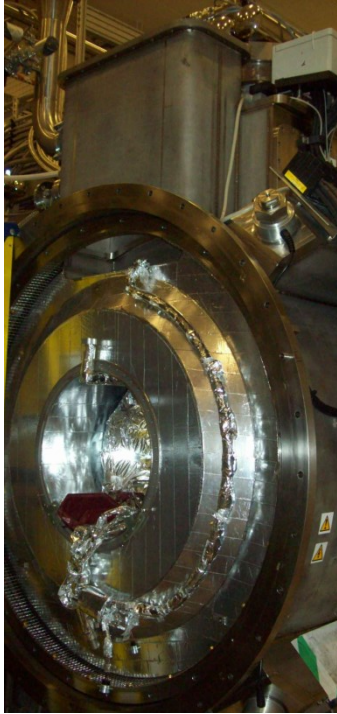
# Focus coil, quench test with Neon

- FCD is being energised with liquid neon in the absorber (about 1.5 litres)
- No solenoids are powered next to the focus coil
- From previous test this magnet should be stable up to about 180A (design: 225A)
- Ramping is divided into three sections: up to 50A: 25mA/s, up to 70A: 15mA/s, above 70A: 10mA/s
- Gas pressure rises until 70A, then falls and starts to rise again at approx 170A, indicating that stable running is possible at currents up to 170A
- Magnet quenches at 184.9A, pressure in absorber 1155mbar max (down to control pressure of 1140mbar after 5 minutes)
- Isolation vacuum in magnet bore remains unchanged at 2.1E-4 mbar: indication for no mechanical damage
- On Pico logger: main coils quenched, not the current leads
- On magnet terminals: after 20min upstream coil shows higher resistance (21.6 Ohm) than downstream coil (19.0 Ohm). Next day the resistances are equal
- This happened on June 7th



# Absorber after quench

Purpose of test: verify mechanical reliability of absorber under eddy current forces

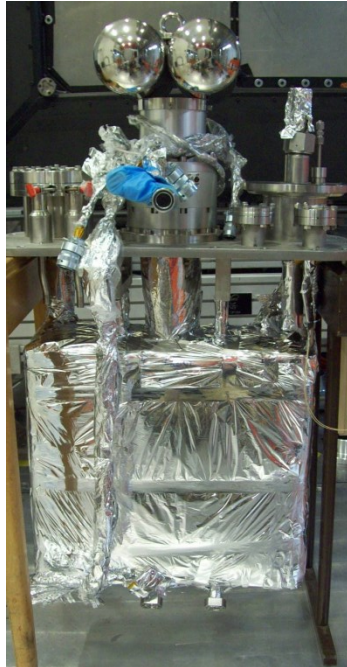


No visible sign of any damage to the suspension

Absorber was cooled to 27K and 1.5 litres of neon was condensed. The focus coil was ramped and it quenched at 184.9A.



# Recondensor turret, by-pass

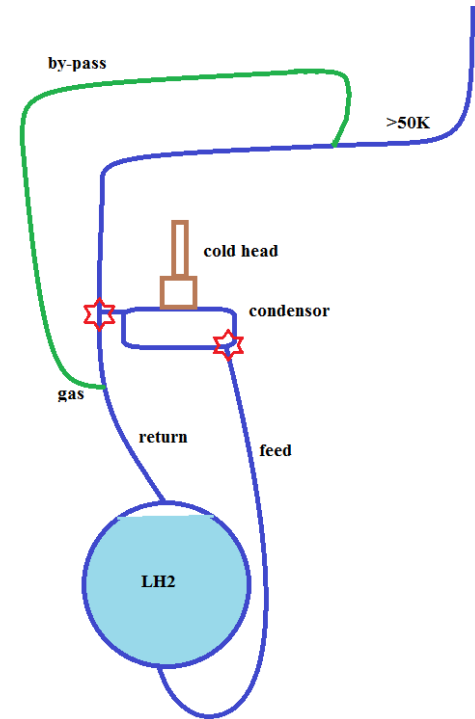


Original turret



Changed turret

The change-over is underway presently



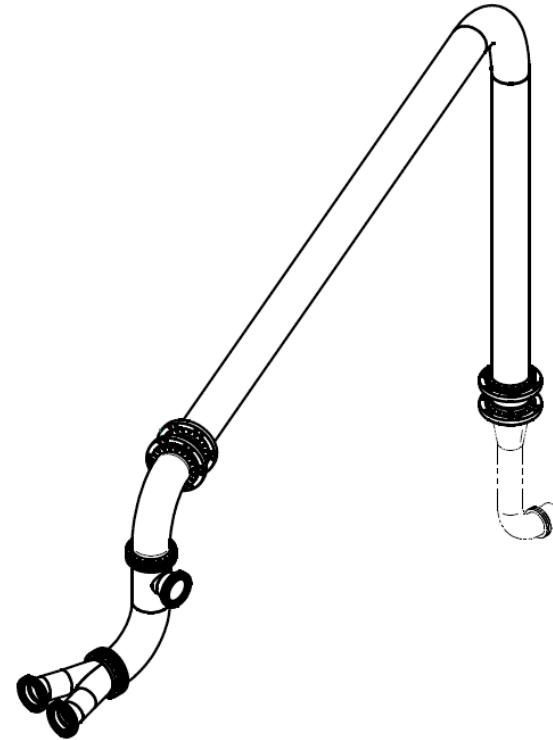
The pipe in the middle is the by-pass pipe between the hydrogen absorber at 20K and the return pipes at 50K: no freezing possible as contact to cold head is avoided



# Lift-off valve on widened quench duct



In the event of sudden pressure build-up in magnet bore: the aluminium lid will lift, release hydrogen gas and will re-seal the quench line afterwards



Magnet side

The quench line from the magnet to the housing on the roof of the building has been significantly increased in diameter and streamlined to limit any rise in pressure



# Outstanding issues

- Install modified turret
- Check correct operation of lift-off valve
- Finalise quench duct
- Repeat cool-down with neon (this would be the third time)
- Check modified control software (modified in June)
- Complete documentation
- Have LH2 system signed off by ISIS
- Cool down with hydrogen

