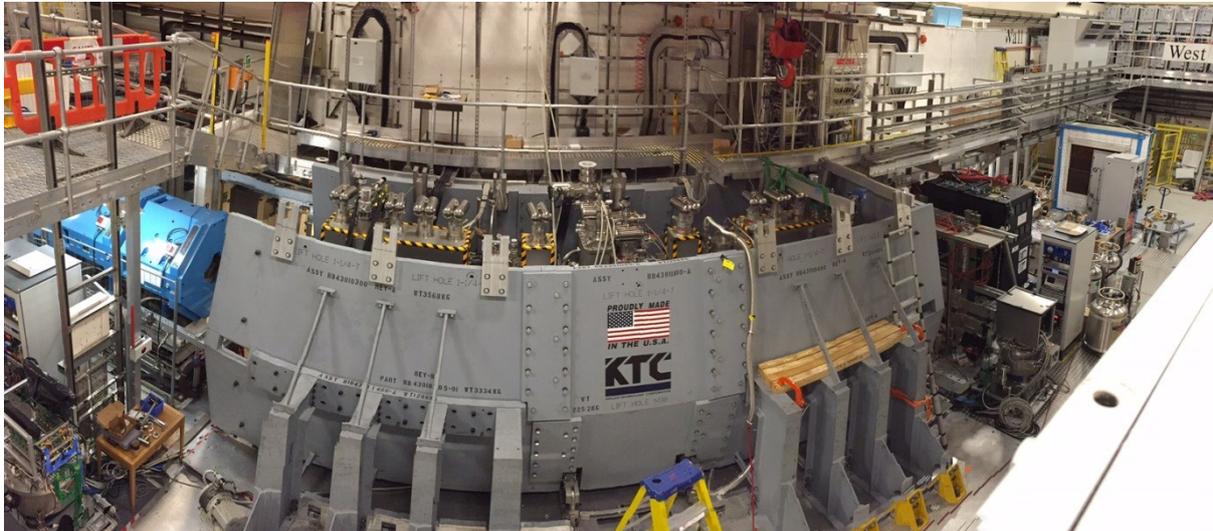
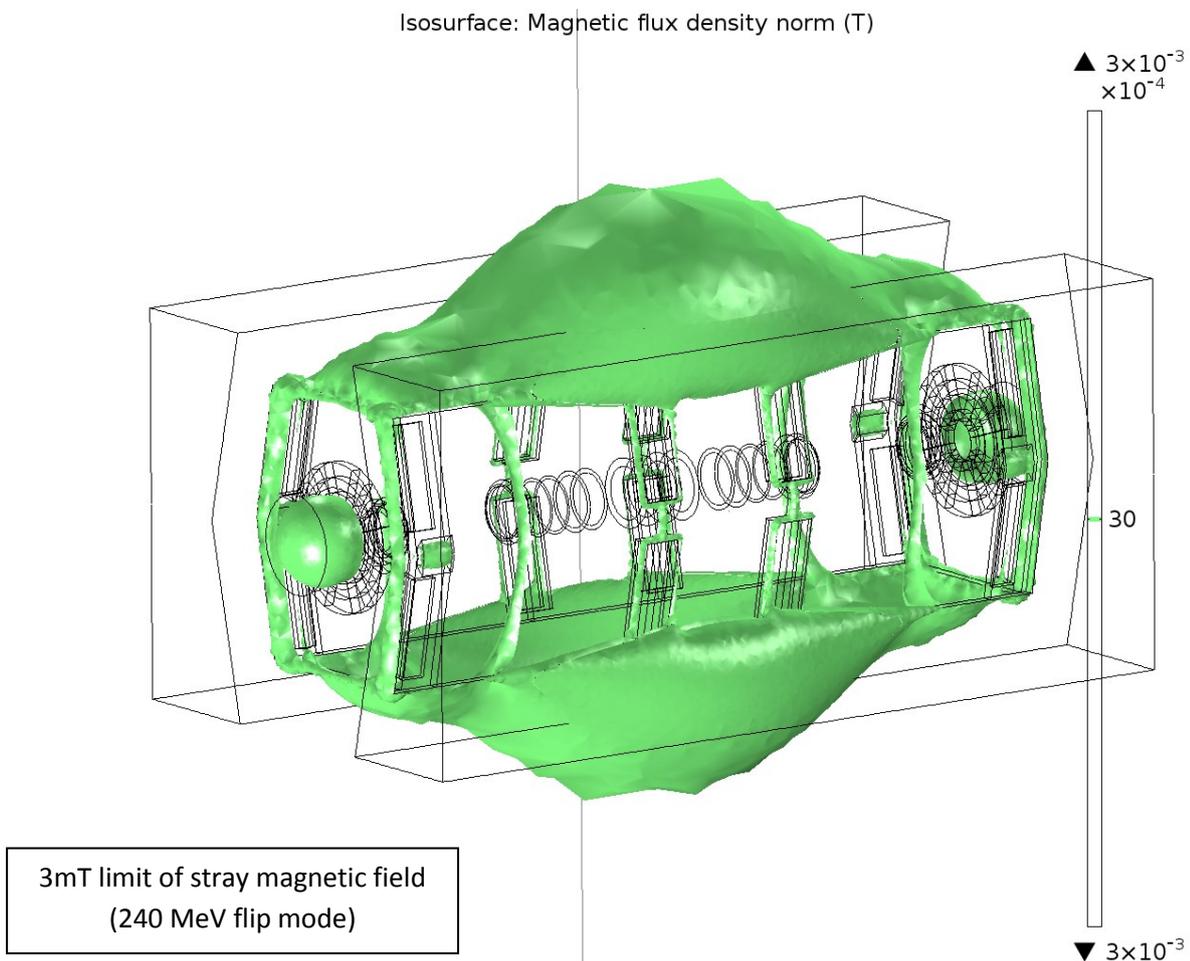


Specification of stray magnetic field measurements around MICE

The stray magnetic field produced by the superconducting magnets in the MICE cooling channel is intended to be almost totally mitigated by the surrounding partial return yoke (PRY). This painted grey steel construction can be seen in the picture below



The PRY has been modelled and designed to reduce the stray field within the envelope of the assembly down to a figure of 3mT laterally and 10mT vertically.



As this will still produce a stray field higher than the earth's natural background of ~0.5 Gauss (0.05mT) it has been decided that the MICE project should monitor the level around the experiment to ensure that it does not produce any undesired effect on ISIS or MICE operations. To achieve this it is intended to measure and record the magnetic field at a few key locations around the hall so that the data can be monitored and reviewed.

Map of positions:

See page overleaf.

ISIS (Red) locations measuring magnetic field at key operationally sensitive areas

MICE (Green) locations measuring PRY performance to ensure equipment & personnel safety

Measurement logging and availability of data:

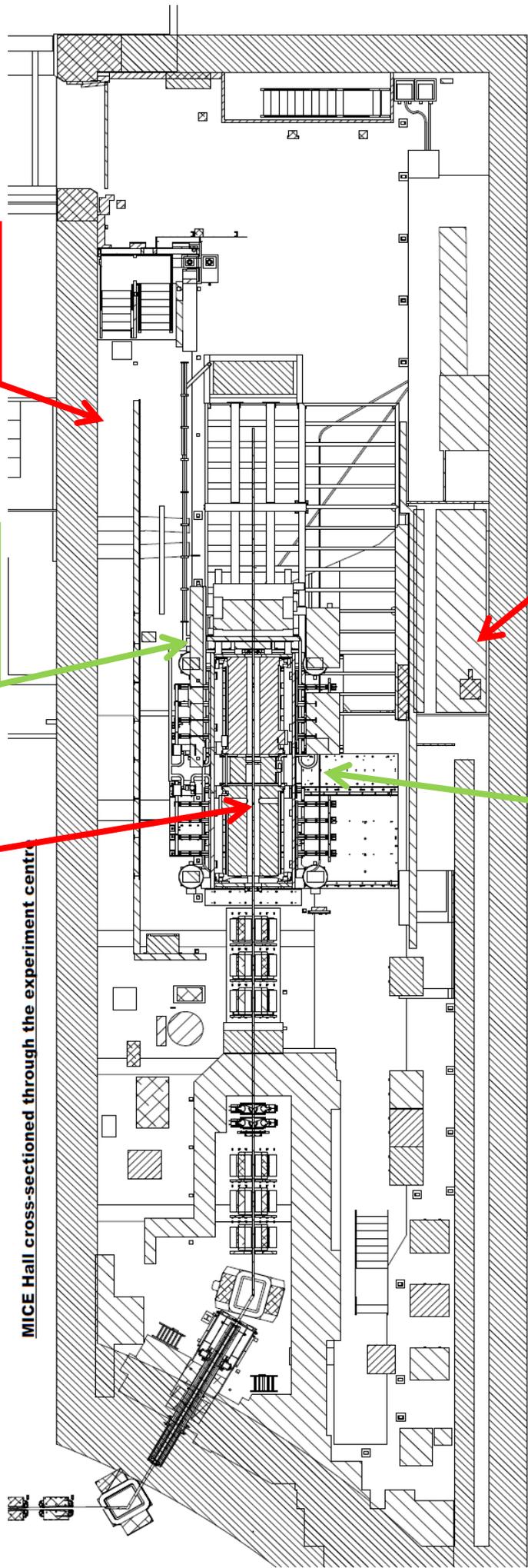
The magnitude of the stray magnetic field will be measured in the stated locations with a 3-axis hall probe and at a user-selectable time delay of up to 0.25s intervals with an accuracy of 1% and 0.01 Gauss resolution. The data will be logged and saved locally on the attached computers and also transferred via Ethernet connection to a central archive machine.

It is intended in the near future that the data will be processed into MICE EPICS process variables and the ISIS relevant information sent to the MCR to be included in a MICE status display.

Specification of sensor:

SPECIFICATIONS: 3-axis DC Gaussmeter VGM	
Range/Resolution:	0-799.99 G/ 0.01 G. Includes polarity of X, Y, Z. Magnitude = is sqrt of sum of squares.
Accuracy:	1° of reading (16° to 29° C), 2% of reading (-4° to 65° C) Pointing accuracy 1% of arc.
Offsets:	Relative zero (subtracts present field from X, Y, Z); Unlimited manual offset of X, Y, Z.
Probe:	3-axis nondetachable 6.3 x 6.3 x 50 mm long. All three sensors are within 1.5 mm of probe end.
Peak Hold:	0.005 sec time constant. Peaks in X, Y, Z and magnitude are recorded and stored separately.
Alarm:	Associated with magnitude only, 5 millisecond response time; Simultaneous red light.
Alarm Levels:	100 levels can be selected, from 1.00 to 790.00 G
Meter Size:	5.8 x 3.8 x 2.0 inches; 147 x 97 x 51 mm
Weight:	11.7 oz
Battery:	9 volt alkaline (~ 10 hour life) / "Low Battery" indicator.

Includes NIST traceable calibration certificate



Probe fixed by the wall on the south mezz on the opposite side to the MCR and diagnostics room

Probe fixed on the corner of the south mezz above the downstream end of the cooling channel

Probe fixed under the cooling channel magnets in floor duct No.5 amongst ISIS cabling

Probe fixed by the wall in the RF cage area on the opposite side to the LINAC

Probe fixed outside the PRY shielding by the open area to the north of cooling channel

Probes to ensure safe operation of **ISIS** systems

Probes to ensure safe operation of **MICE** systems

ISIS foyer:

It was requested that the stray field in the ISIS foyer area be measured. As this is likely to be near background level it was agreed that this would be measured at the request of ISIS using a portable meter.

5Gauss line:

The 5 Gauss safety line for pacemakers has been taped to the floor around the cooling channel using yellow & black safety tape. The position of this is presently based upon the FEA model with a small safety factor added. During the magnet commissioning period the position of the 5 Gauss field will be checked to make sure the line is correctly placed. Once the magnets are fully trained and operating at full current this position will be finally assessed and a more hard-wearing line will be painted on the floor to replace the tape.

Mapping of stray field in hall to validate FEA:

Once the magnets are commissioned and operating at full current the stray field all around the cooling channel will be comprehensively measured to validate the development models produced by Holger Witte and Paul Smith using Opera and ComSol FEA software.

It is intended that the field will be measured in a 3D matrix around the channel using a custom built assembly utilising a portable 3-axis hall probe attached to a laser tracker nest used to record position.