Status and plans for ISS

Update on progress since ISCC on 7/2/2017 (Liam Gaffney)

UNIVERSITY OF LIVERPOOL

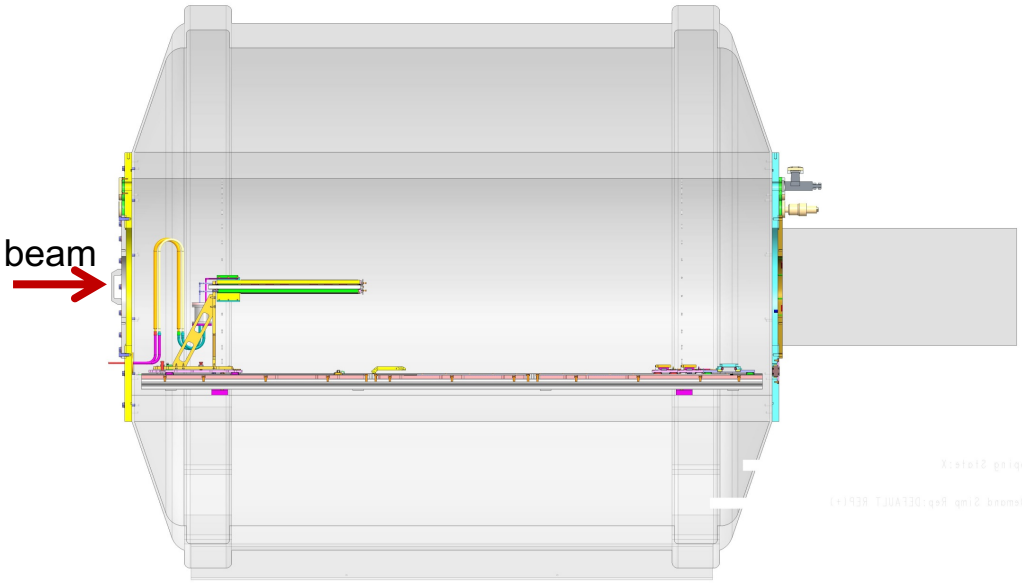
Robert Page

ISS funding context

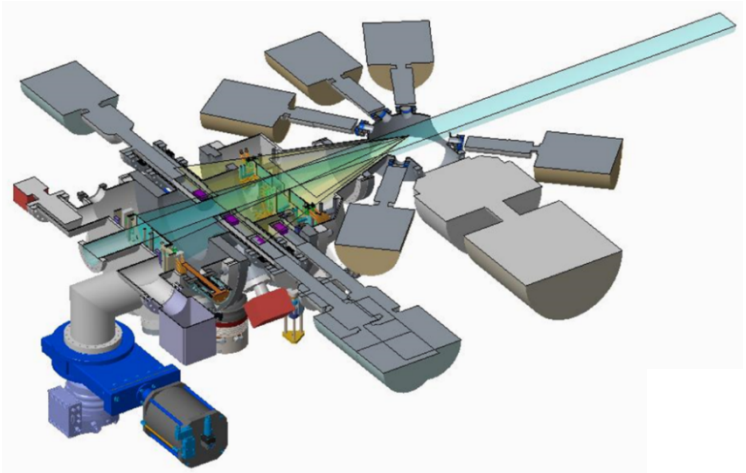
UK STFC funding ~£5M

Funding started January 2015

Construct 2 spectrometer systems

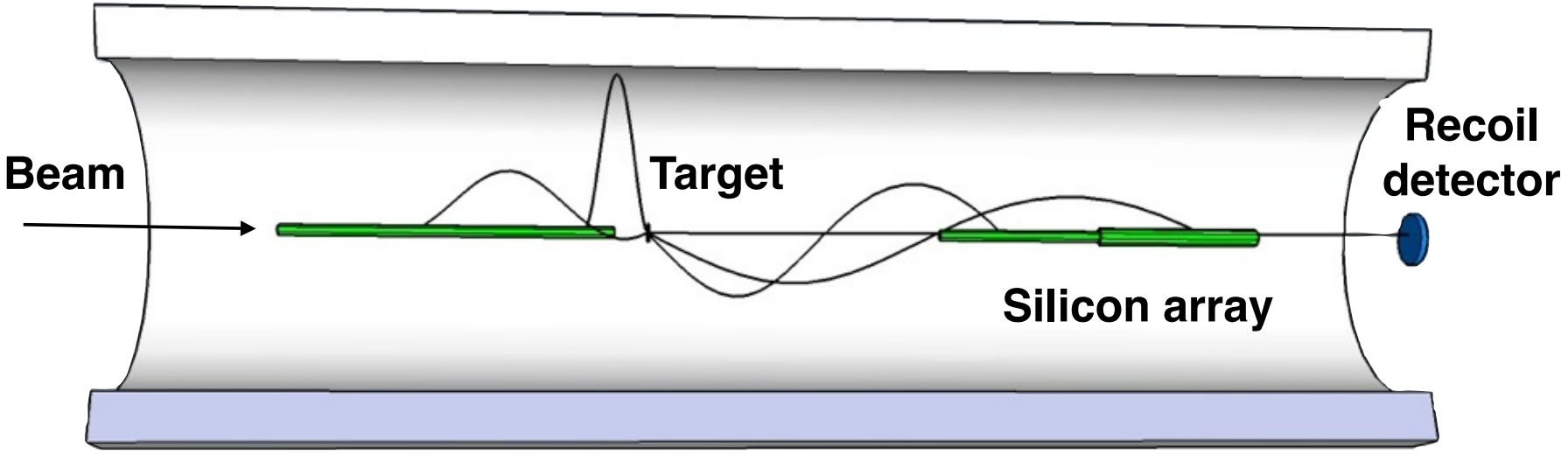


ISS to use HIE-ISOLDE beams

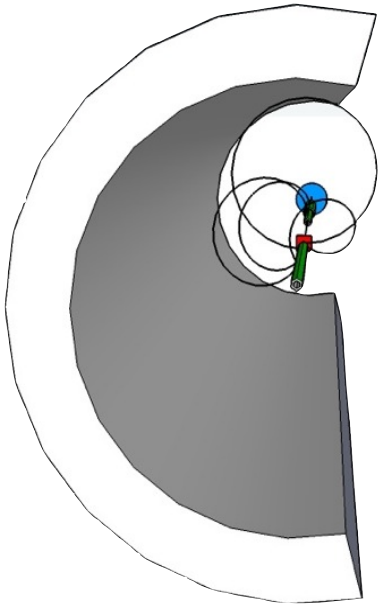


Si detector system on CRYRING@ESR

Solenoidal spectrometer concept



- Magnet
- Beam
- Si array
- Physics
- Collaboration



Magnet cooling

Cooling with liquid He started 6/2/2017

Thanks to CERN cryogenics team, Patrick Retz, ...

Magnet Energising, February 2017

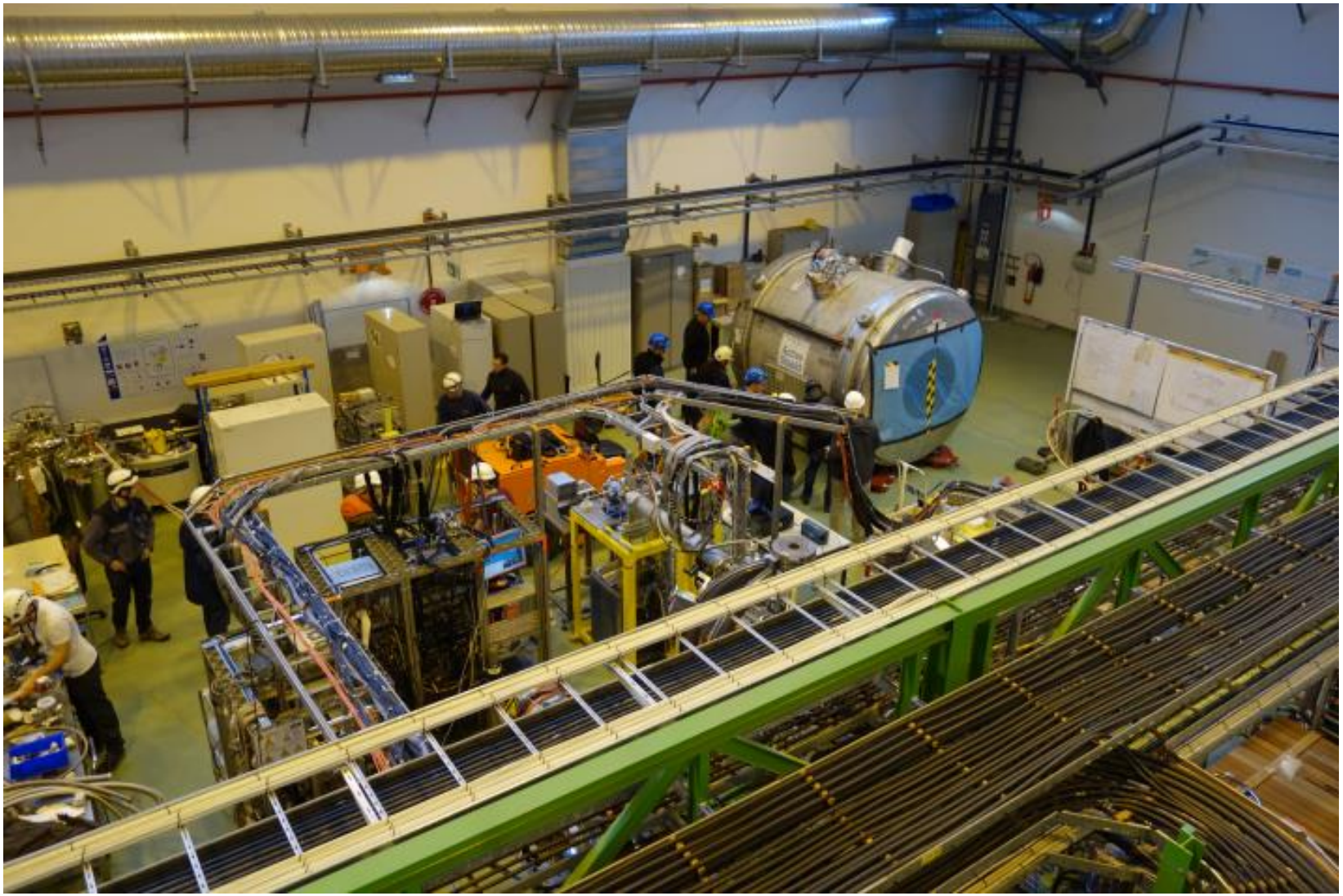
ramped up to 2.75 T, held for 1 hour then ramped down

Into the ISOLDE Hall, March 2017

Into the ISOLDE Hall, March 2017

~18 tons – too heavy for ISOLDE hall crane!

Into the ISOLDE Hall, March 2017



Thanks to all at CERN for careful planning & execution

Magnet base frame tests, May 2017

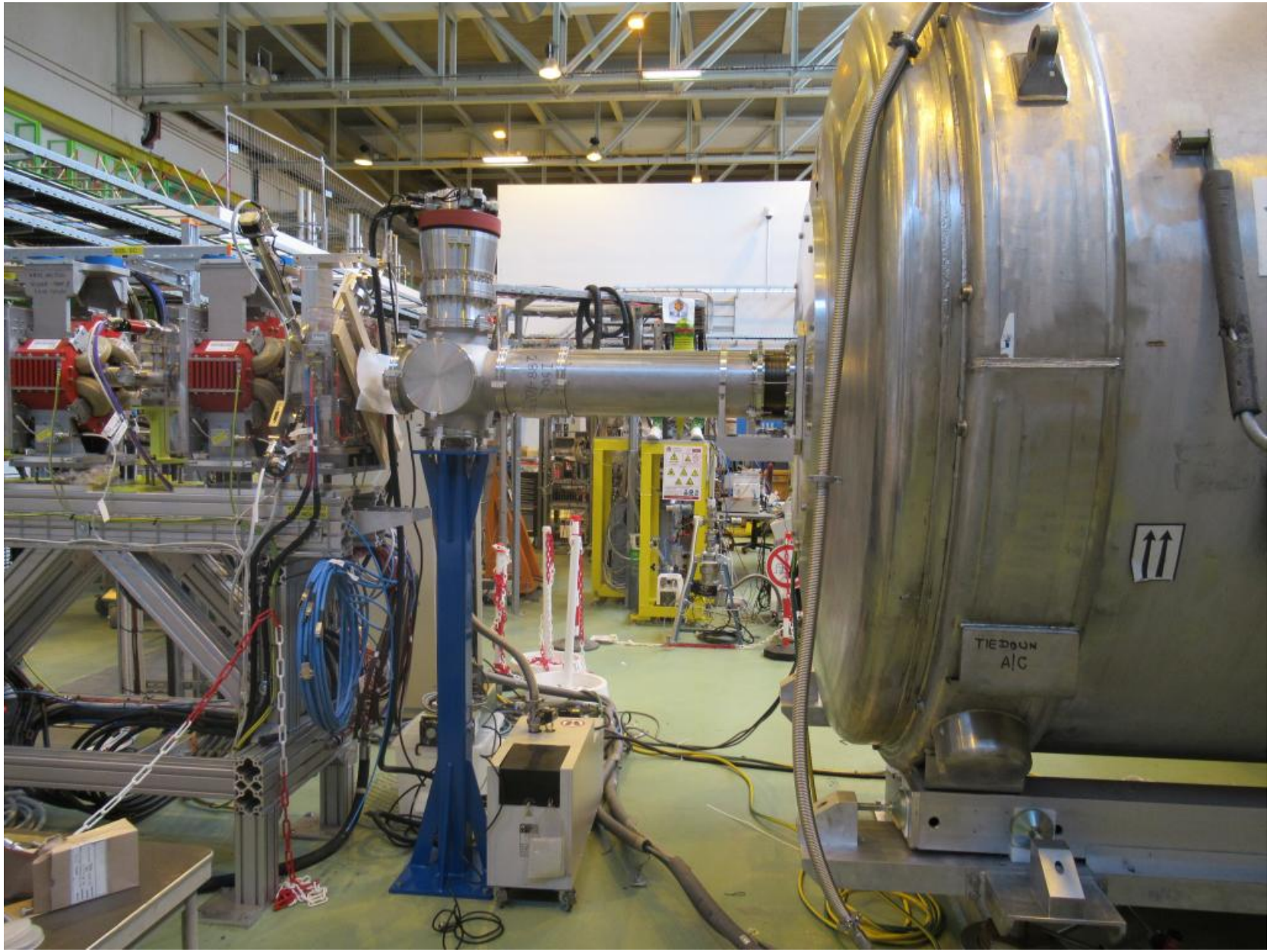
Frame manufacture paid for by KU Leuven

Magnet on base frame, June 2017

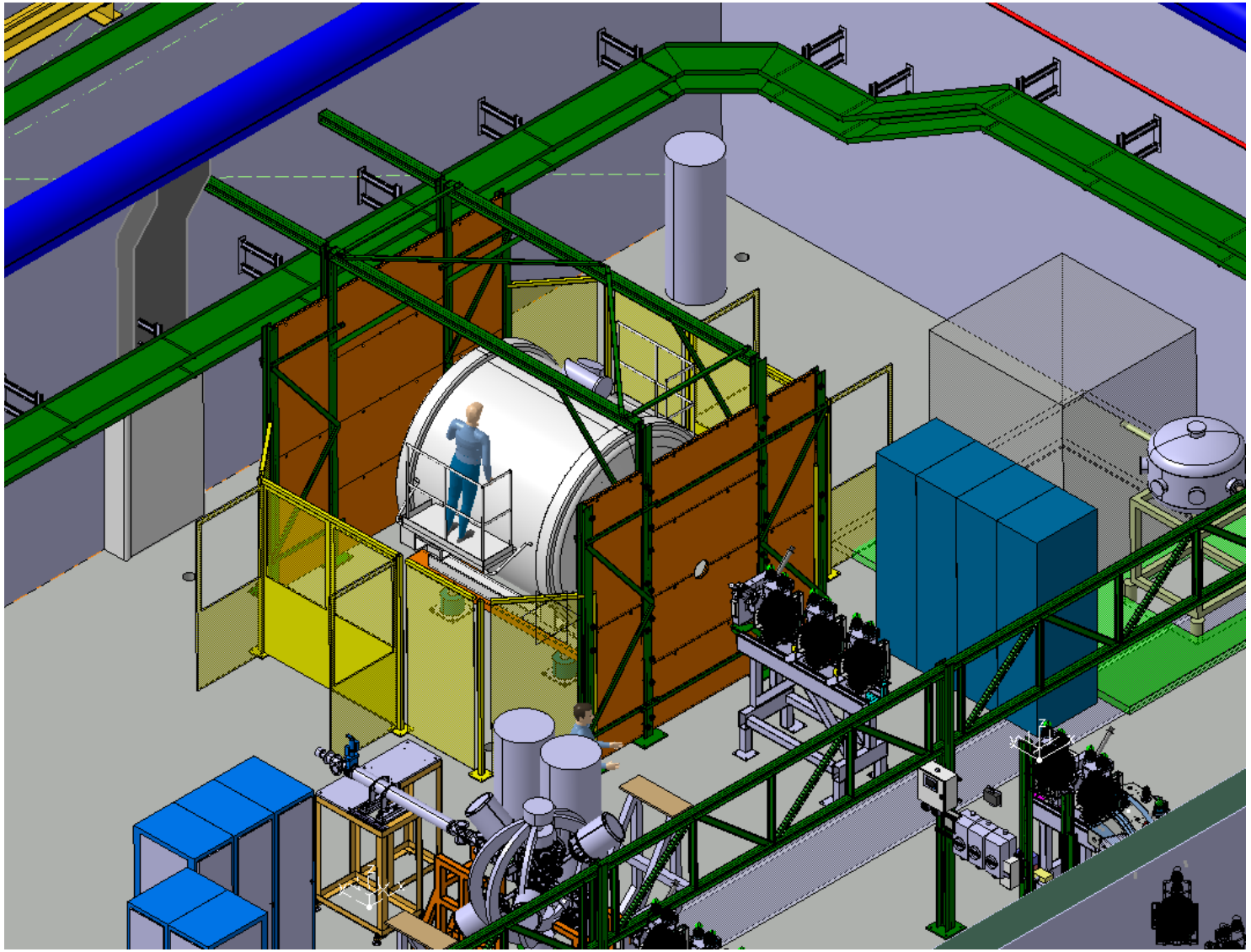
Magnet on base frame, June 2017

Magnet on base frame, June 2017

Aligned & connected, June 2017

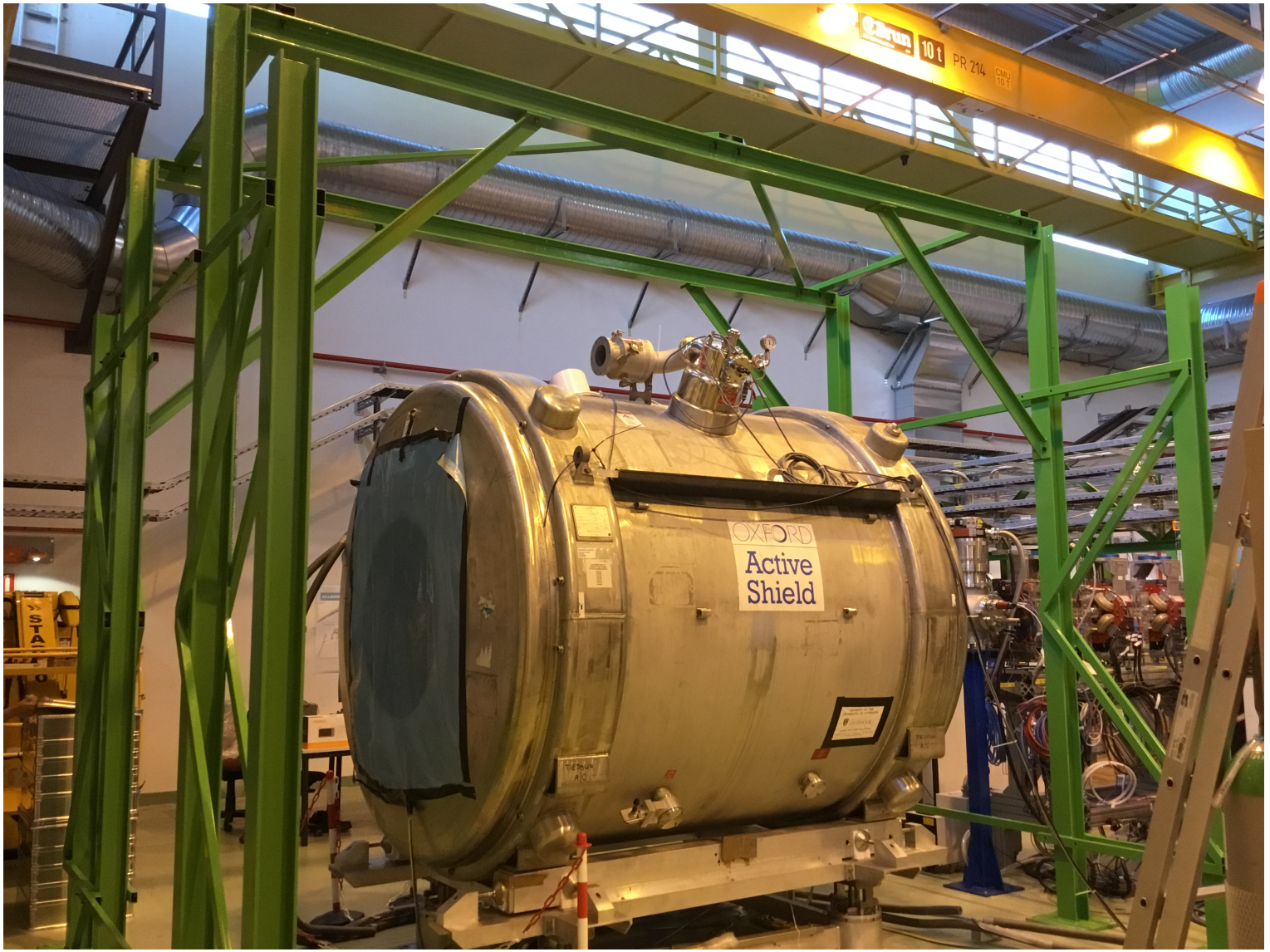


Magnetic shielding design



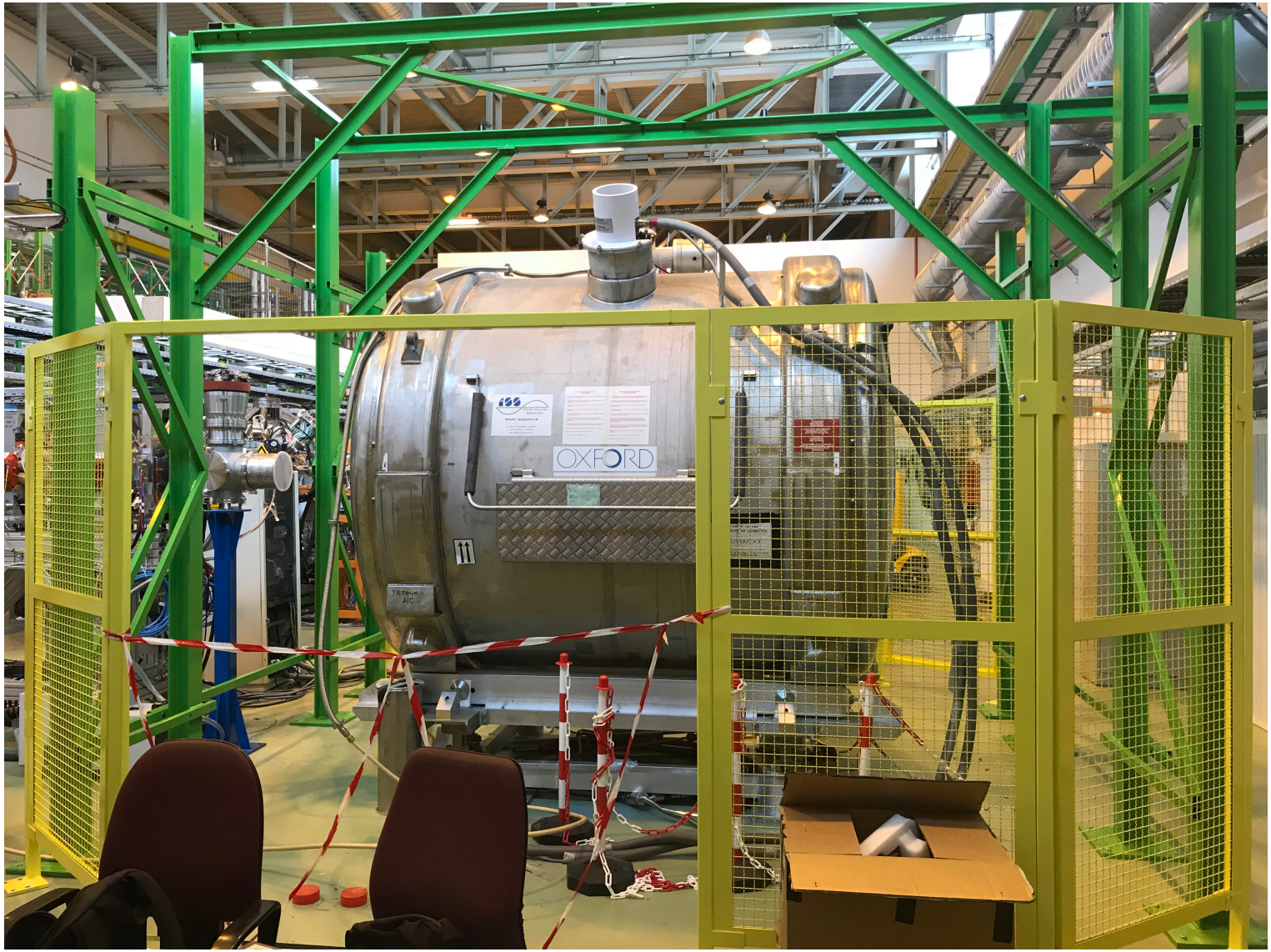
Thanks to Jerémie Bauche, Kevin Buffet, et al.

Magnetic shielding installation, Nov 2017



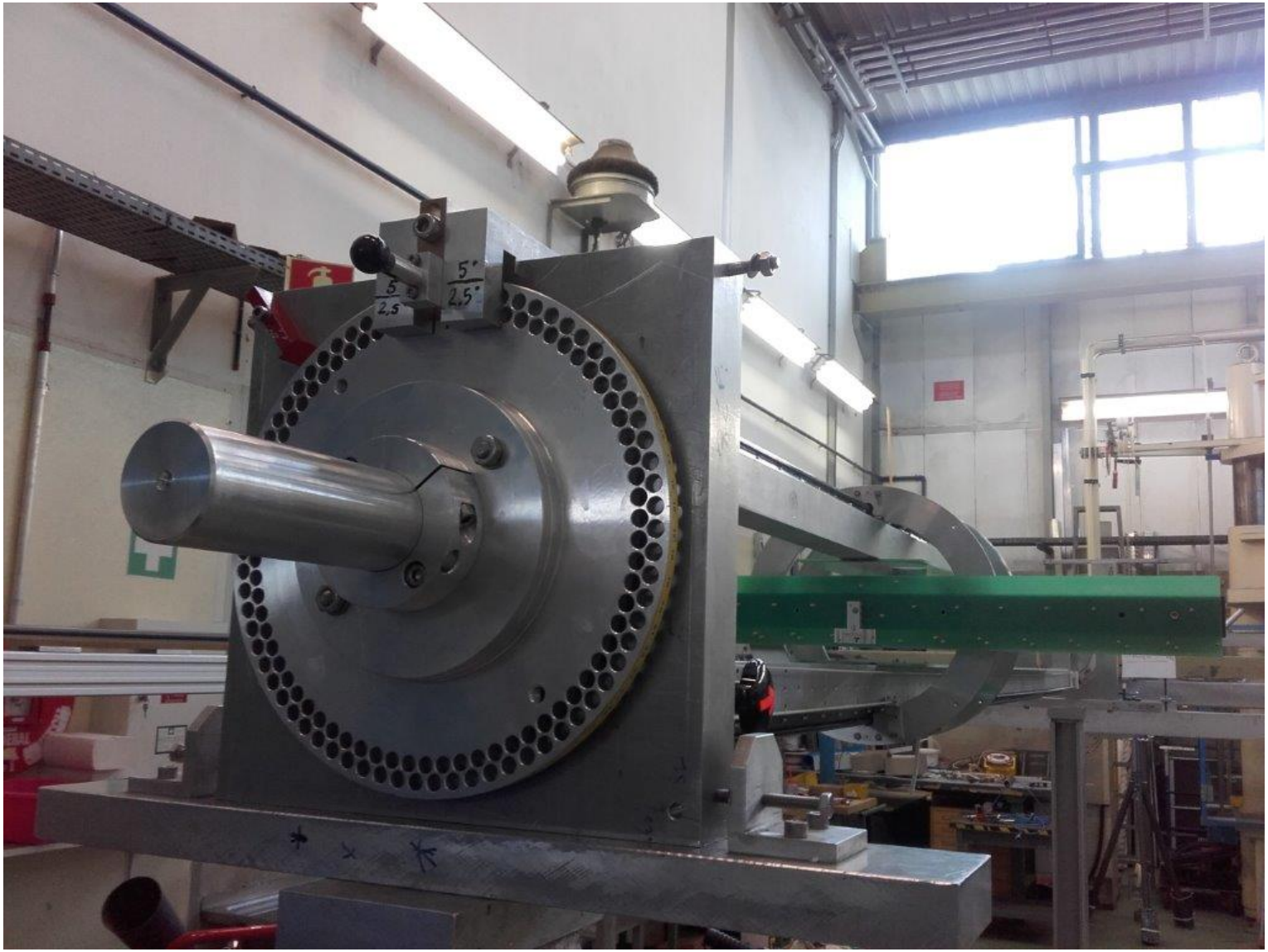
Manufacture paid for by KU Leuven

Magnetic shielding installation, Nov 2017



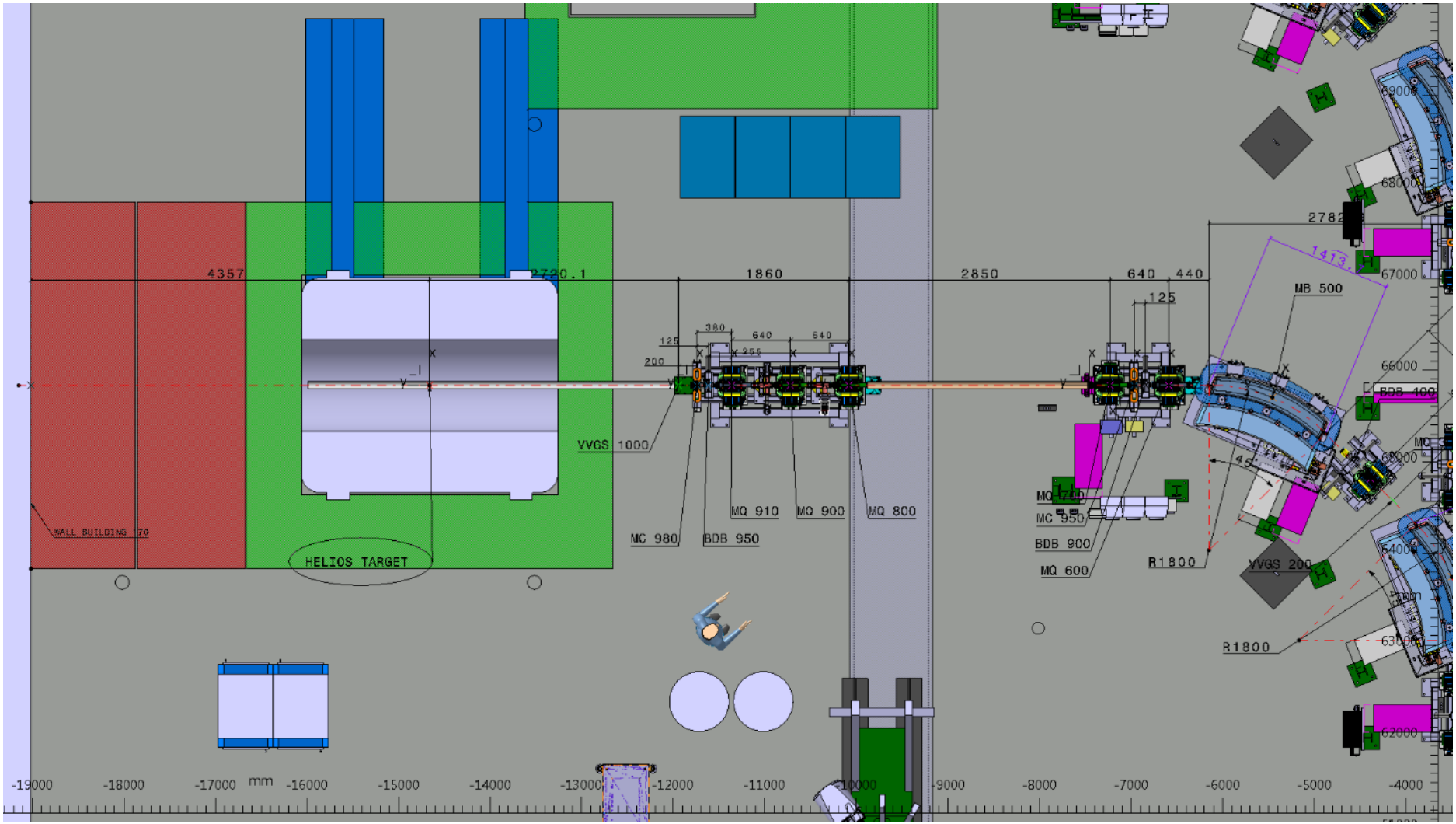
Manufacture paid for by KU Leuven

Magnetic field mapping, Nov 2017



Start week commencing 13/11/2017

XT02 beam tuning, Nov/Dec 2017



Complete before winter shutdown

Physics before LS2

IS621 Single-particle behaviour towards the "island of inversion" - ^{28,30}Mg(d,p)^{29,31}Mg in inverse kinematics

IS631 The (d,p) reaction on ^{206}Hg

In 2018 will use Si array & DAQ from Argonne

Technical details discussed in Manchester, July 2017

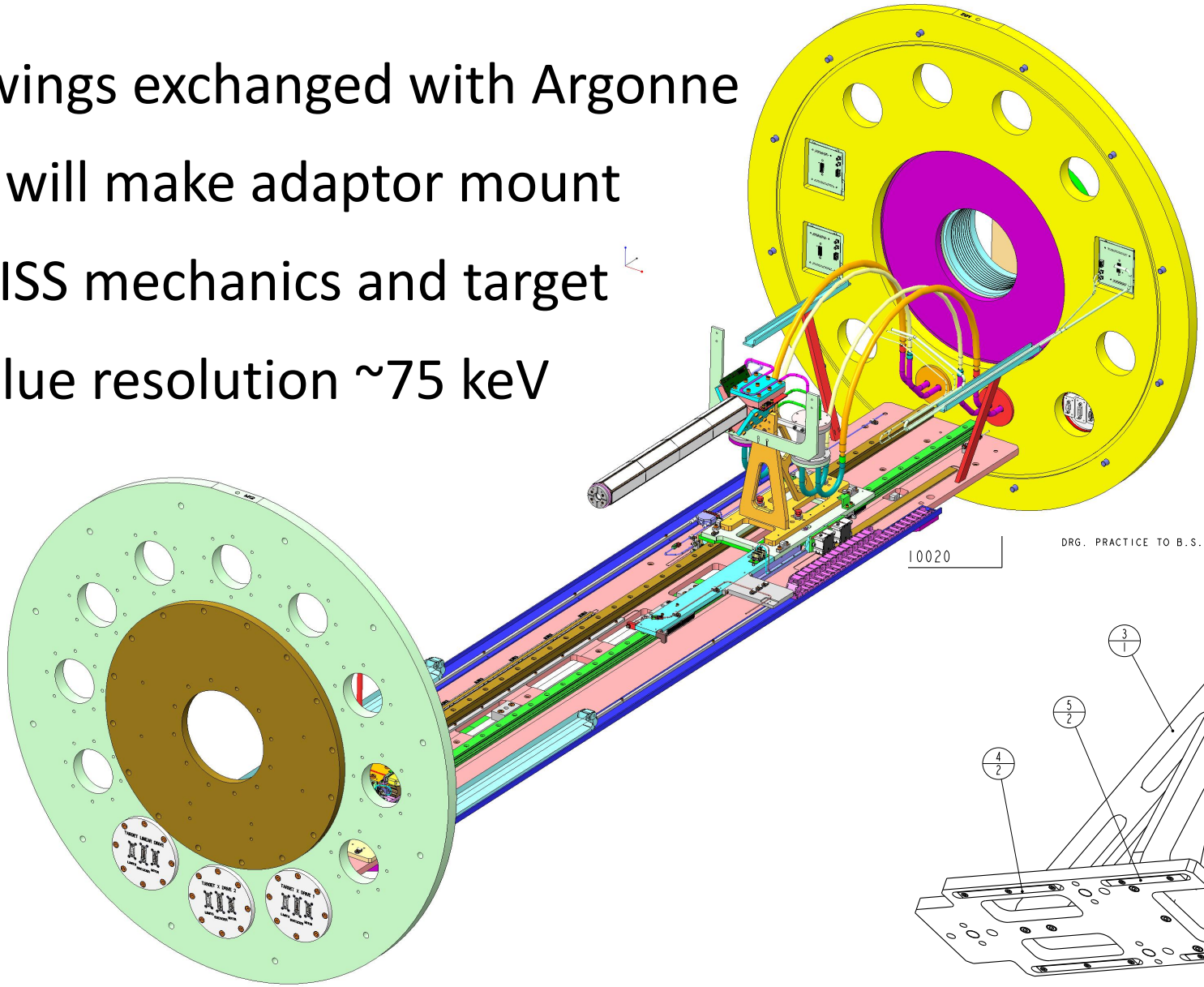
Integrating the Argonne detector

Drawings exchanged with Argonne

ANL will make adaptor mount

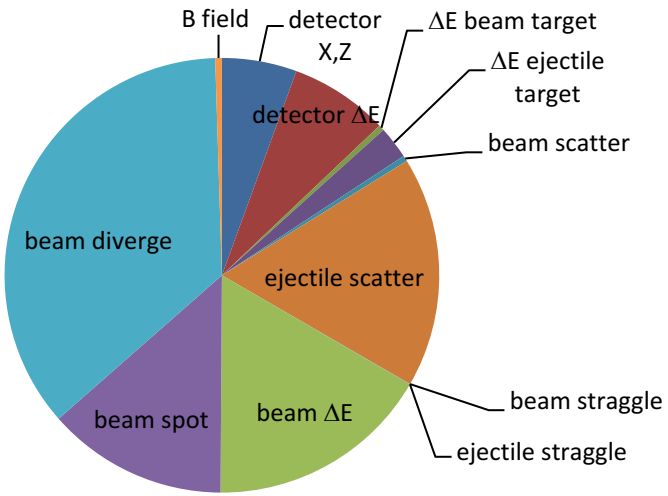
Use ISS mechanics and target

Q value resolution ~75 keV

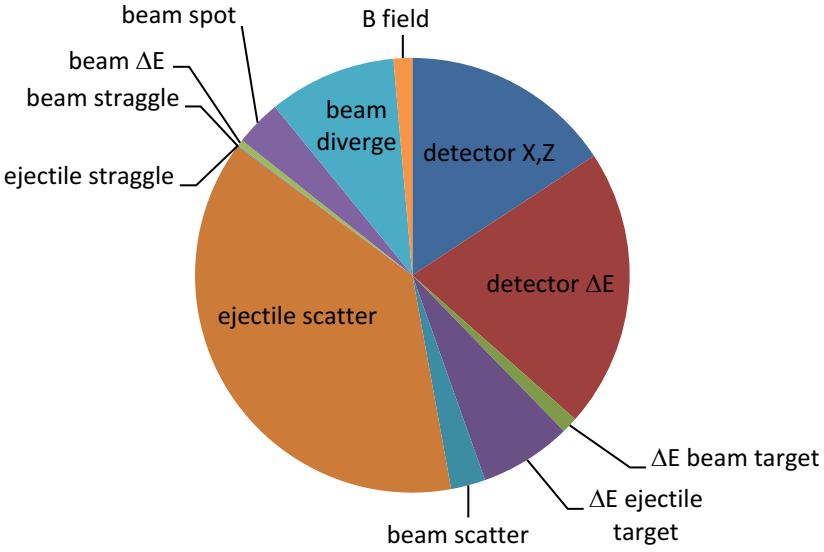


ISS – improved Q-value resolution

With HIE-ISOLDE beam: ~40 keV



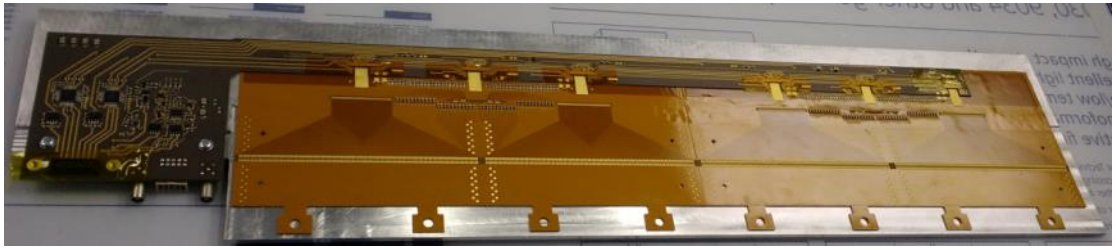
With manipulated beam*: ~25 keV

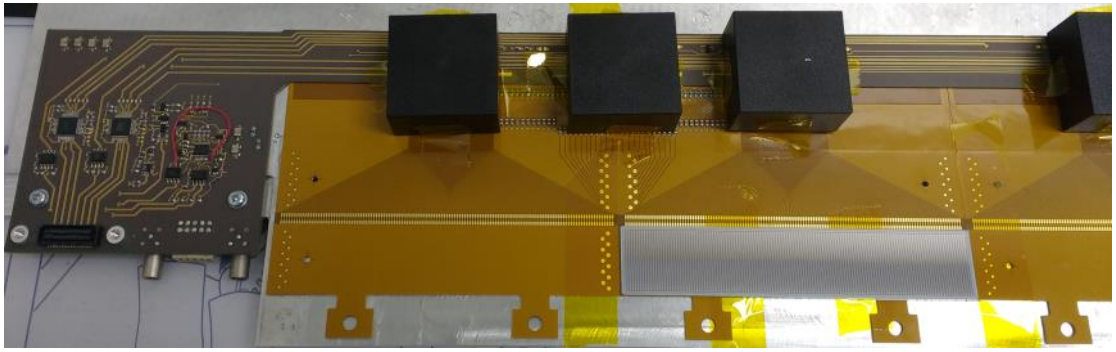


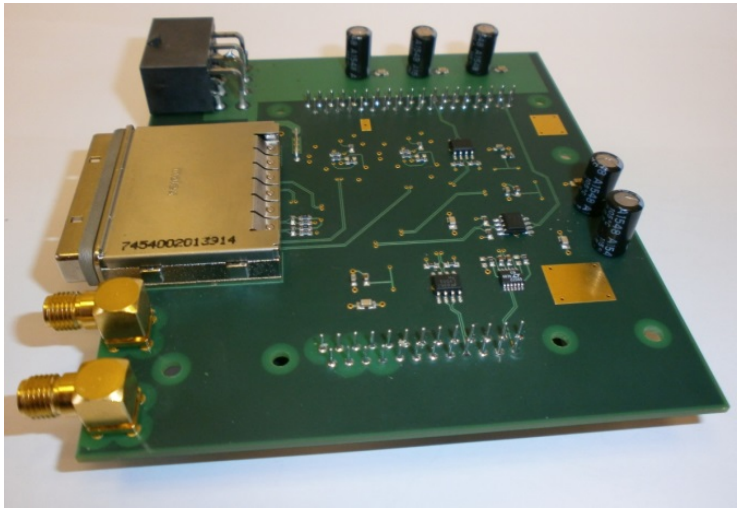
d(^{225}Ra,d') @ 10 MeV/u

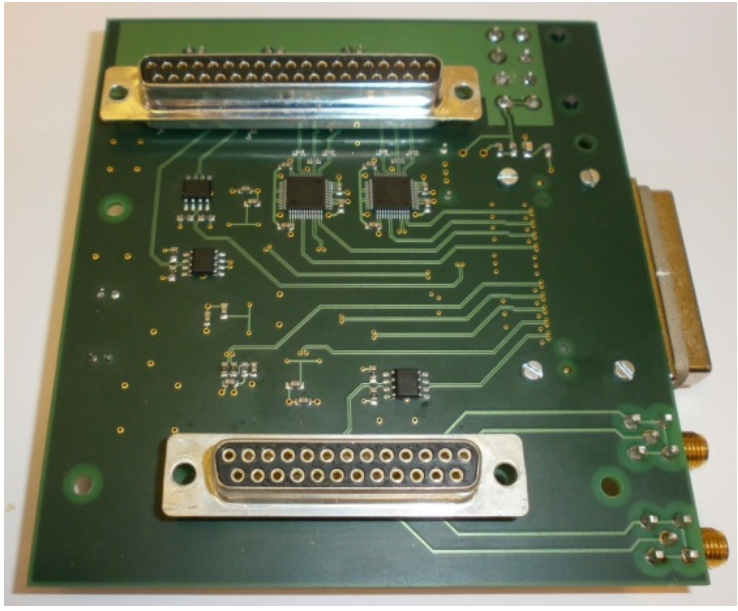
*manipulated beam:
FWHM ΔE/E reduced from 0.5% to 0.1% through de-bunching and phase rotation
Transverse emittance (normalised rms) reduced from 0.05 to 0.02 mm mrad through collimation

Progress towards complete ISS



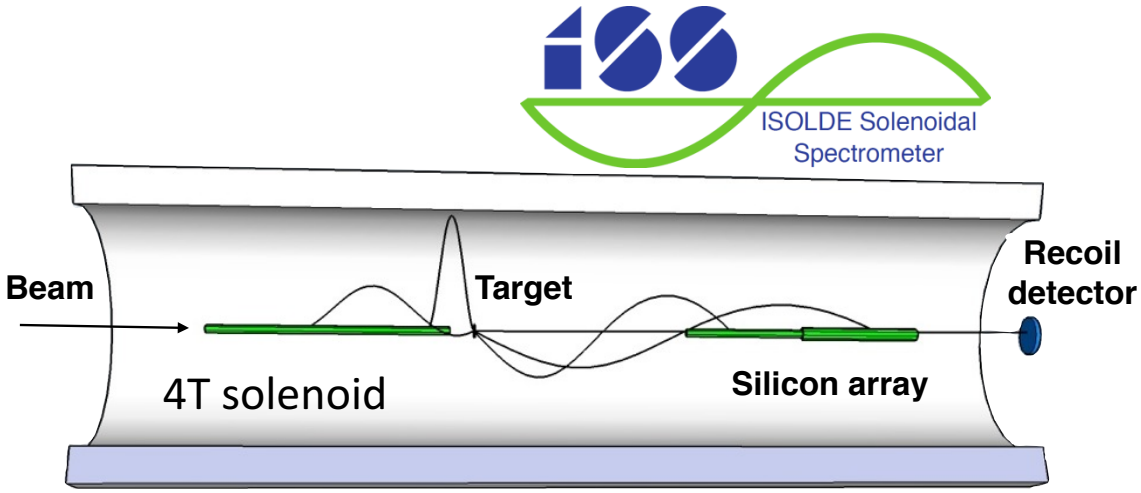






~£2M UK investment

Physics during LS2?

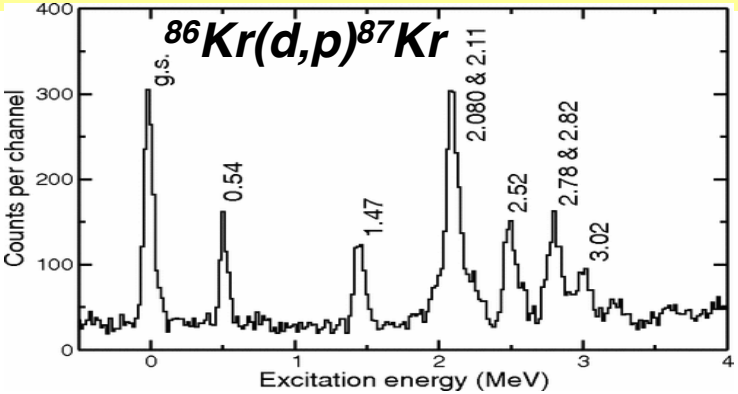


Helical orbit spectrometer principle

ISS solenoid in ISOLDE Hall

Stable beam tests of new Si array for ISS during LS2 so ready for physics with radioactive beams after LS2.

REX or HIE energies; HIE-ISOLDE preferred



HELIOS – D.K. Sharp, PRC **87** (2013) 014312

Typical test beams: ^{22}Ne, ^{38}Ar, ^{86}Kr, ^{136}Xe

Test beam tuning, recoil detectors, DAQ,…

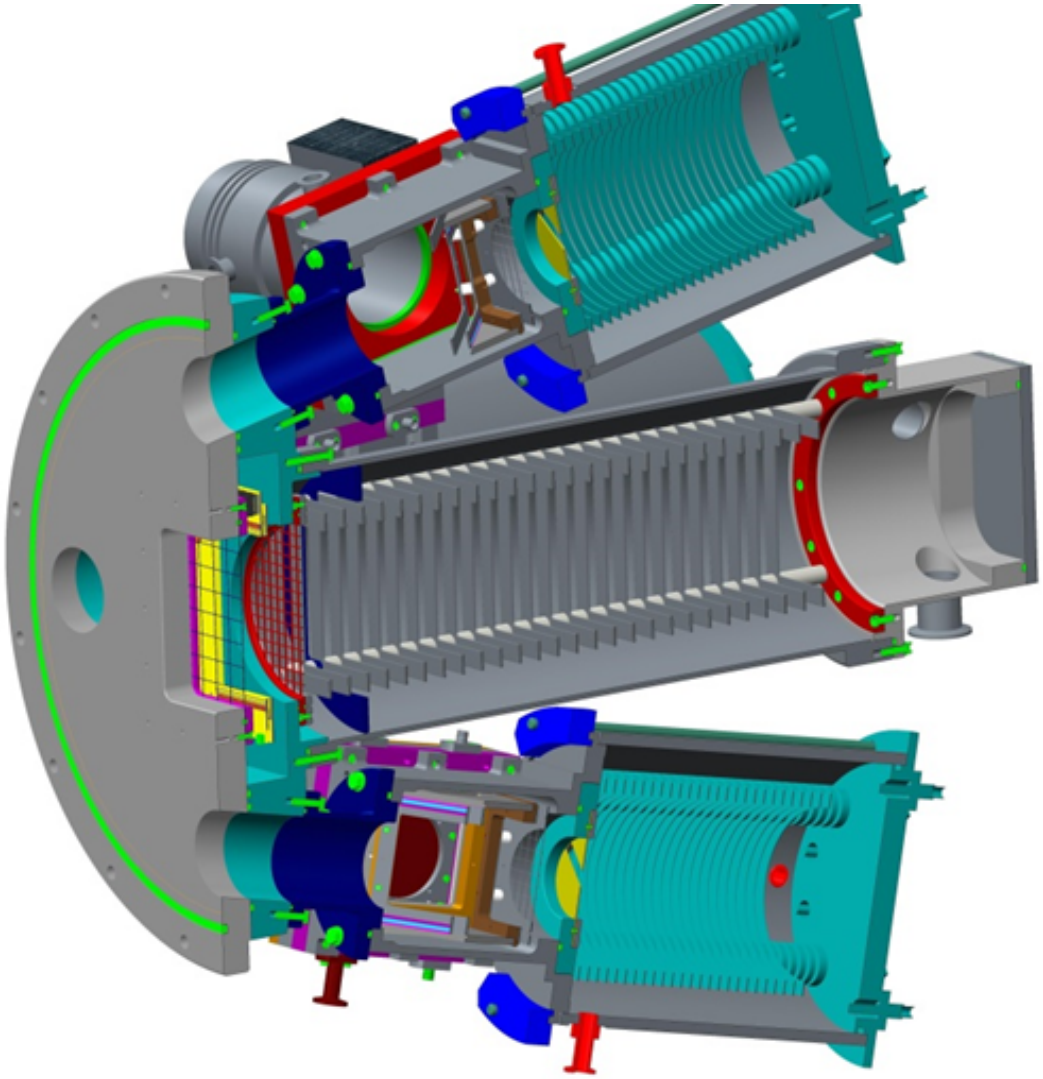
Physics with ”rare” stable/long-lived isotopes;

- low abundance, target chemistry (gases/reactive elements), …

Measure ISS improvements over HELIOS;

- energy resolution, efficiency, …

Additional UK funding secured



ISS Collaboration

Physics meeting, Manchester July 2017

http://npg.dl.ac.uk/isol-srs/ScienceMeeting2017.html