Science & Technology Facilities Council

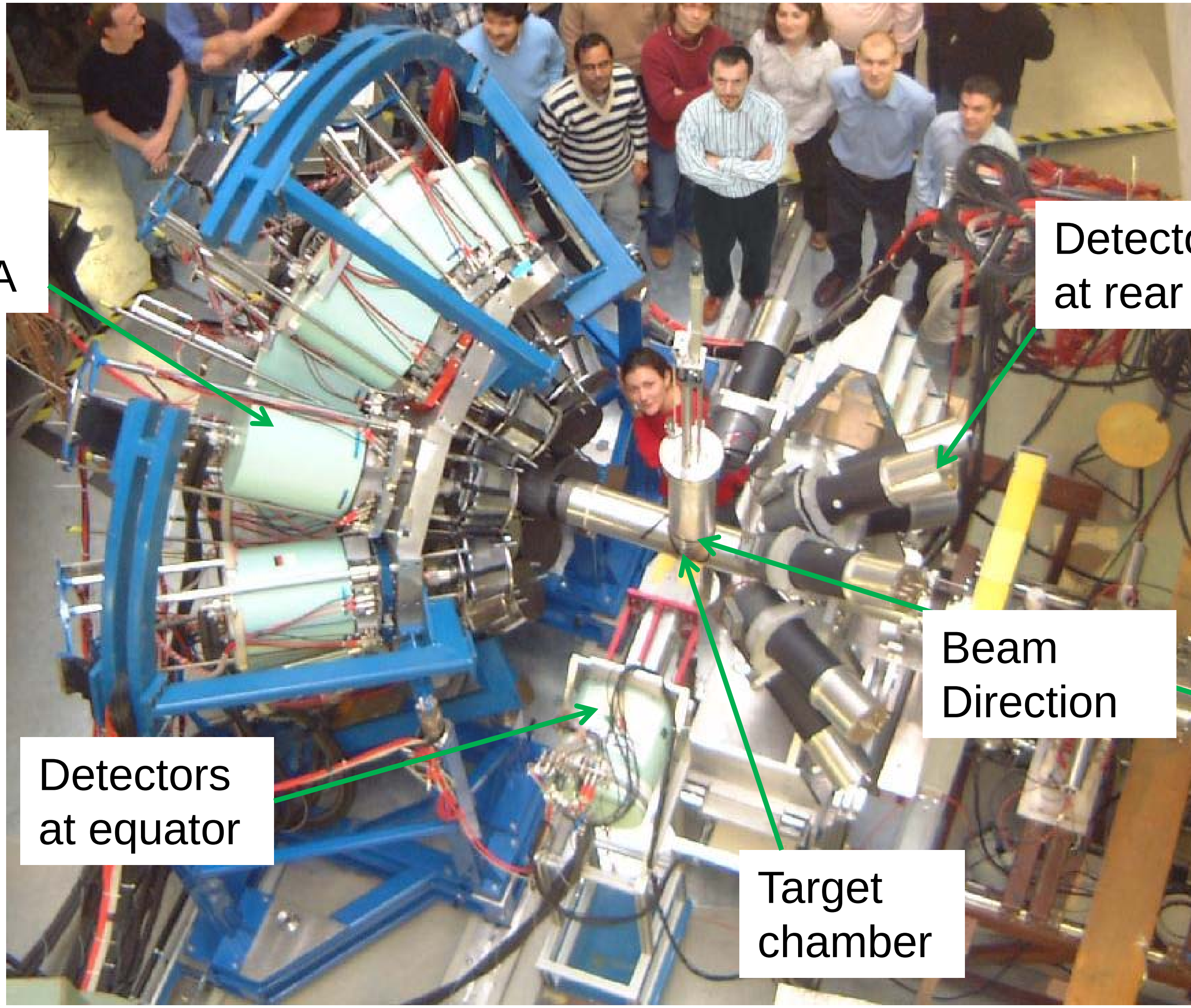
AGATA at GSI Mechanics 23/11/2010

John Strachan

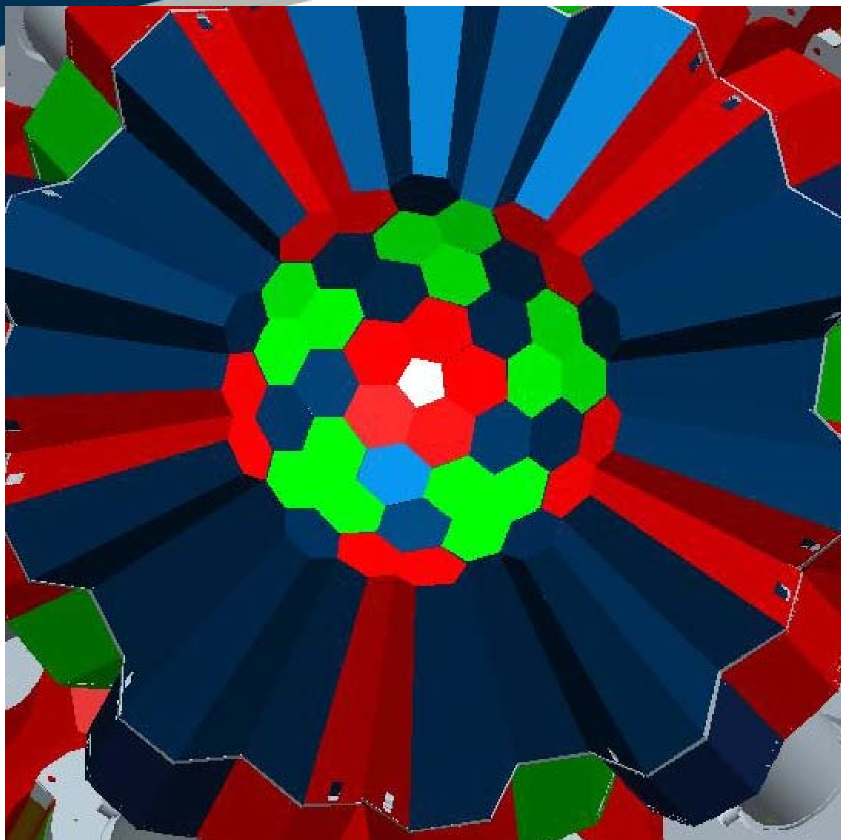
Structure

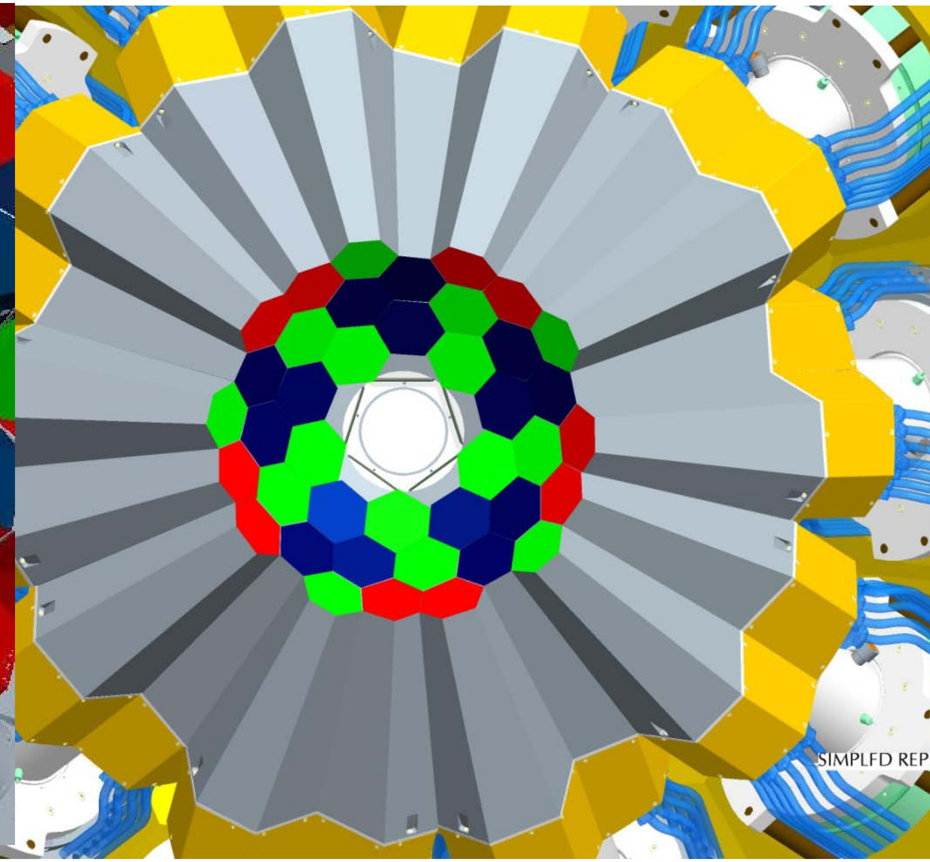
- Location
- AGATA – Germanium crystal Layout
- Beam Geometry
- Target – Types
- Ancillay Detectors
- AGATA – structure
- Overall layout at GSI
- Cabling

Location


RISING replaced by AGATA
Detectors at rear
Beam Direction
Detectors at equator
Target chamber

AGATA - GermaniumCrystal layout

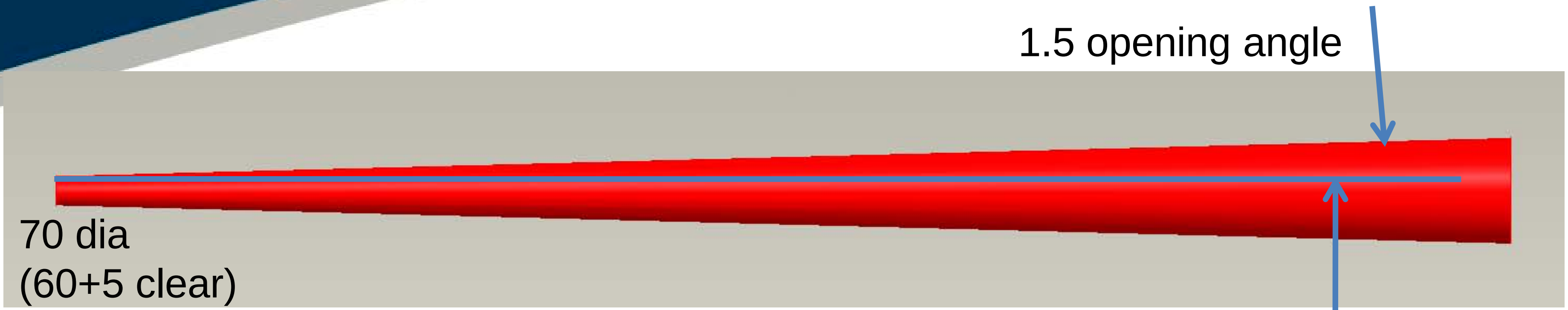


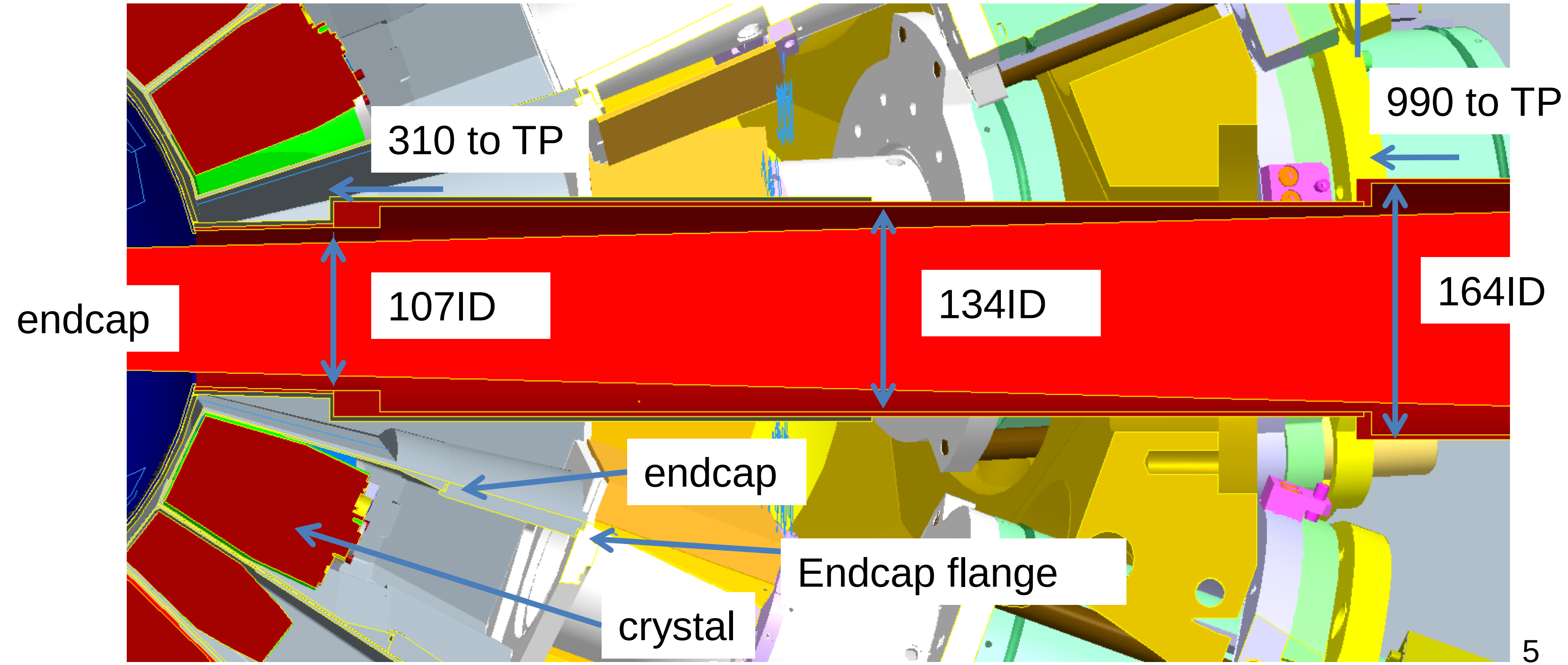


Arrangement of 1 pi with triples

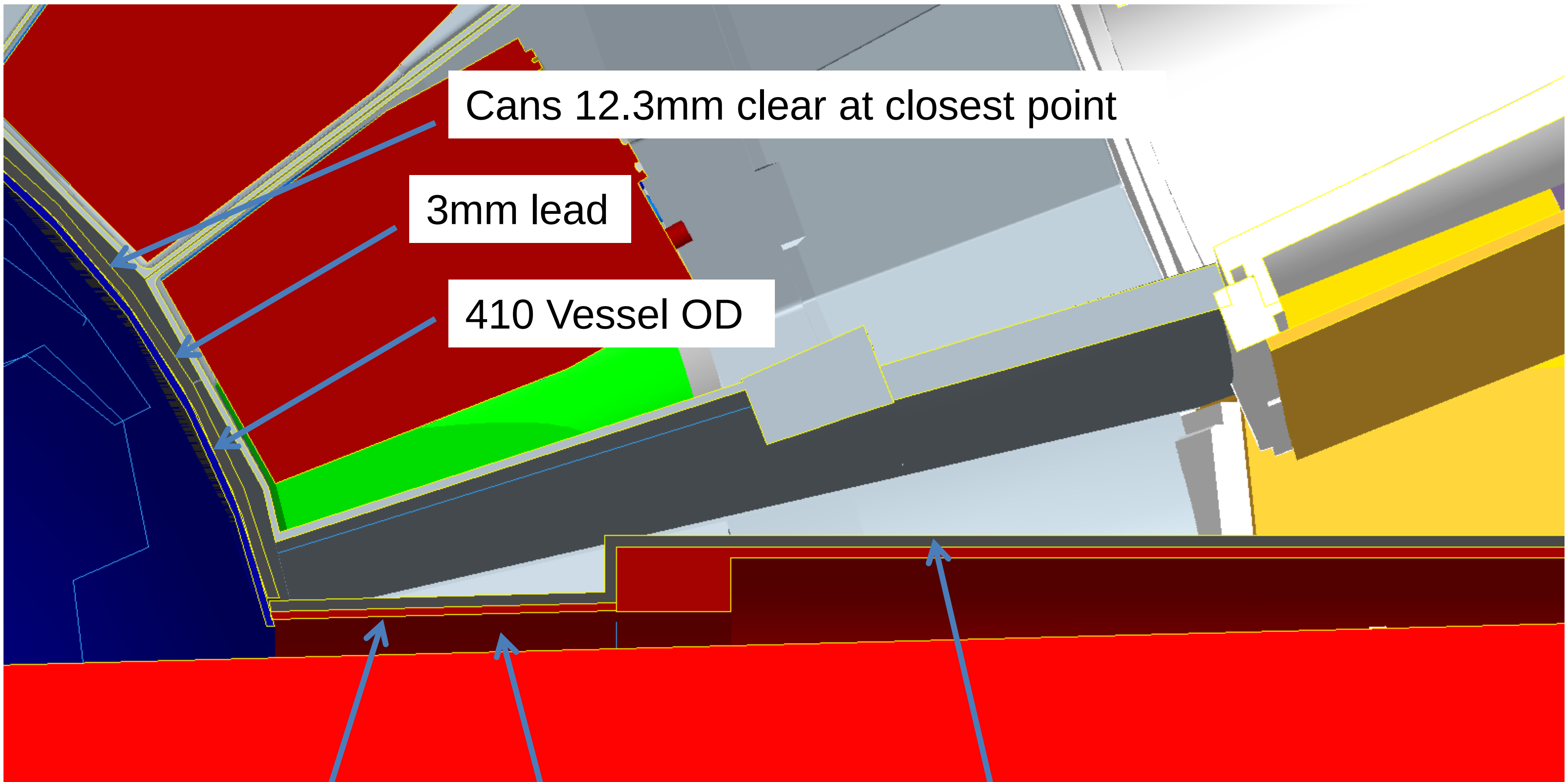
Proposed arrangement at GSI
Showing doubles in the first ring and
triples in the second ring

Beam Geometry





Beam Geometry



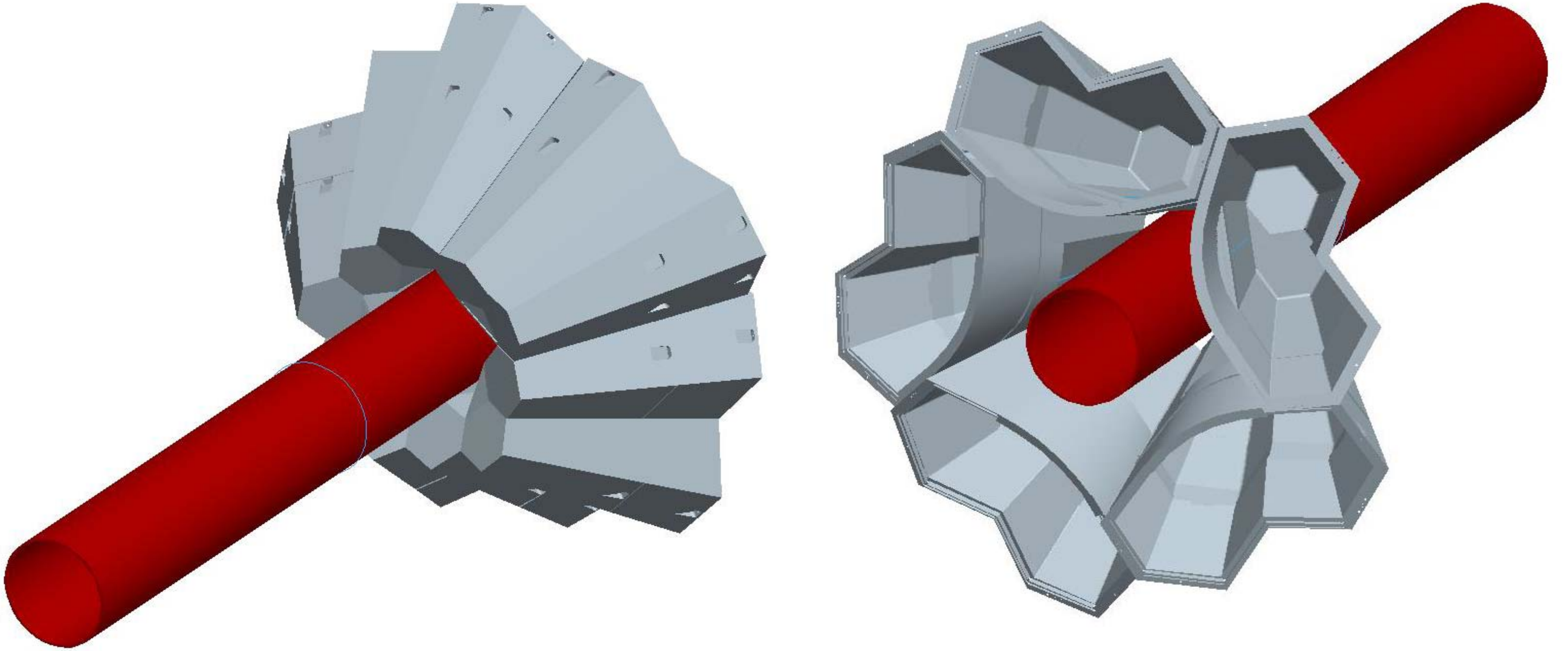
Tapered pipe

Beam 10mm clear

3mm Lead Shielding

Agata Doubles

AGATA DOUBLE CRYOSTAT
PRELIMINARY DESIGN



5 DOUBLES AROUND 120 DIA BEAM PIPE

Target Types

Currently 3 target types are proposed.

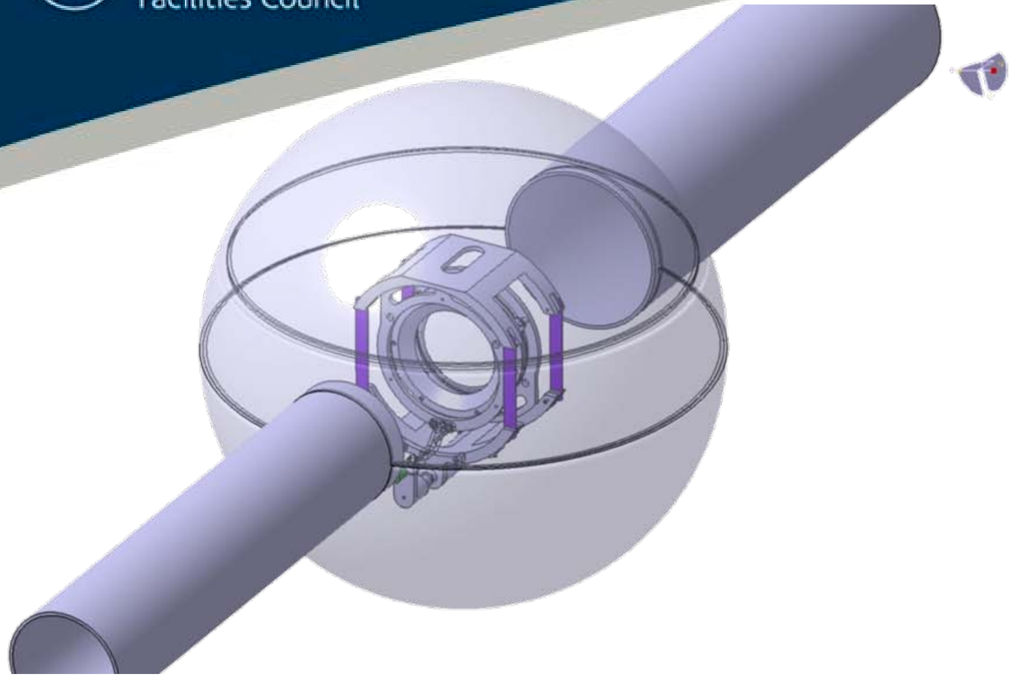
Type 1. Liquid Hydrogen Target
From CEA Saclay, Alexandre Obertelli

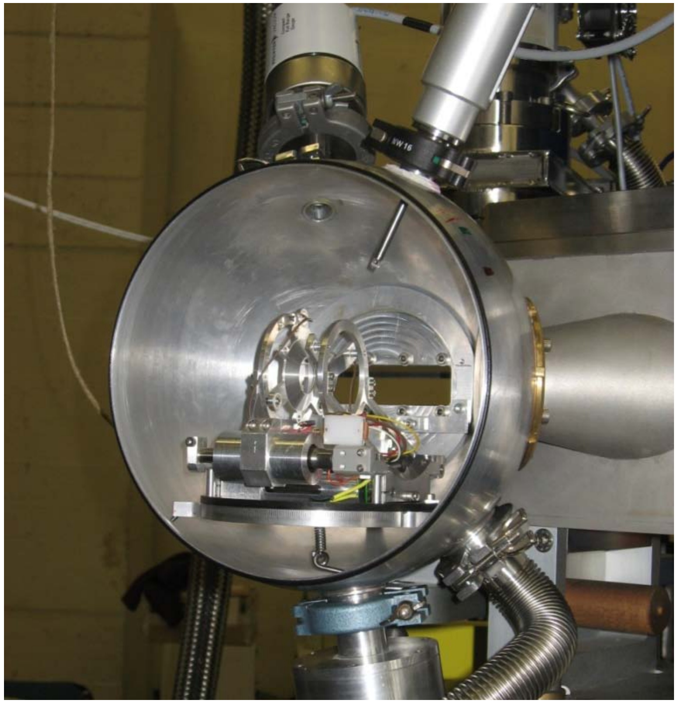
Type 2. Plunger Target
From Cologne University, Christoph Fransen

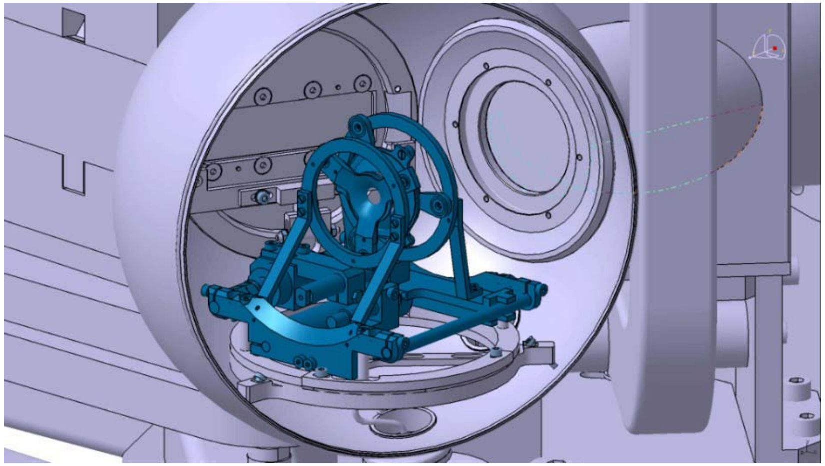
Type 3. ‘Standard’ Target
To have a target ladder, and motion of +/-100mm in beam direction
As yet unspecified

A standard target chamber is envisioned that will suit each of these designs, and is part of the Type 3 project.

Plunger Target







Very compact Mechanism to fit inside the target chamber. Some features within the target chamber required to mount the system.

Status of the PRESPEC H_2 target

Alexandre Obertelli, CEA Saclay
Agata Week, Lyon, November 23rd 2010

Science & Technology Facilities Council

Overview

New **liquid H_2 target** developed for **PRESPEC**

- several centimeters long (20 mm = 1. 10^{23} cm^{-2})
- dedicated to *(p,p')* and knockout coupled to gamma spectroscopy

Ready to run from early 2011

- Test experiment (S378) to be scheduled
- Selected physics cases to be presented to G-PAC spring 2011

Physics program on Shell Evolution in unstable nuclei (in discussion)

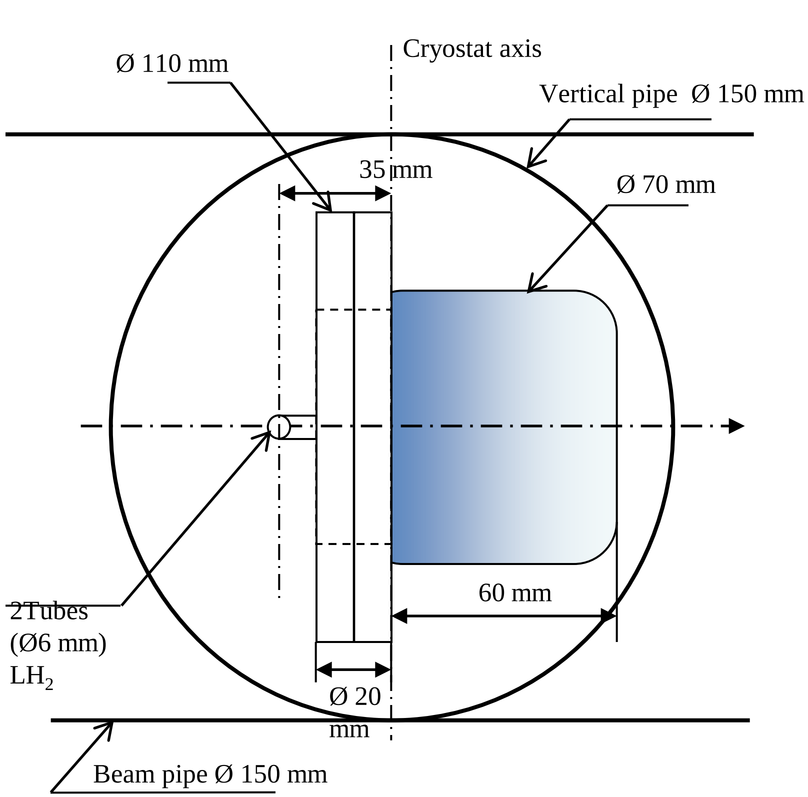
- **N=34** shell gap: spectroscopy of ^{53}Sc */ Valiente-Dobon - Algora*
- Onset of collectivity at **N=40** : spectroscopy of ^{64}Cr */ Obertelli*
- Origin of collectivity in **N~50** Tin isotopes via *(p,p')* */ Dombradi*
- Single-particle states at **N~82** in Tin isotopes via I-E pickup */ Boutachkov*

irfu cea saclay

Target-cell design

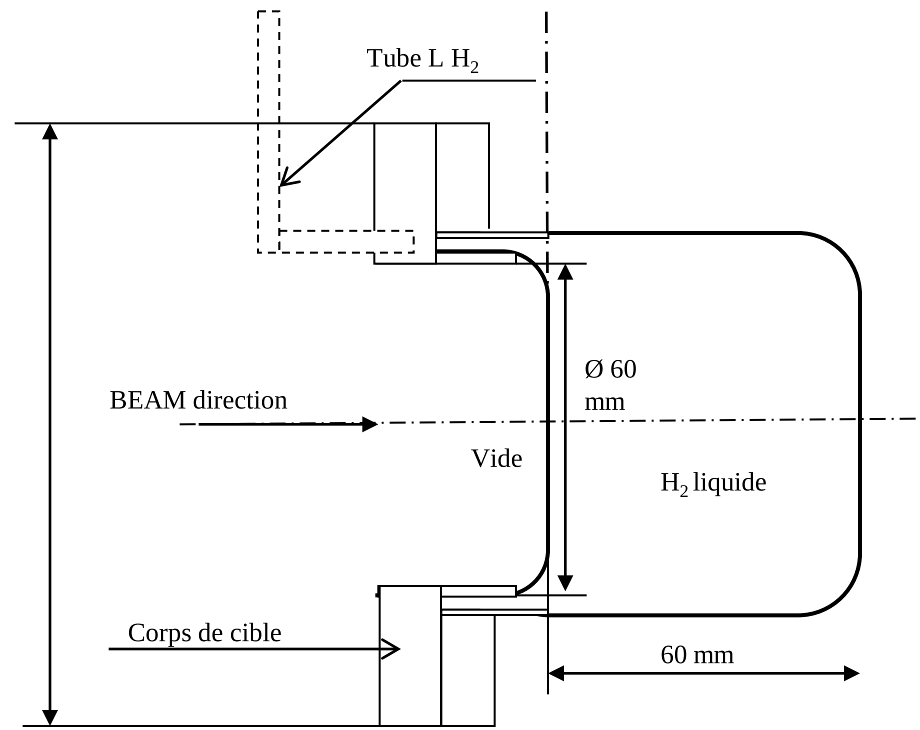
« Pocket » of liquid H2 (20 Kelvin) contained in a Mylar cell

Top view



Side view

Central axis of the cryostat



Produced targets

Engineers in charge:
J.-M. Gheller, CEA Saclay
Ph. Chesny, CEA Saclay

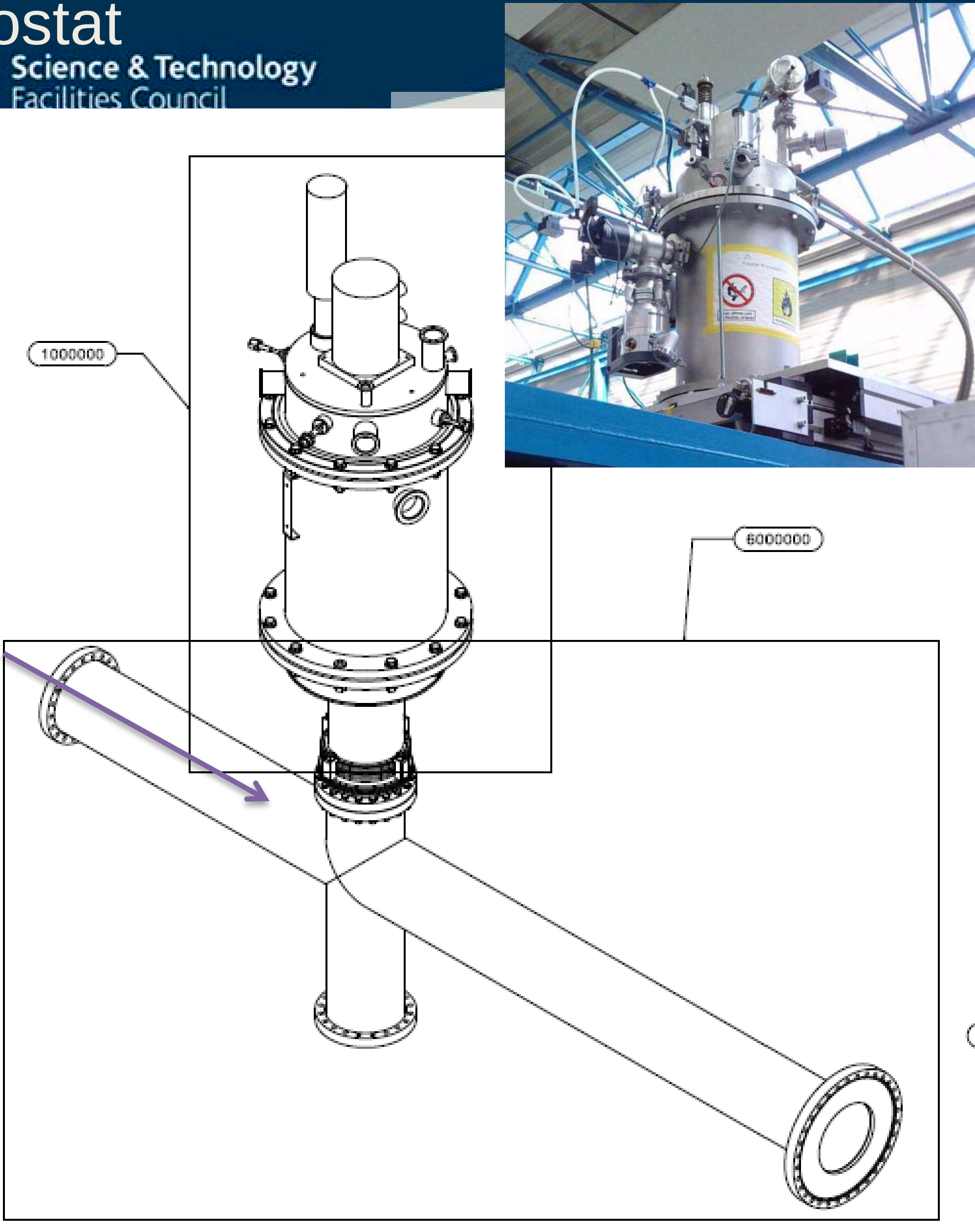
September 2010

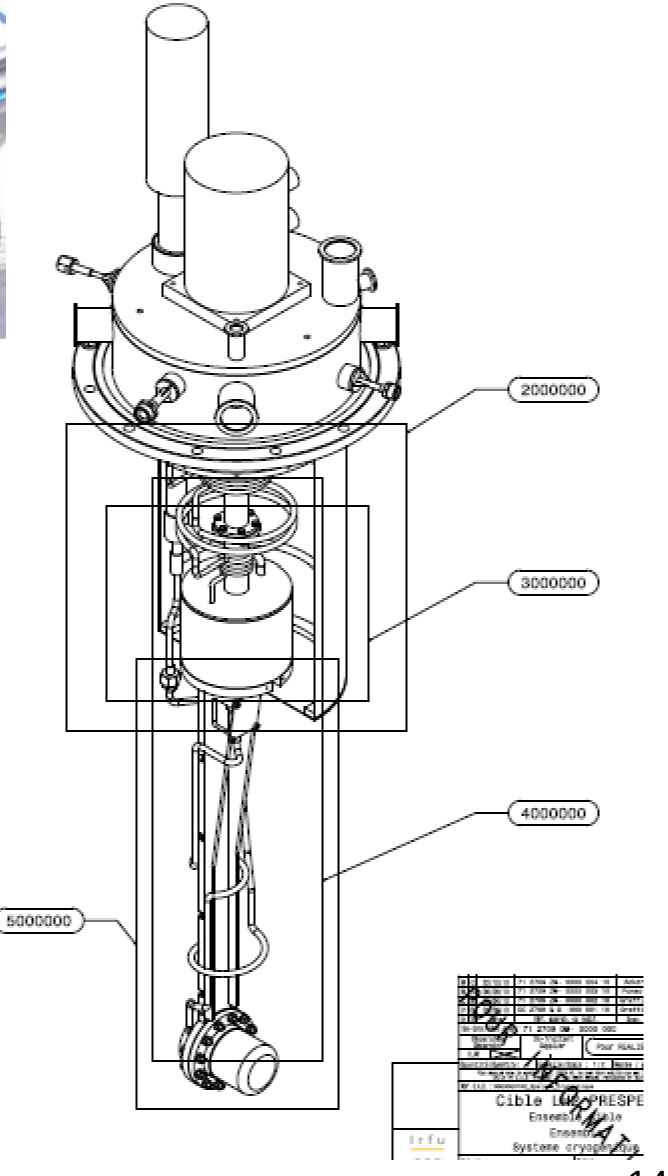
- Cell in one piece of Mylar
- 150 – 250 μm

Target cell planed:
- 20 mm
- 35 mm
- 61 mm (see picture)

∅ 70 mm, 61 mm thickness

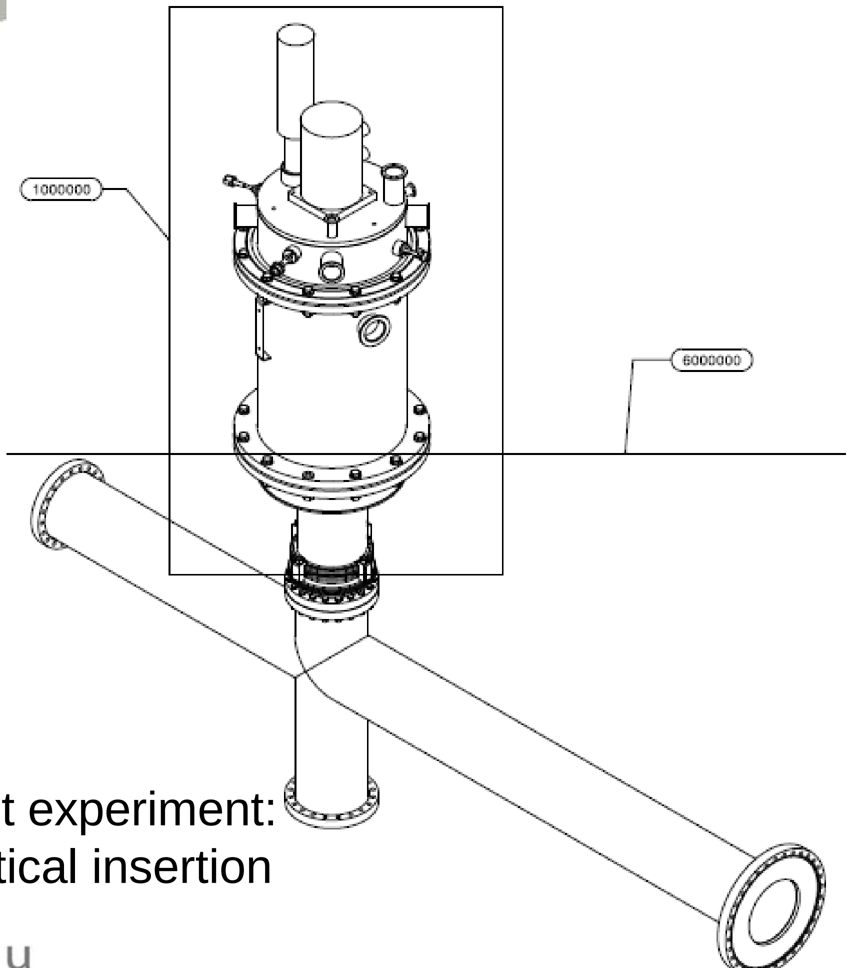
Cryostat


1000000
6000000


2000000
3000000
4000000
5000000
Cible LH2 PRESPEC
Ensemble Cible
Système cryogénique

Installation with PRESPEC

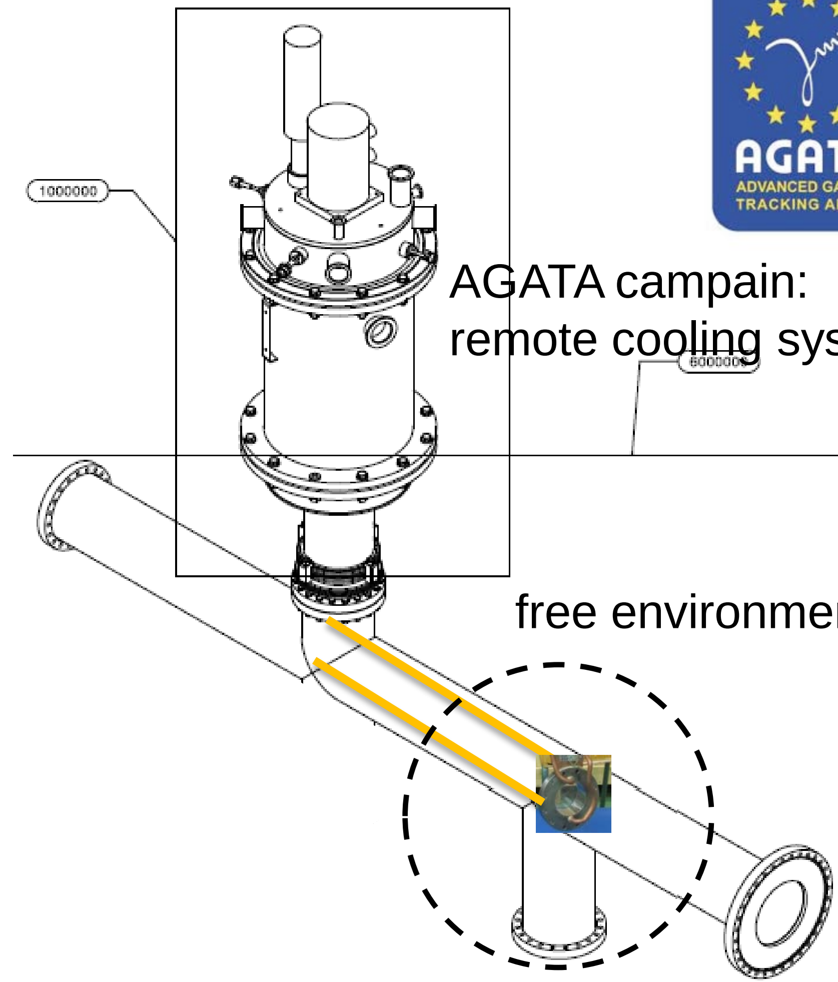
Support under construction



Test experiment:
vertical insertion

Ready

AGATA campain:
remote cooling system



free environment

To be designed accordingly
to AGATA geometry / reaction chamber

Test experiment

S378, G-PAC 39

Objectives

- demonstrate working conditions
- validate G4 simulations (resolution, background)

Experimental conditions

- stable beam at 300 MeV/nucleon on secondary target.
- proposed ^{58}Ni, but flexible as long as not too heavy (LYCCA)
- inelastic scattering and -1p knockout
- 20 shifts of parasitic beam

Installation time

- 1 week to install electronics and H_2 circuit + mounting frame (from january 2011)
- 1-2 days to install and cool down the H_2 target

Summary

- **H_2 target** for PRESPEC developed
- **Ready to run** in 2011
- **Physics programme** at GSI on shell evolution away from stability

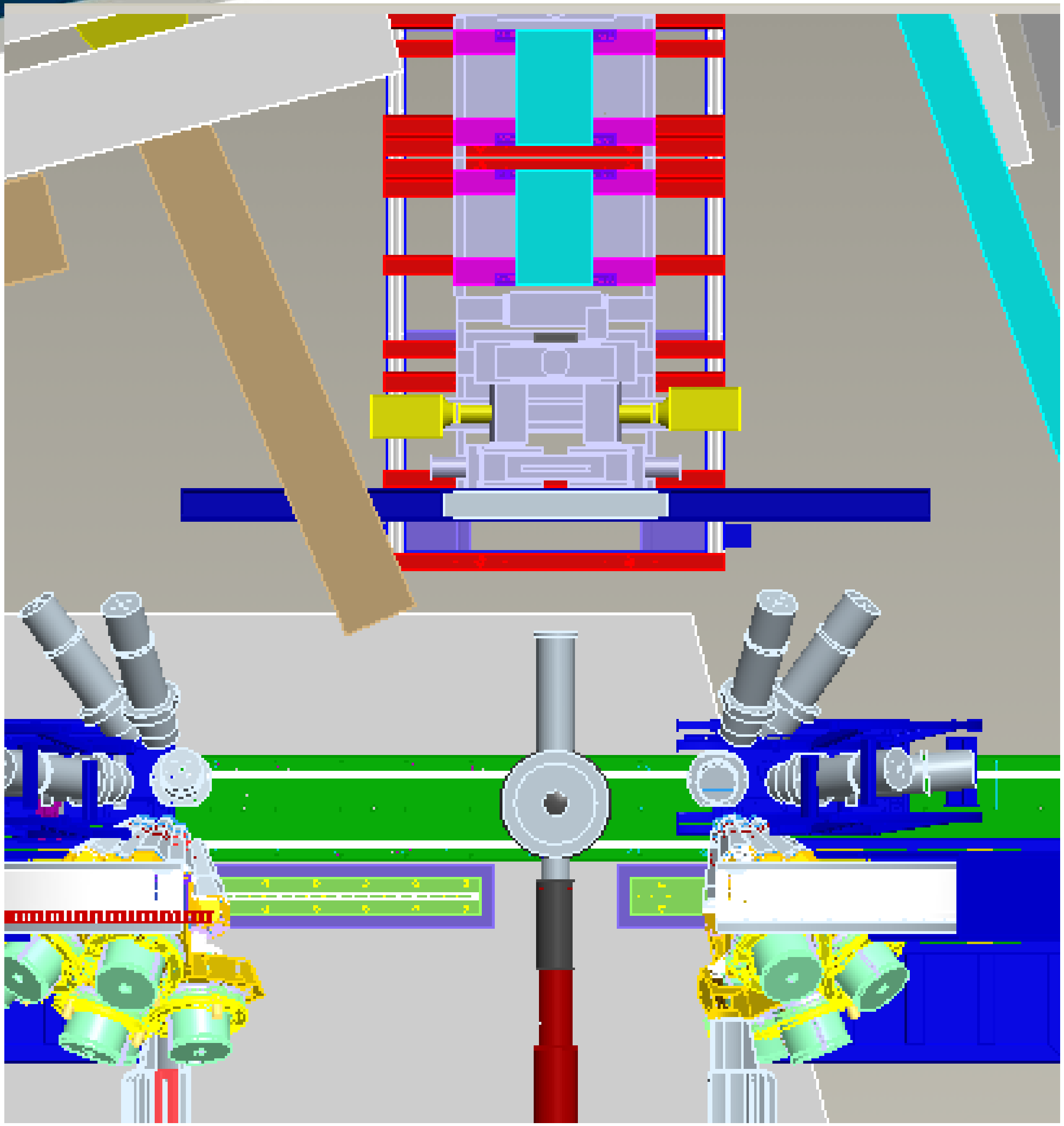
Next steps

- Full integration and cooling cycles at Saclay (2010)
- Safety report
- Test experiment S378 (wished « ASAP »)
- Integration with AGATA

AGATA
ADVANCED GAMMA TRACKING ARRAY

irfu
cea
saclay

Dewer Location



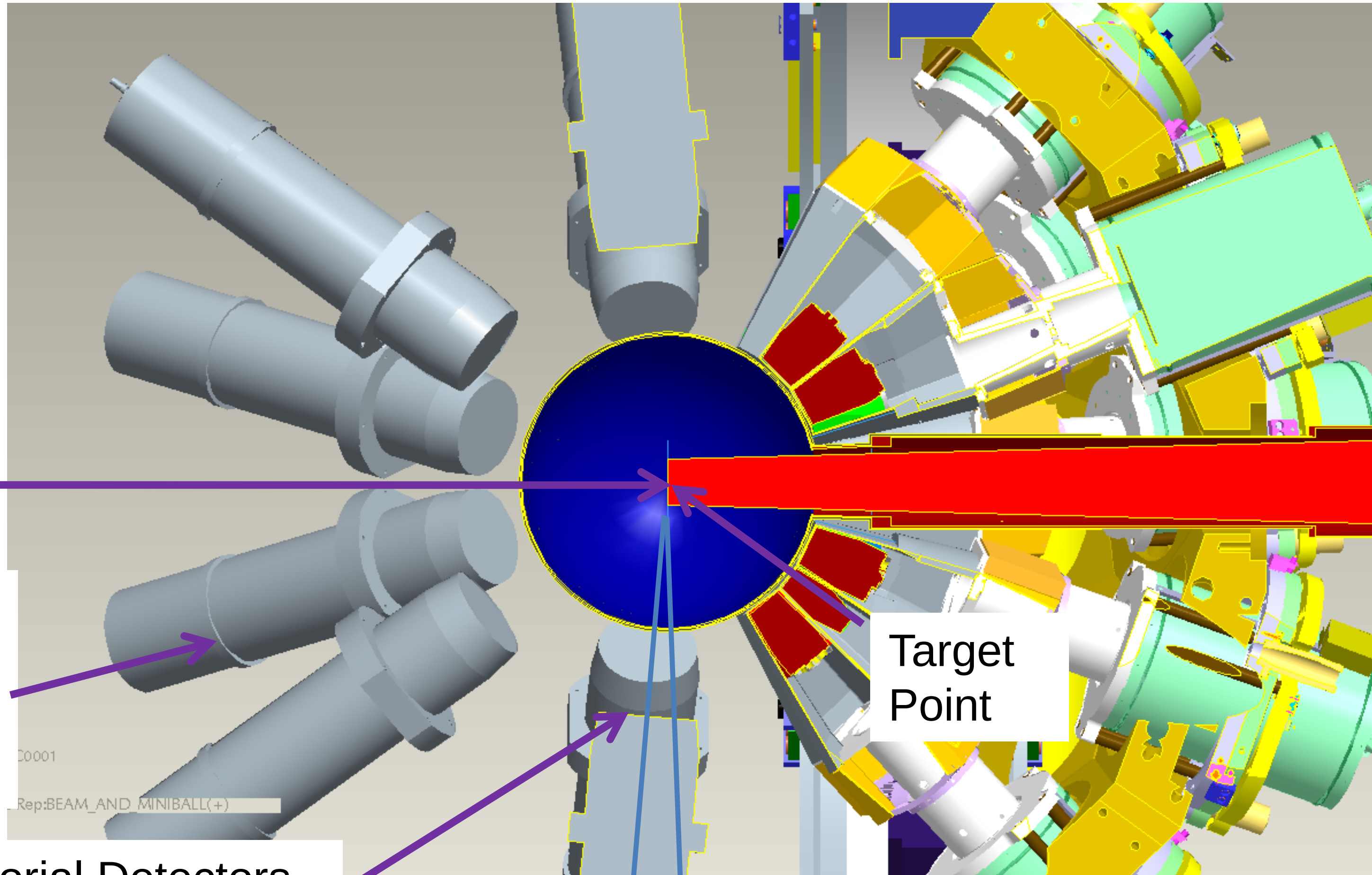
Ancillary detectors

Currently 2 ancillary detectors are proposed.

Type 1. Hector
From INFN Milano, Benedicte Million

Type 2. LYCCA
From GSI Plamen Boutakhov
Also Mike Bentley, and Peter Reiter

Hector



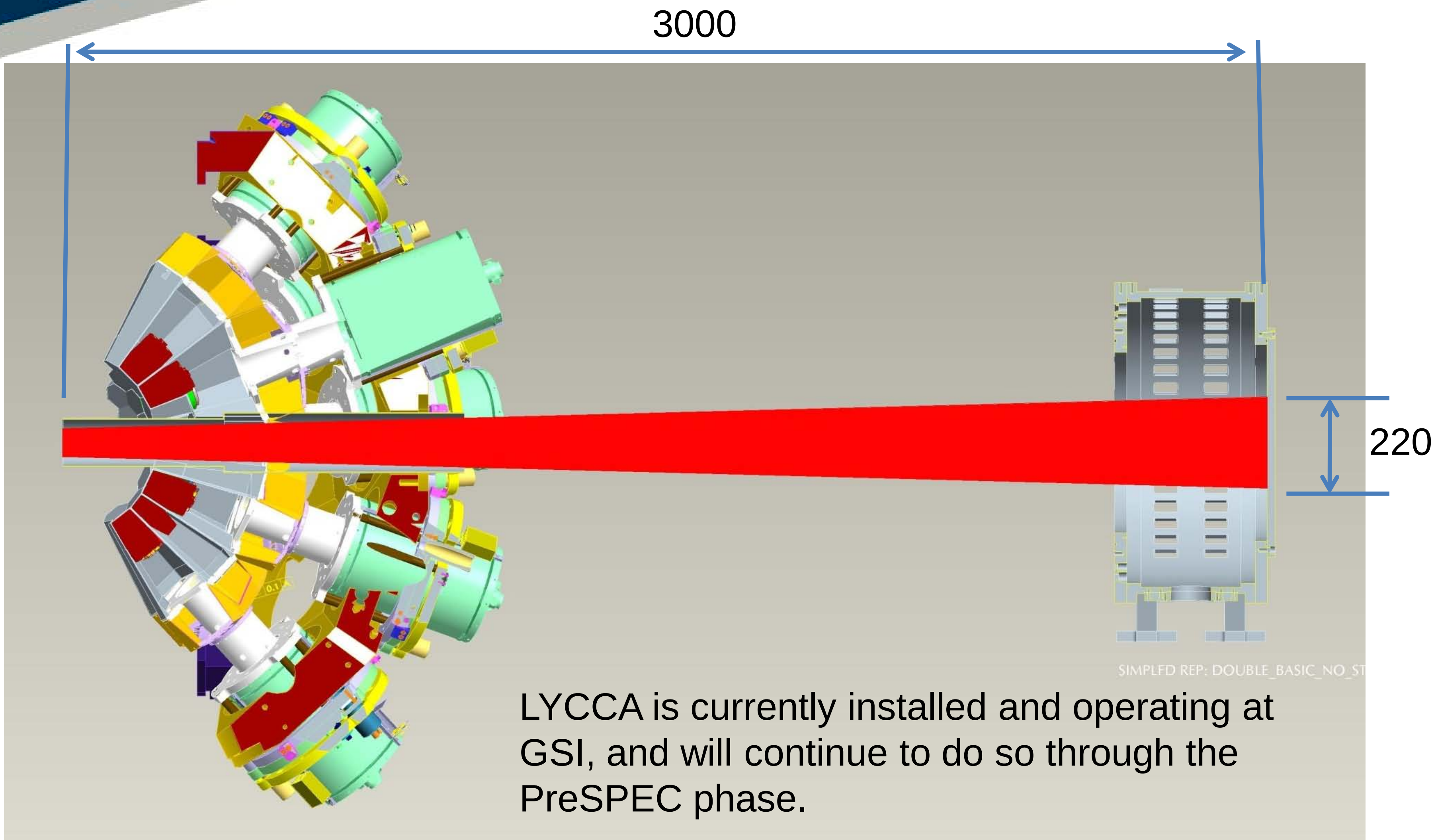
Beam Direction

Rear Detectors focused at target

Equatorial Detectors focused at target

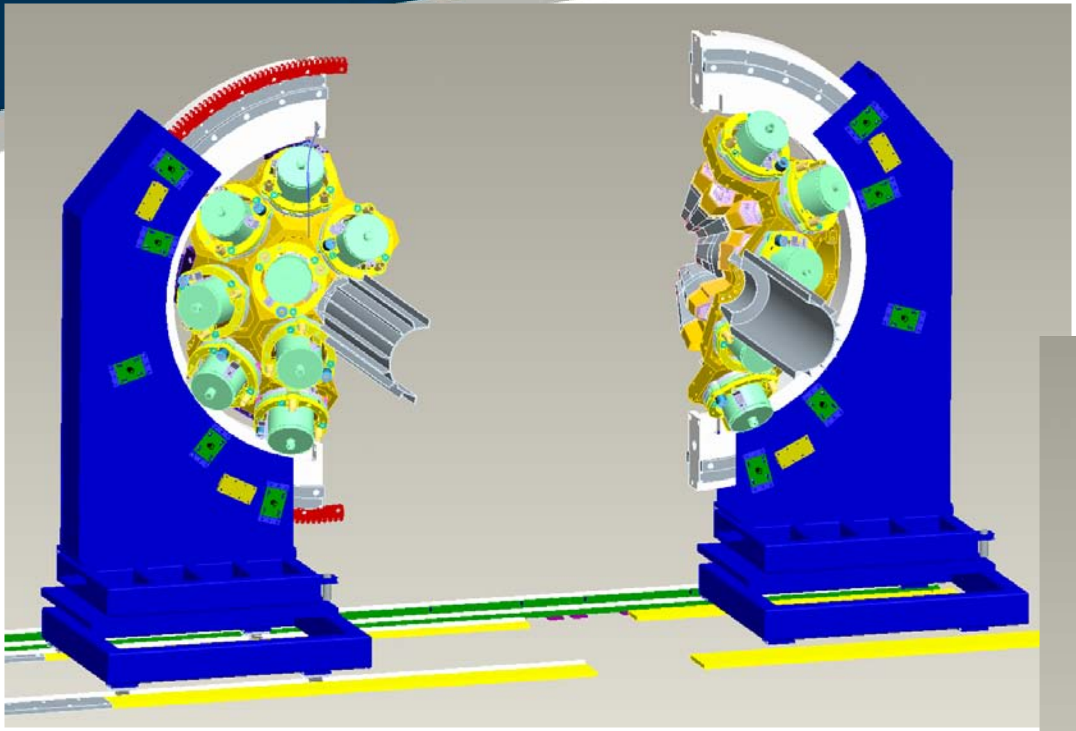
x^o

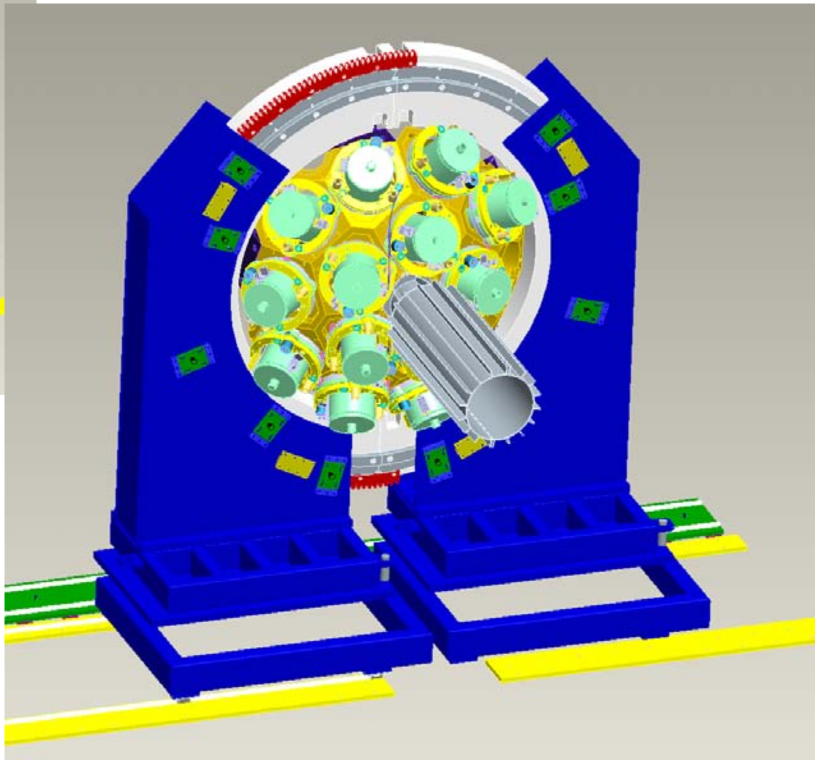
LYCCA



LYCCA is currently installed and operating at GSI, and will continue to do so through the PreSPEC phase.

AGATA Structure





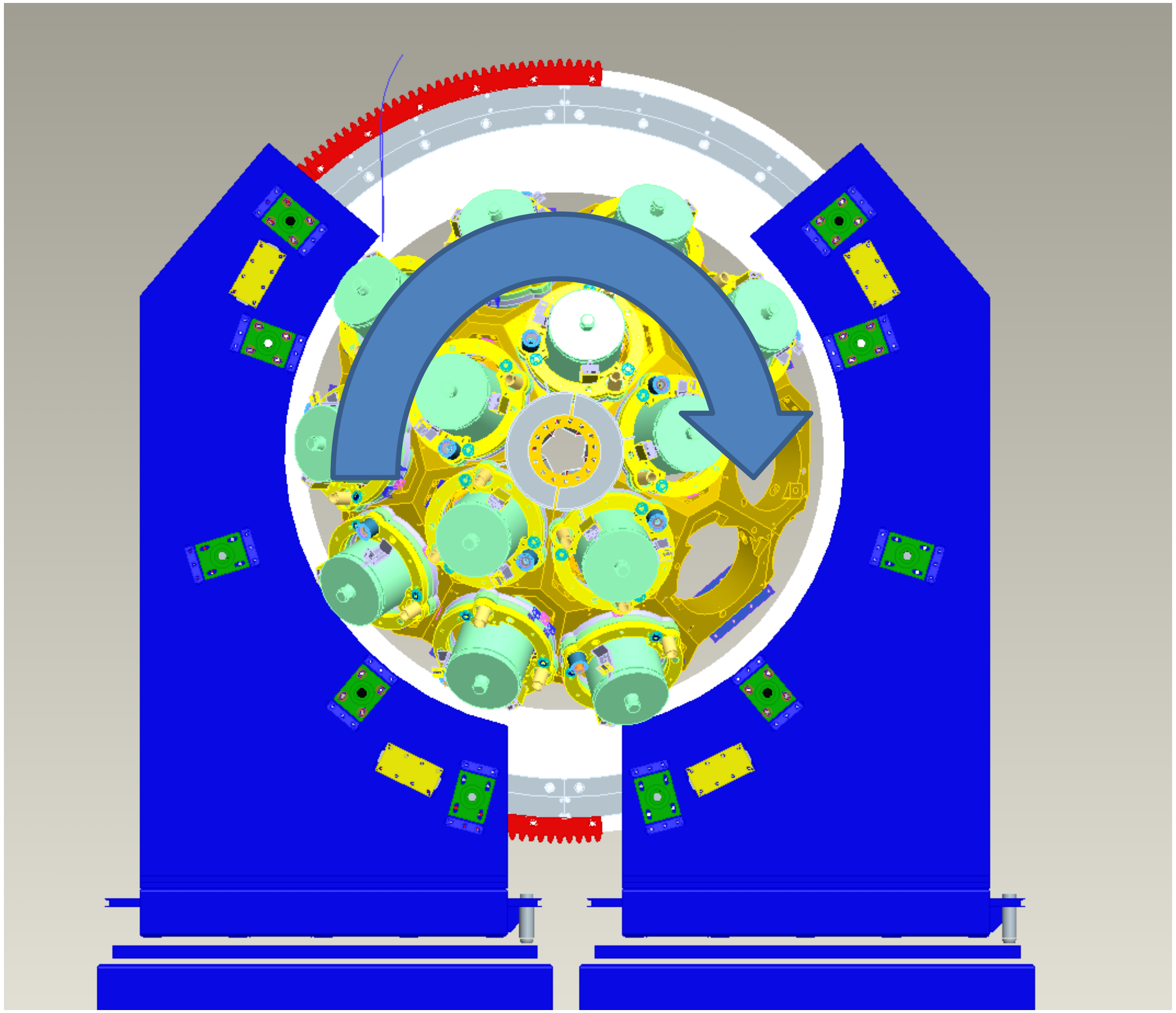
Array can open/close using existing RISING rails and control system.
This feature is to allow access to the target chamber, and to enable the array to be 'parked' out of the way when other experiments are ongoing.

AGATA Structure

Array rotates around beam axis to allow for loading/unloading, and detector access.

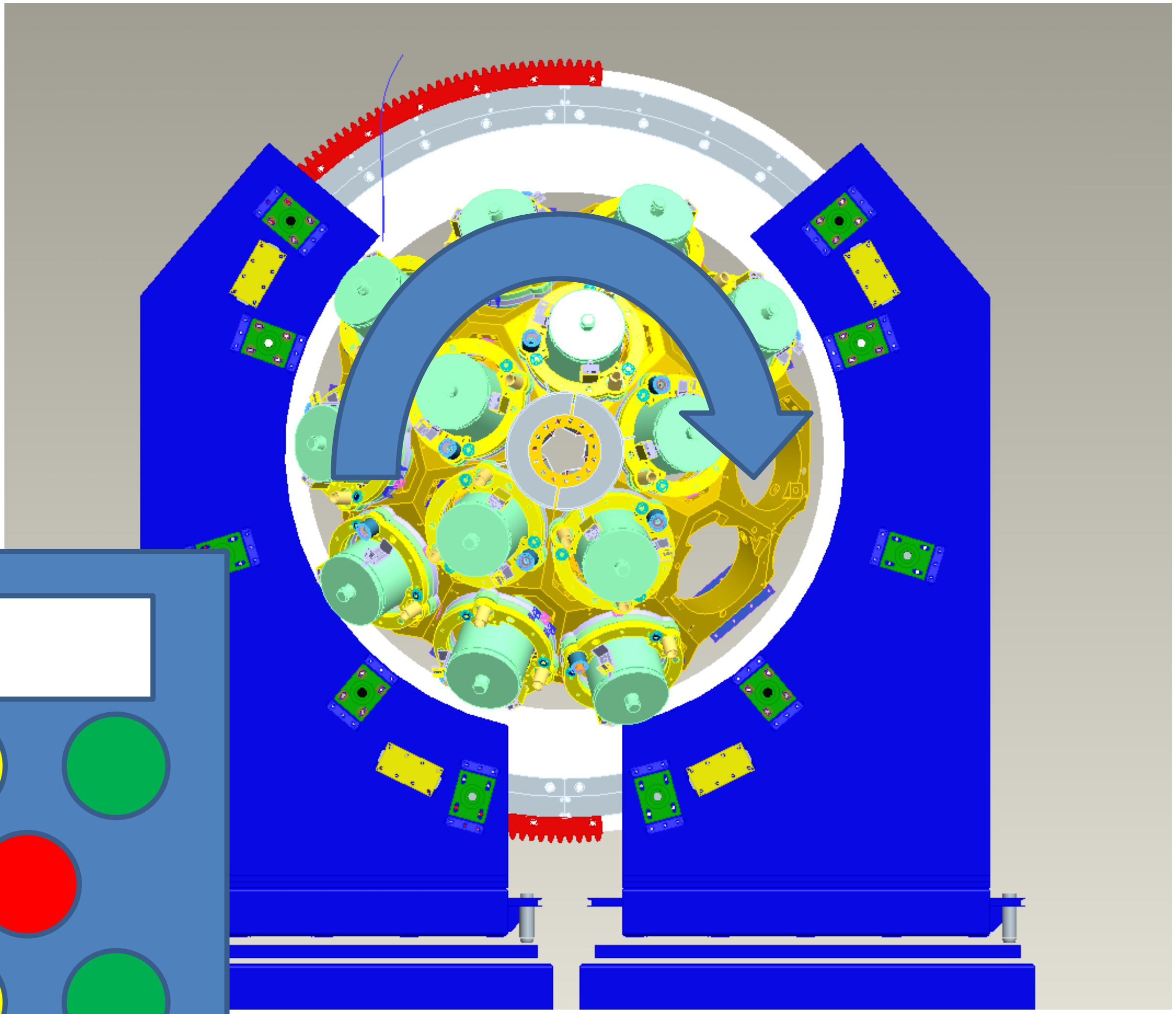
Array driven from left hand side through a spur gear, worm box and a planetary box to a stepper motor.

Motor currently specified such that 15 detectors can be mounted eccentrically without causing overloading

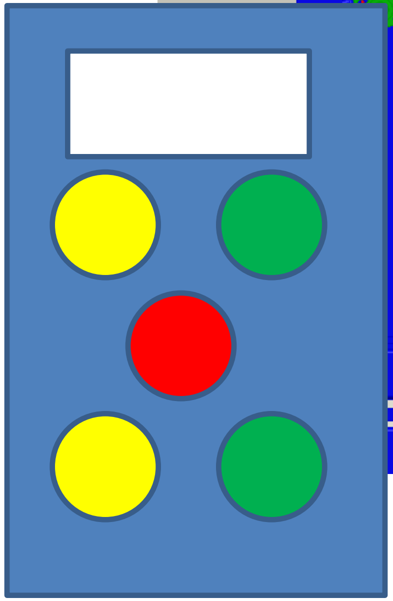


AGATA Structure

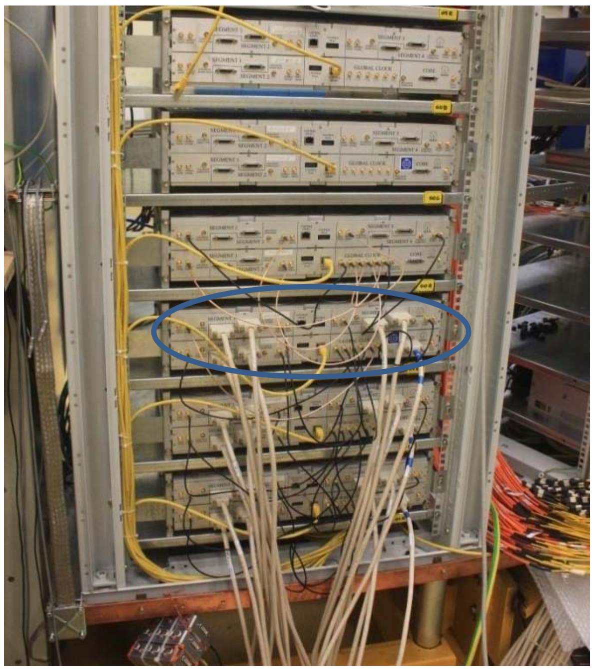
Interlocking pins will be required to ensure that array can't be split without locking pins in position.

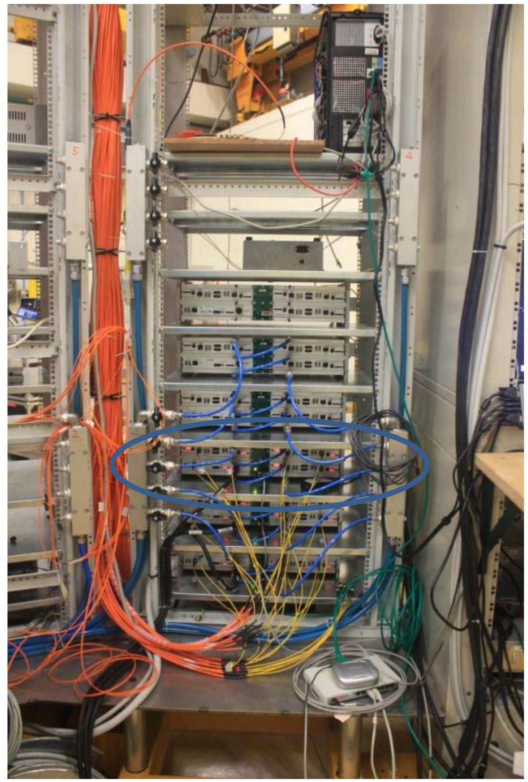


Encoder fitted round main ring and a Jog box used to rotate array.



Cabling - Digitisers

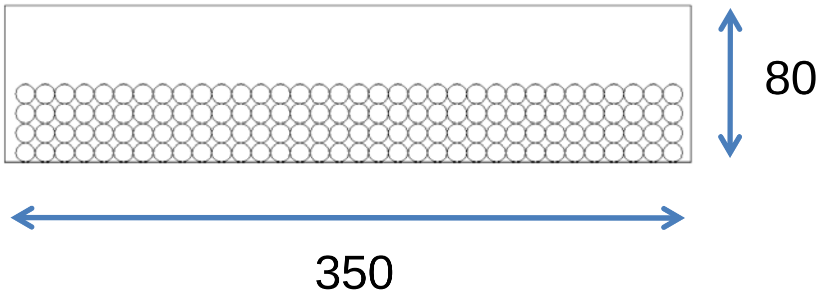




1 digitiser unit per crystal.
40 crystals required. For a 1pi sphere.
Digitisers installed at 160mm pitch.

Say 20 crystals per side.
Two racks are required

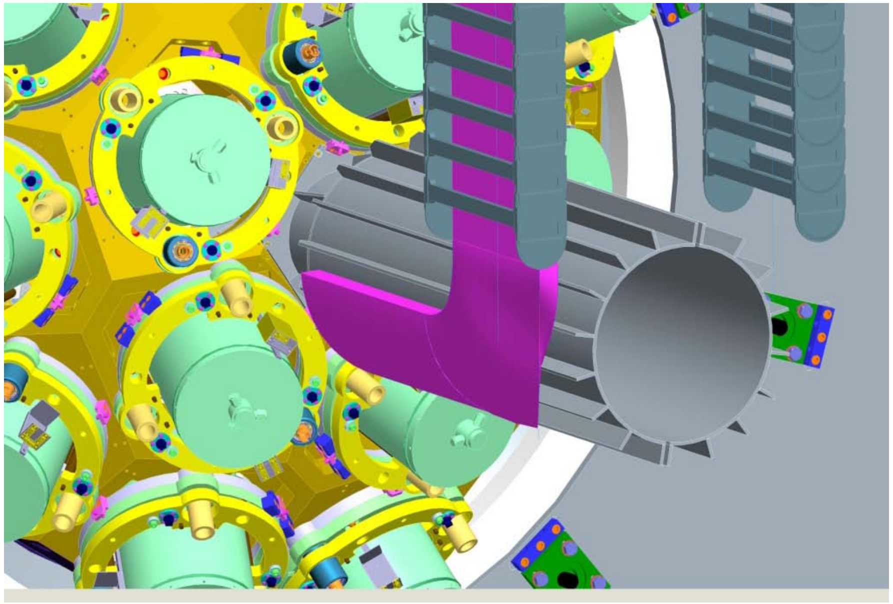
Cable routing

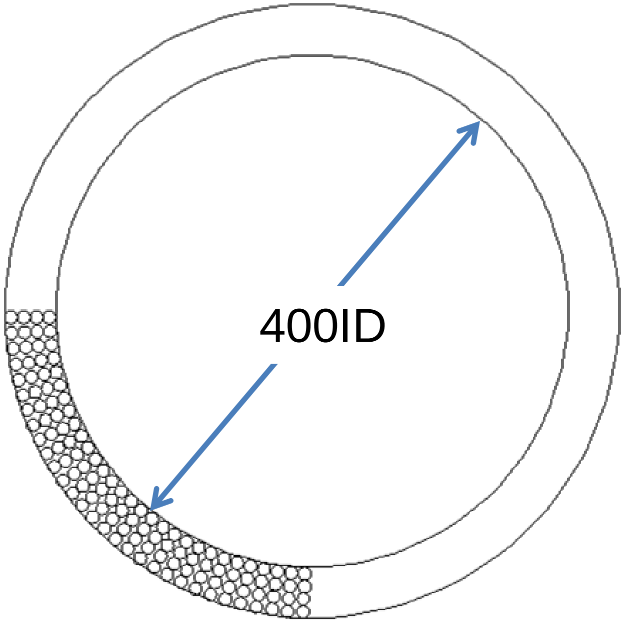


IGUS Series E4.80 can be used

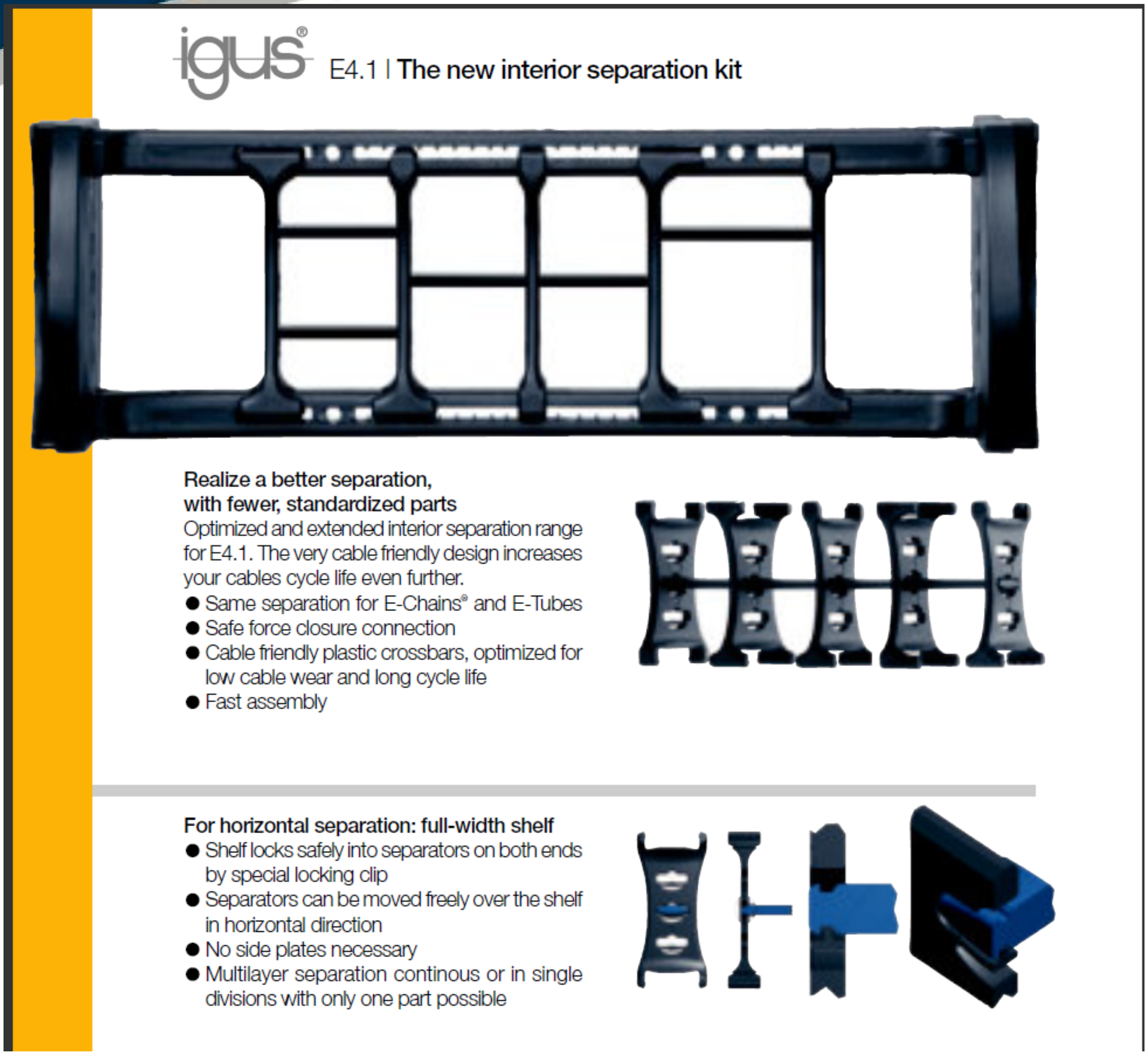
Allow for 40 crystals
7 cables per crystal
This is 280 cables
approx 140 cables per side.

MDR Cables are 13mm diameter





Cable routing



igus® E4.1 | The new interior separation kit

Realize a better separation, with fewer, standardized parts

Optimized and extended interior separation range for E4.1. The very cable friendly design increases your cables cycle life even further.

- Same separation for E-Chains® and E-Tubes
- Safe force closure connection
- Cable friendly plastic crossbars, optimized for low cable wear and long cycle life
- Fast assembly

For horizontal separation: full-width shelf

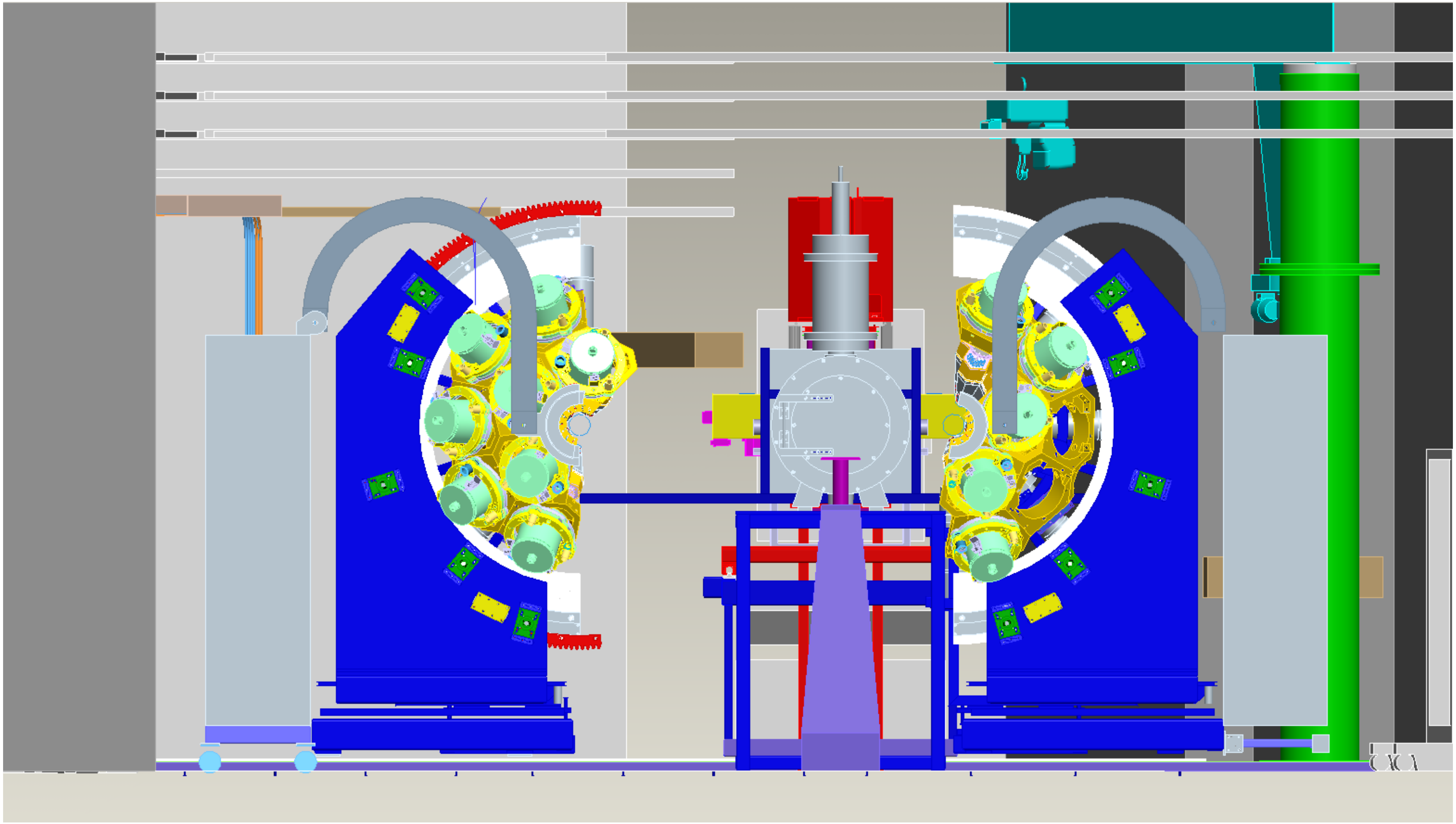
- Shelf locks safely into separators on both ends by special locking clip
- Separators can be moved freely over the shelf in horizontal direction
- No side plates necessary
- Multilayer separation continous or in single divisions with only one part possible

Need cable tray 350 x 160.

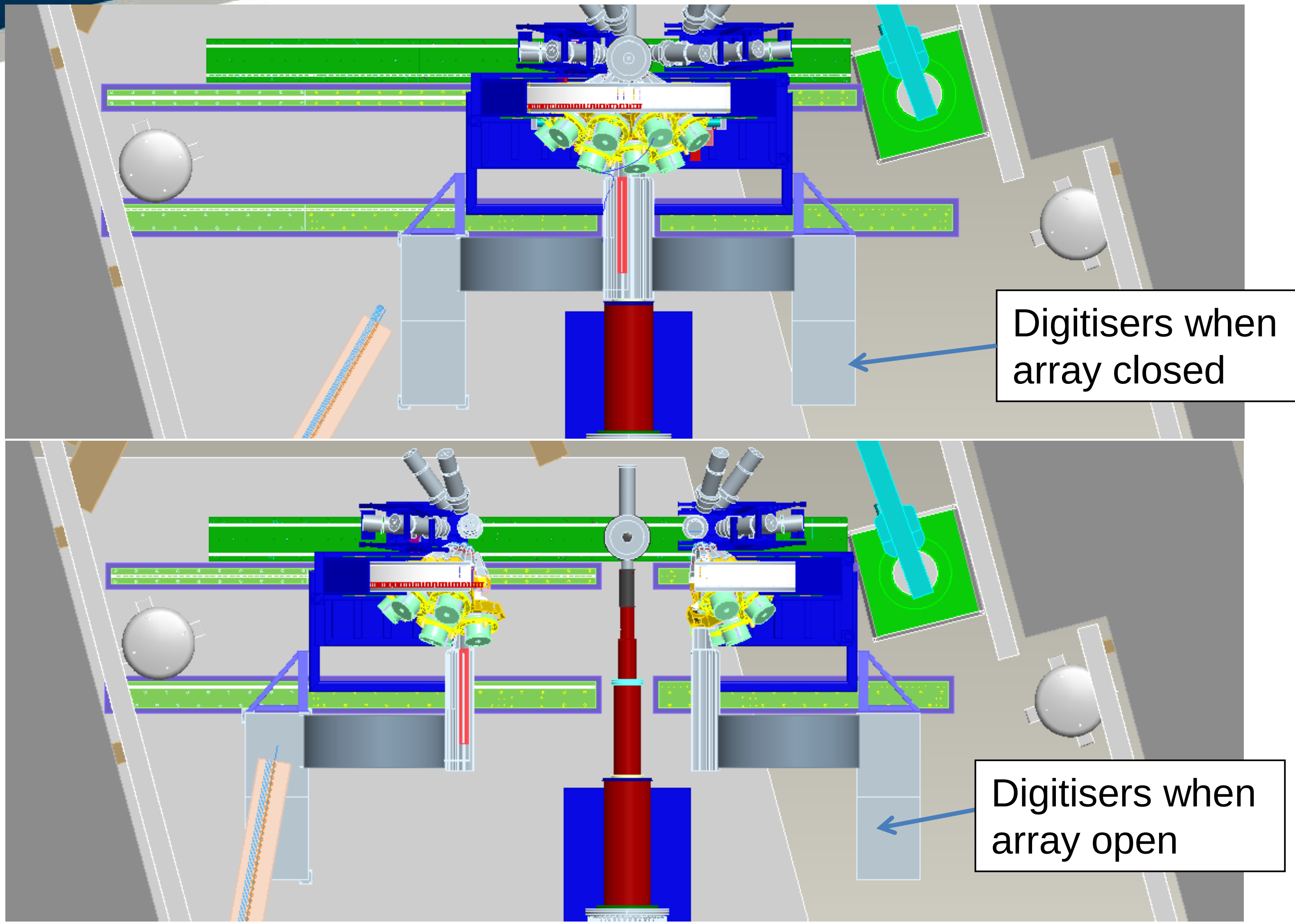
1 option is to start with 350 x 80, then add a second 350 x 80 when required.

Science & Technology Facilities Council

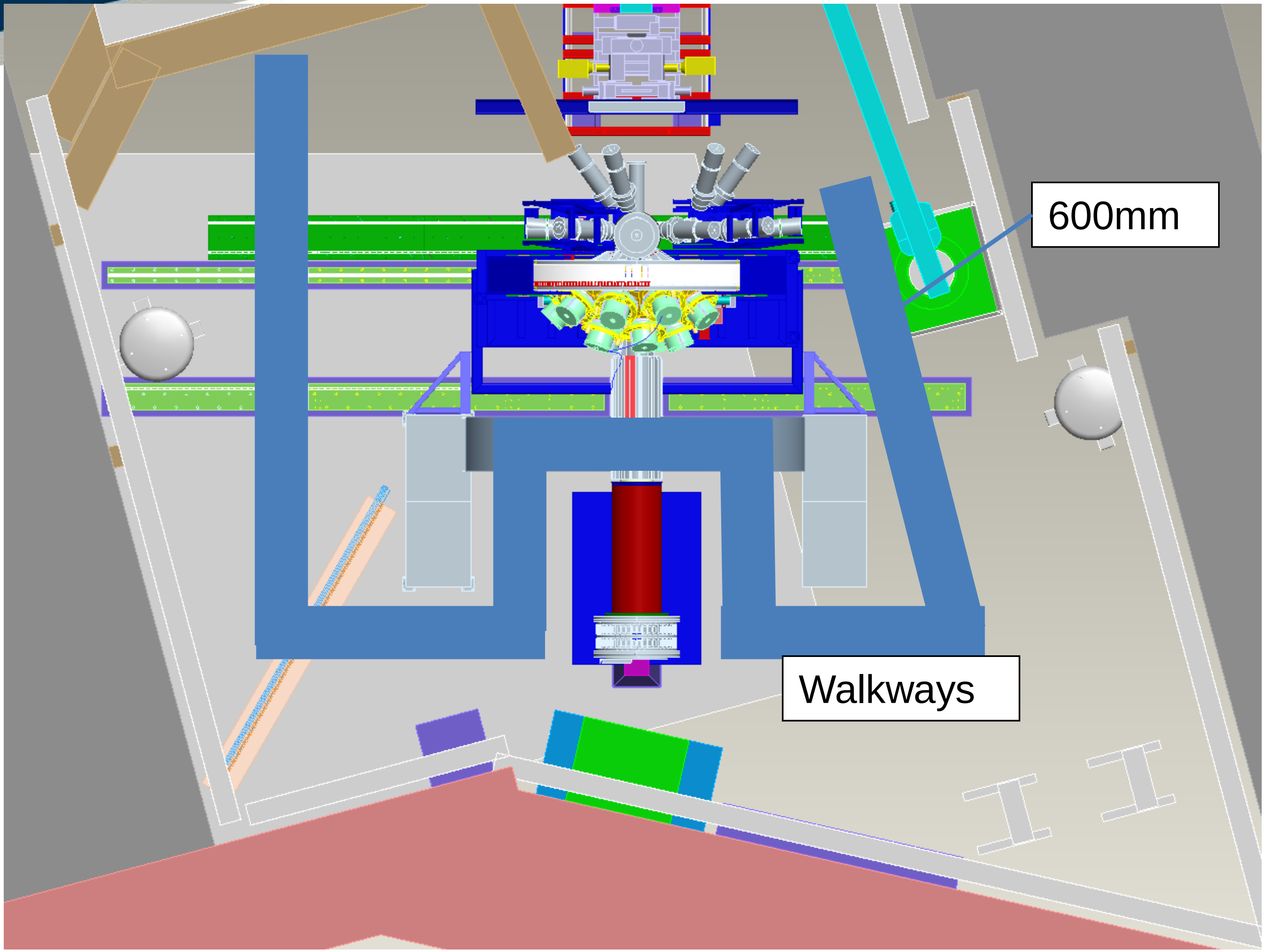
Elevation ball open



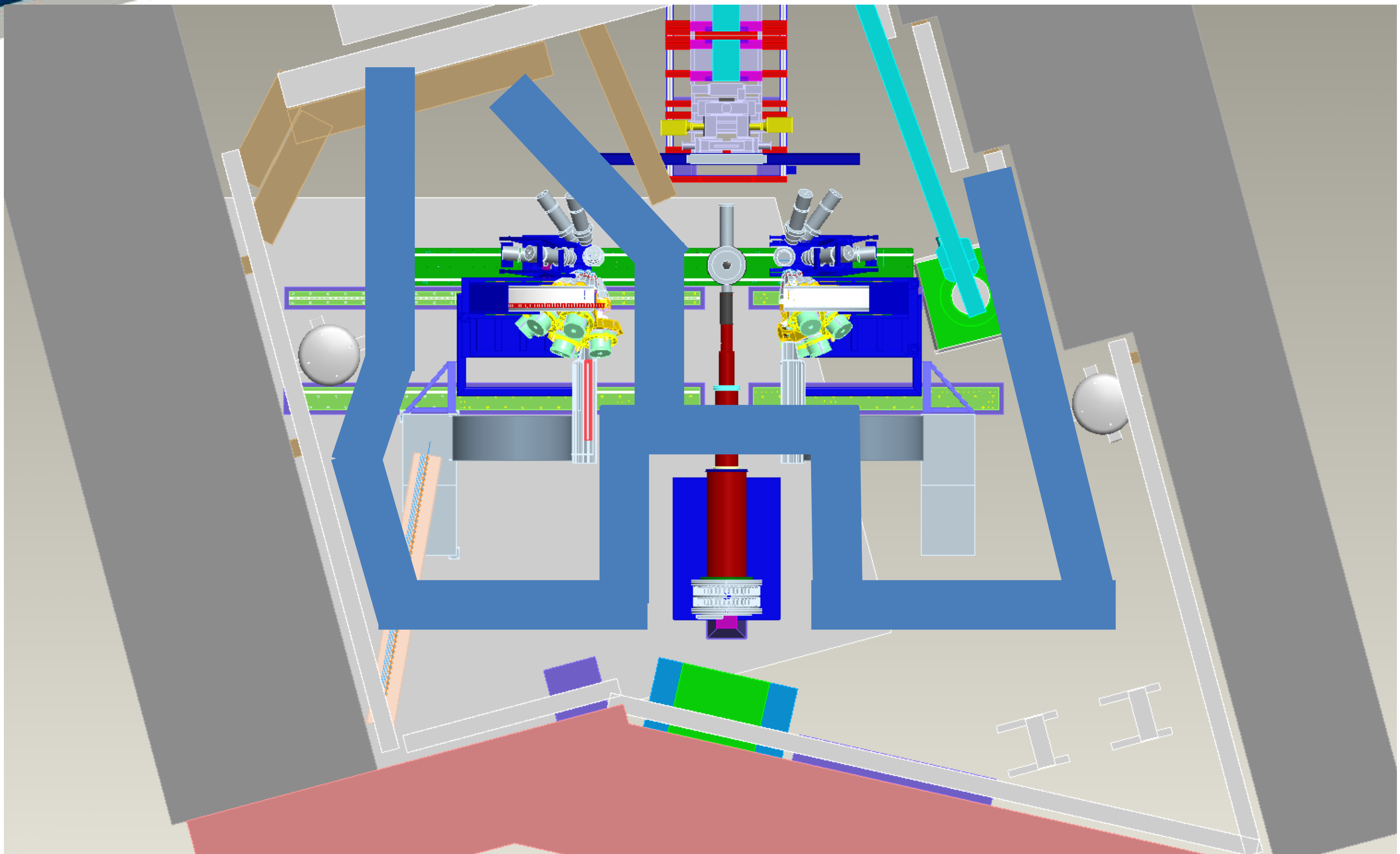
Digitiser Location



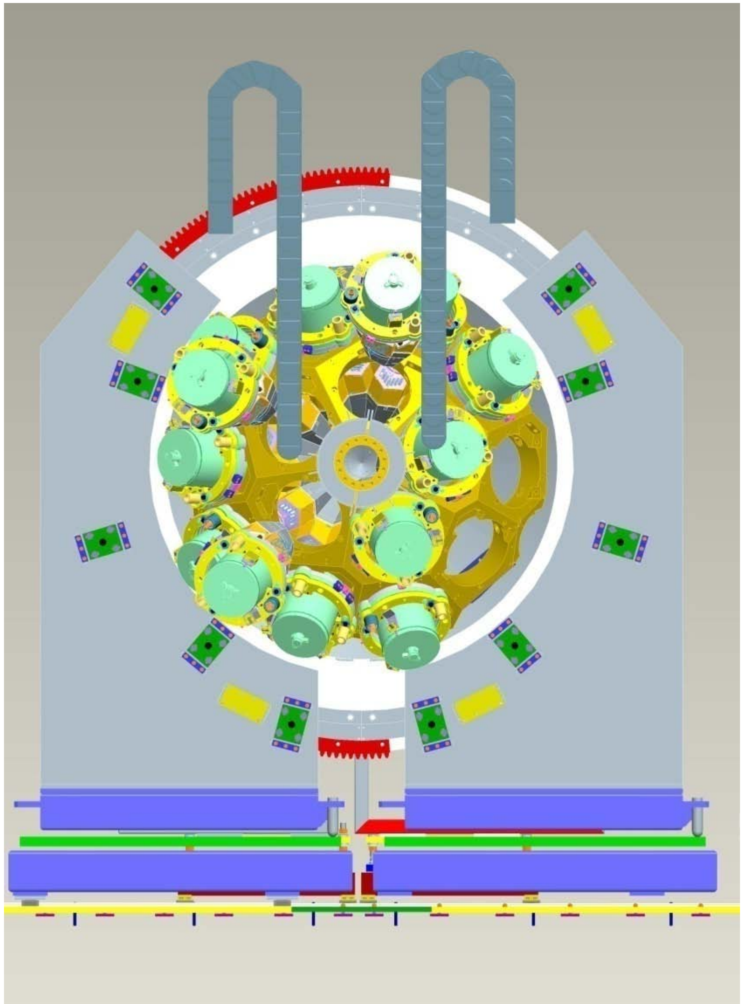
Access Routes ball closed

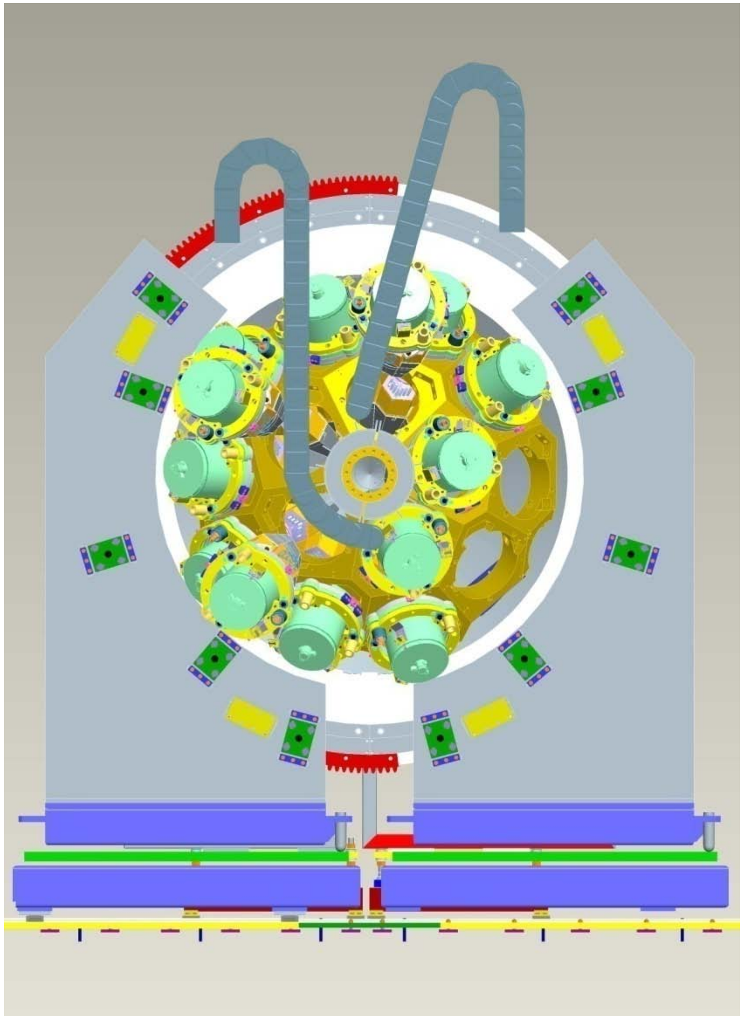


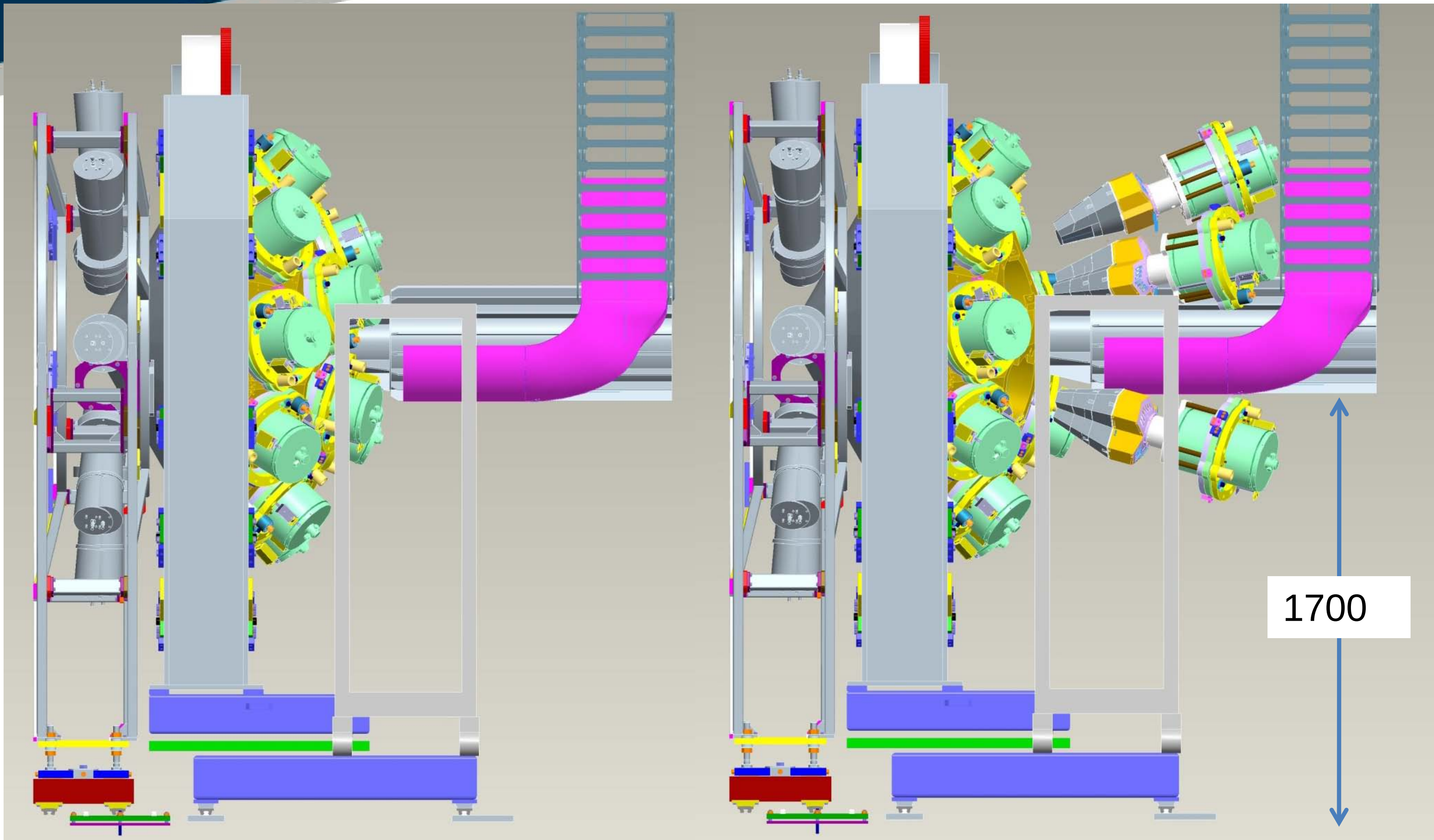
Access Routes ball open



Cable coiler operation

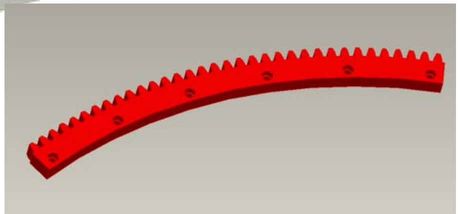
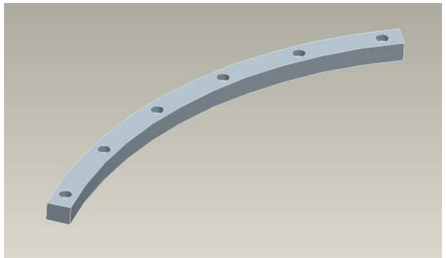
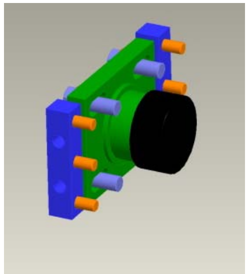






Detectors retracted 850mm

Fabrication

Begin machining simple parts early next year

Finalise control system and components by mid – February.
Order for main ring to be placed by end Feb.

Mechanics to be completed by end July.

Trial build and commissioning of rotating structure At Daresbury in September 2011.