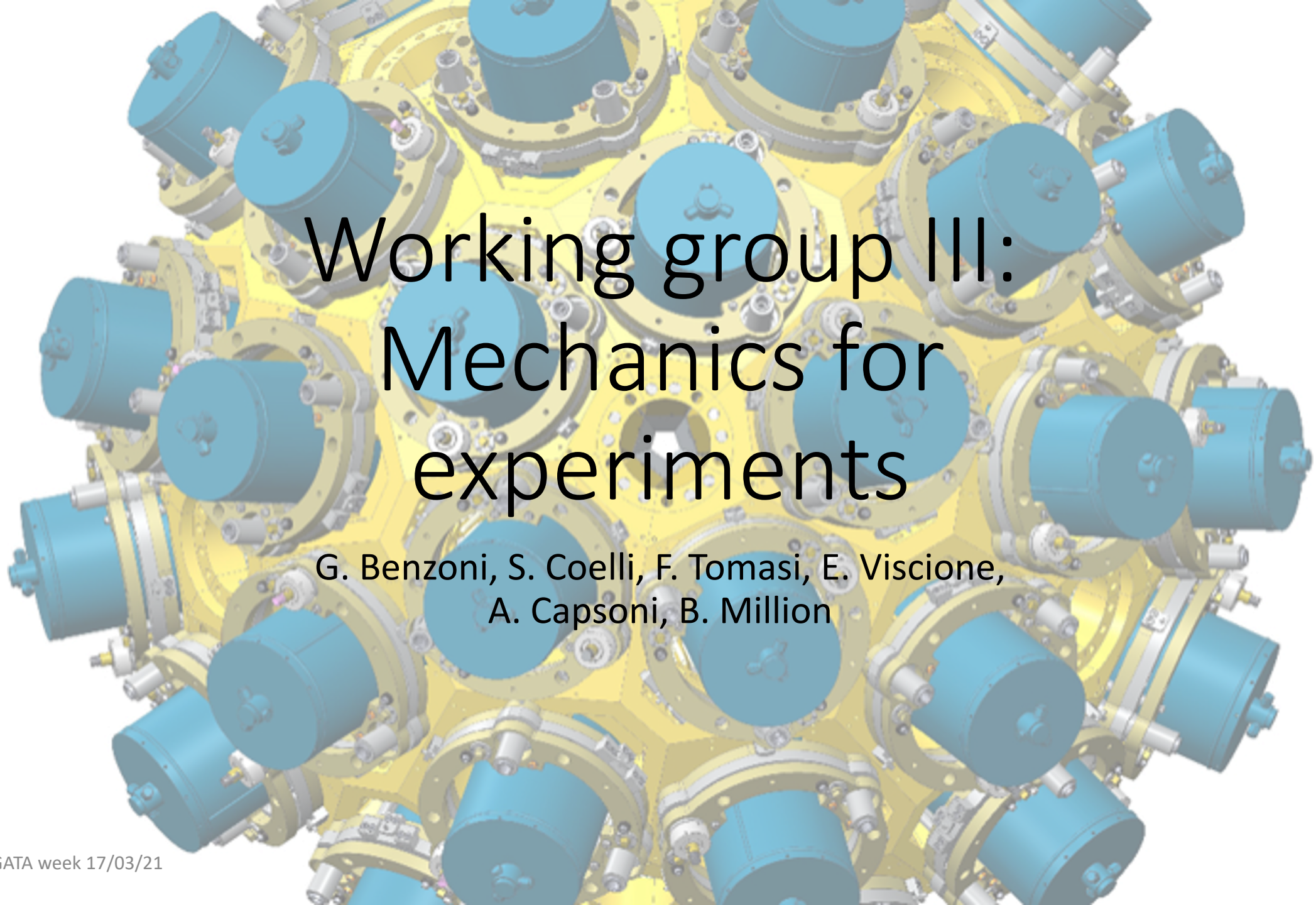


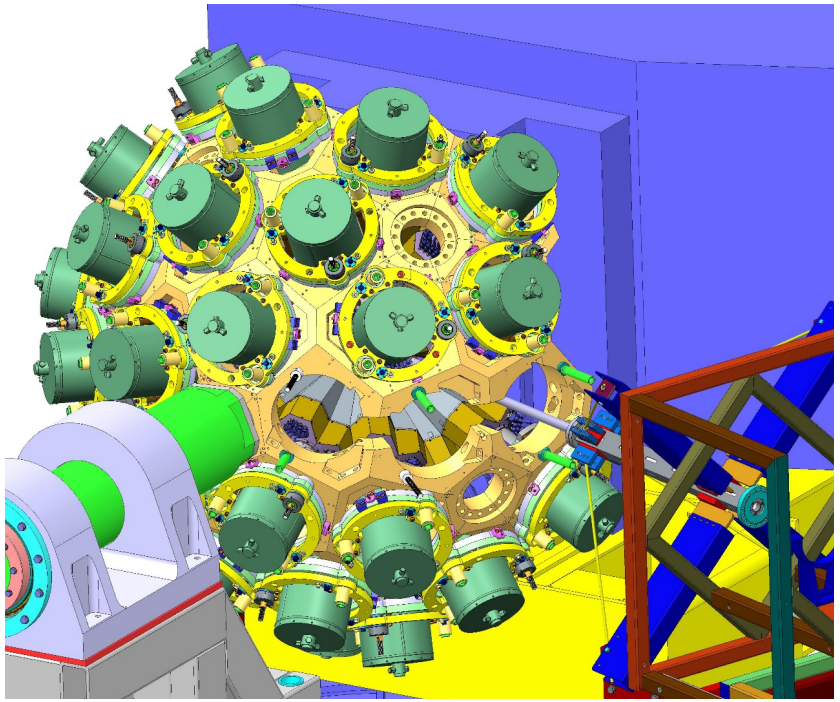
Working group III: Mechanics for experiments

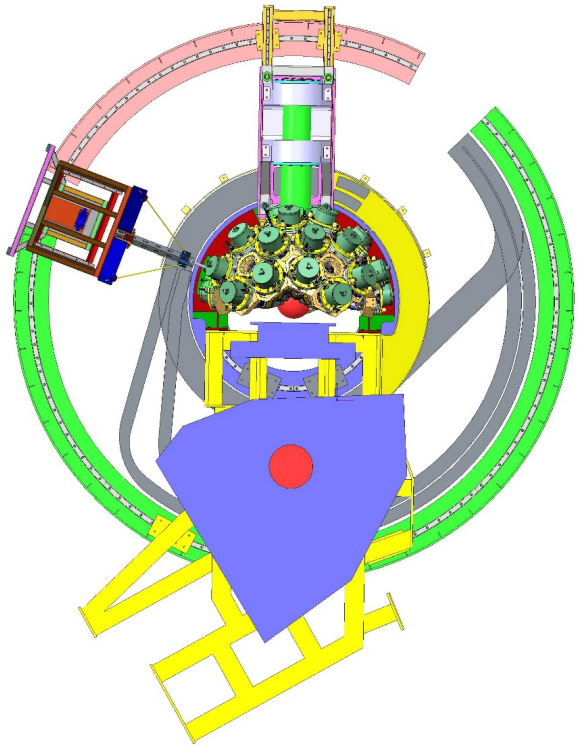
G. Benzoni, S. Coelli, F. Tomasi, E. Viscione,
A. Capsoni, B. Million

Outline:

- Requirements
- Layout of scattering chamber
- Service chamber
- Holding structure and alignment
- Angular coverage
- Timeline and realisation

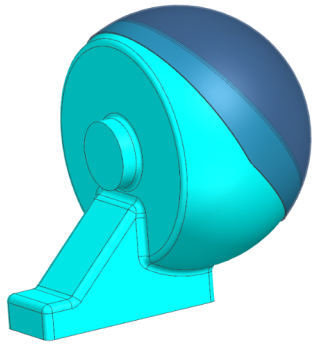
AGATA @ LNL Phase I:
Coupling to PRISMA



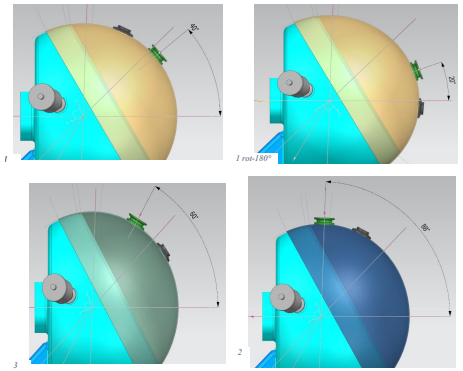


Requirements:

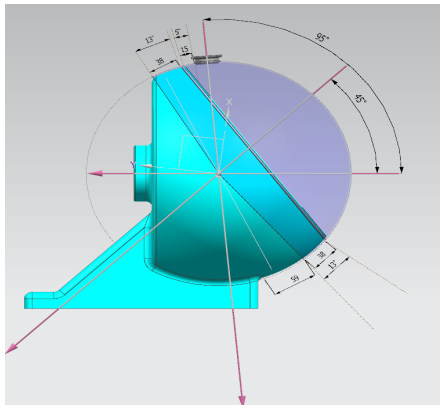
- Follow PRISMA rotation covering the largest possible angular range
- Minimise radiation absorption
- Large space inside the chamber to accommodate ancillary instrumentation
- Easy access to the chamber
- Working pressure 10-6 mbar
- Allow AGATA to work in maximum efficiency configuration (+50 mm from nominal distance)
- Envisage space for electronics of ancillary det. and beam dump
- Easy access to the chamber



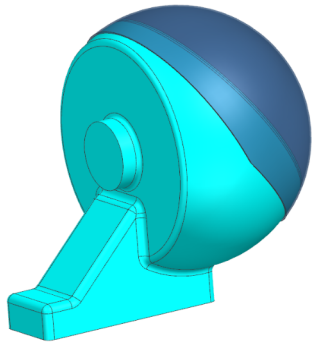
Scattering chamber made of two shells
Outer radius 170 mm
Thickness 2 mm



3 removable shells help covering angles btw ~7-88 deg
Each shell can slide +/- 13 deg from central position

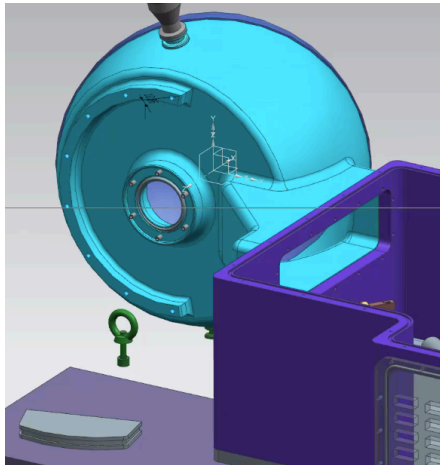


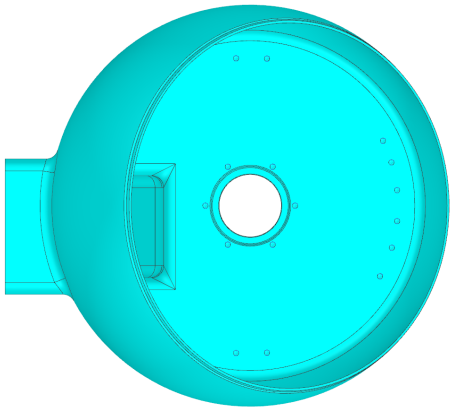
Requirements:



Scattering chamber made of two shells
Outer radius 170 mm
Thickness 2 mm

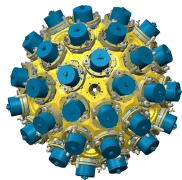
- Follow PRISMA rotation covering the largest possible angular range
- Minimise radiation absorption
- Large space inside to accommodate ancillary instrumentation
- Easy access to the chamber
- Working pressure 10-6 mbar
- Allow AGATA to work in maximum efficiency configuration (+50 mm from nominal distance)
- Envisage space for electronics of ancillary det. and beam dump
- Easy access to the chamber





- Supports for machining exploited to create holes for holding structure of ancillary detectors
- Large frontal opening

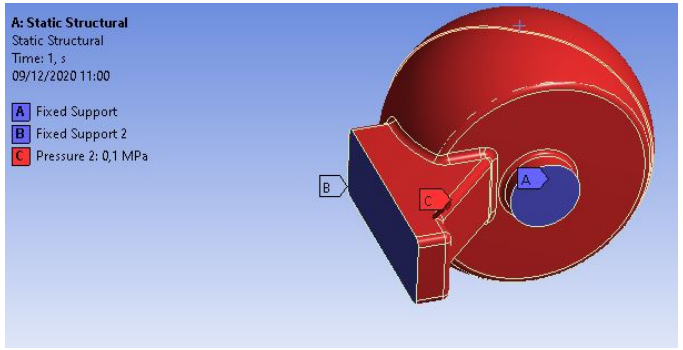
➔ See D. Mengoni for ancillary

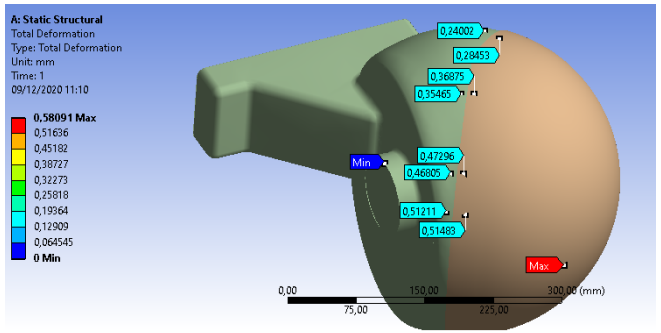


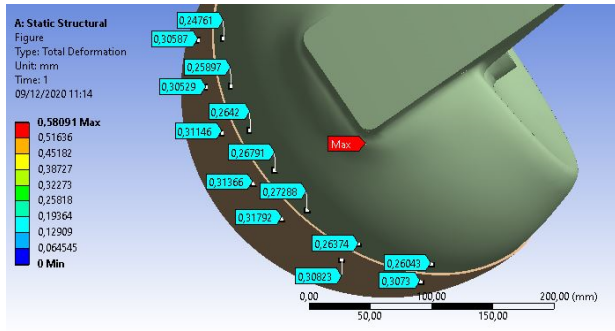
Requirements:

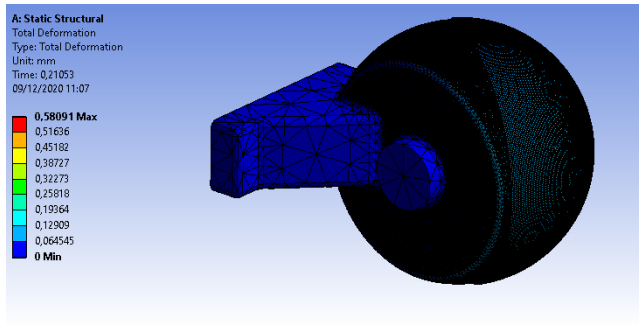
- Follow PRISMA rotation covering the largest possible angular range
- Minimise radiation absorption
- Large space inside to accommodate ancillary instrumentation
- Easy access to the chamber
- Working vacuum level 10^{-6} mbar
- Allow AGATA to work in maximum efficiency configuration (+50 mm from nominal distance)
- Envisage space for electronics of ancillary det. and beam dump
- Easy access to the chamber

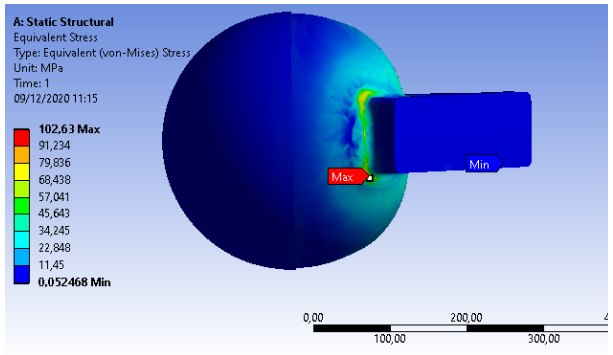
FEA stress under vacuum

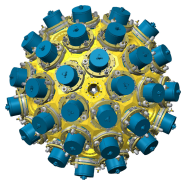




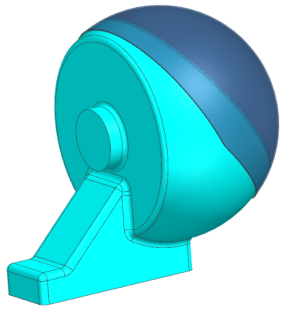






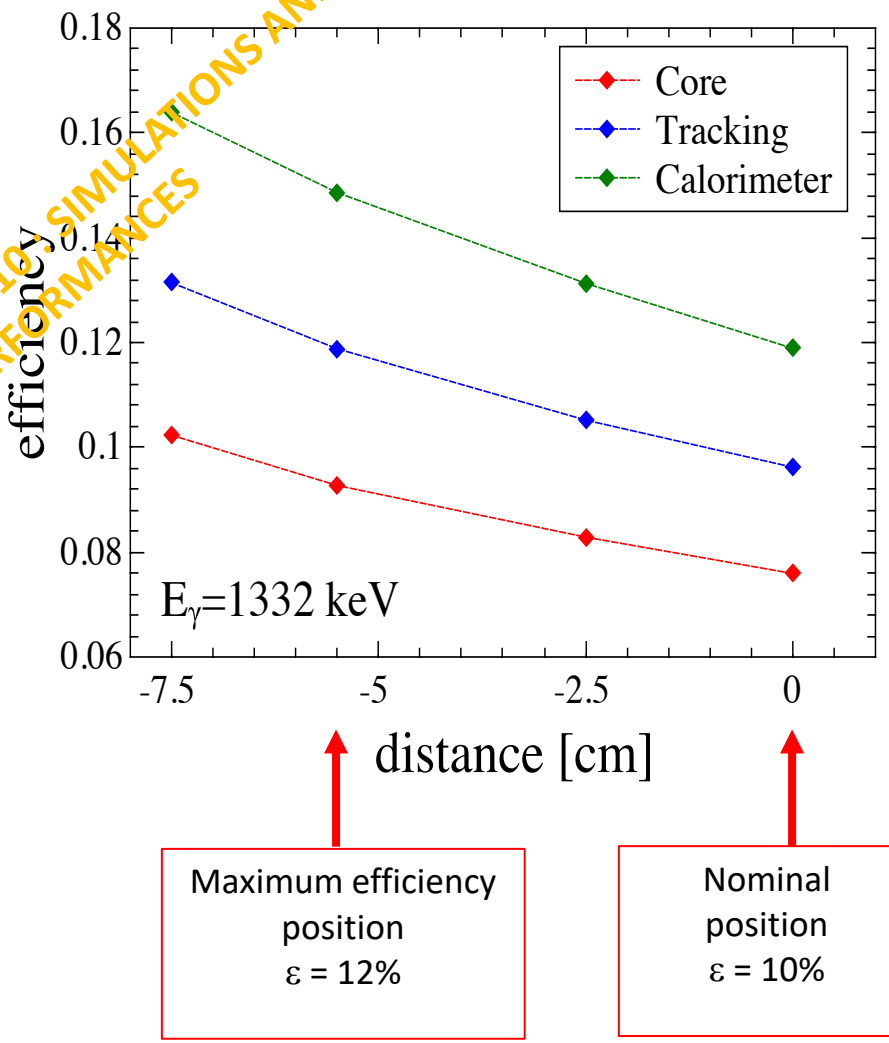


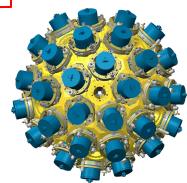
Requirements:



- Follow PRISMA rotation covering the largest possible angular range
- Minimise radiation absorption
- Large space inside to accommodate ancillary instrumentation
- Easy access to the chamber
- Working pressure 10-6 mbar
- Allow AGATA to work in maximum efficiency configuration (+50 mm from nominal distance)
- Envisage space for electronics of ancillary det. and beam dump
- Easy access to the chamber

Courtesy of TASK 10, SIMULATIONS AND PERFORMANCES





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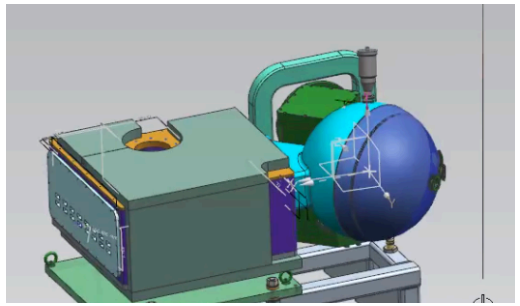
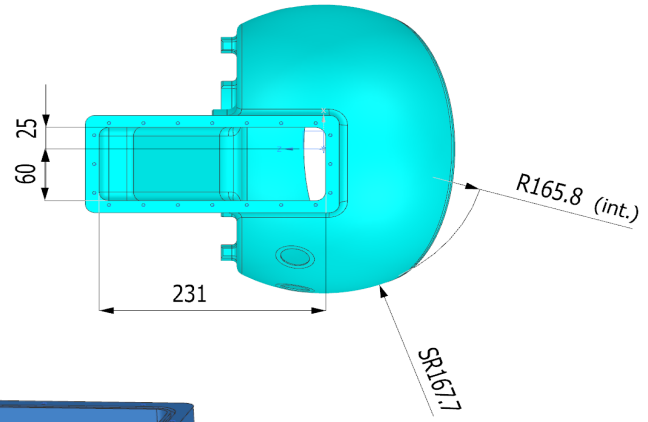
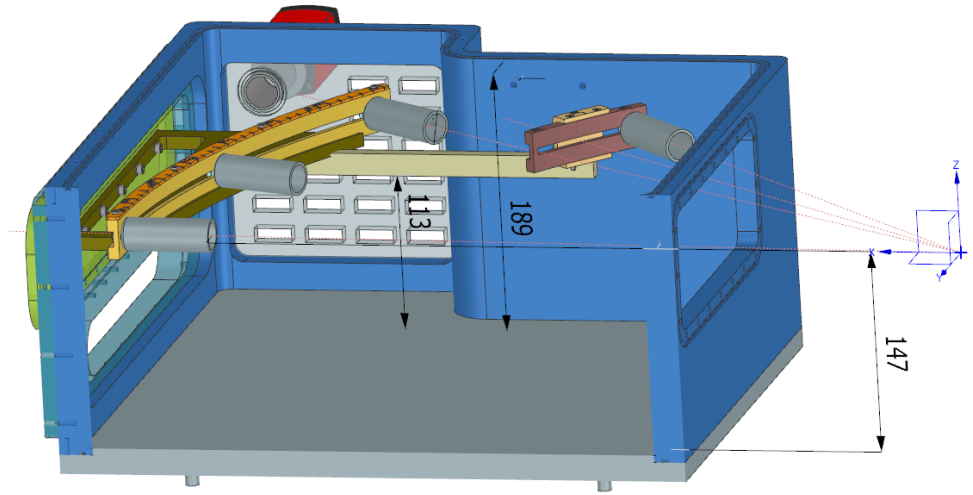
- Easy access to the chamber
- Working pressure 10-6 mbar
- Allow AGATA to work in maximum efficiency configuration (+50 mm from nominal distance)
- Envisage space for electronics of ancillary det. and beam dumps

Use of a service chamber , “expansion chamber”, to accommodate beam dumps, provide space for cables and front-end electronics for ancillary det.







Requirements:

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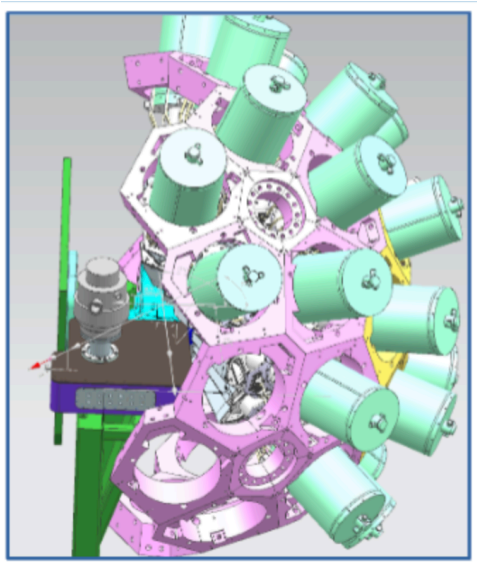
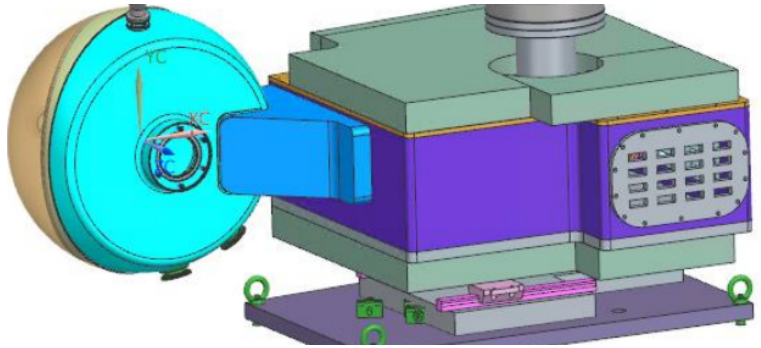
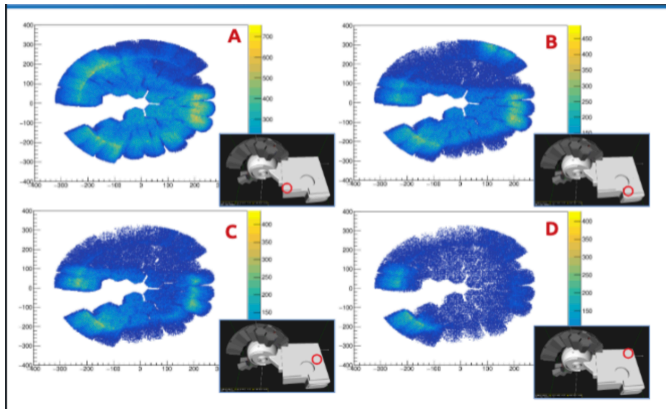
- Envisage space for electronics of ancillary det. and beam dump



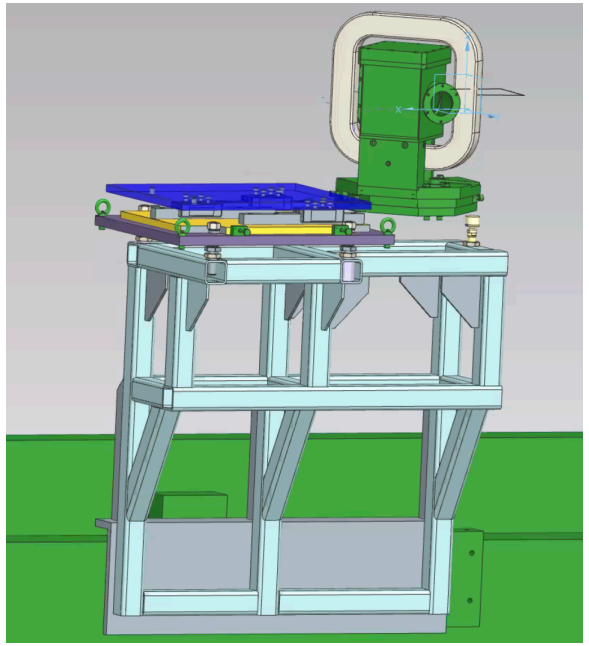


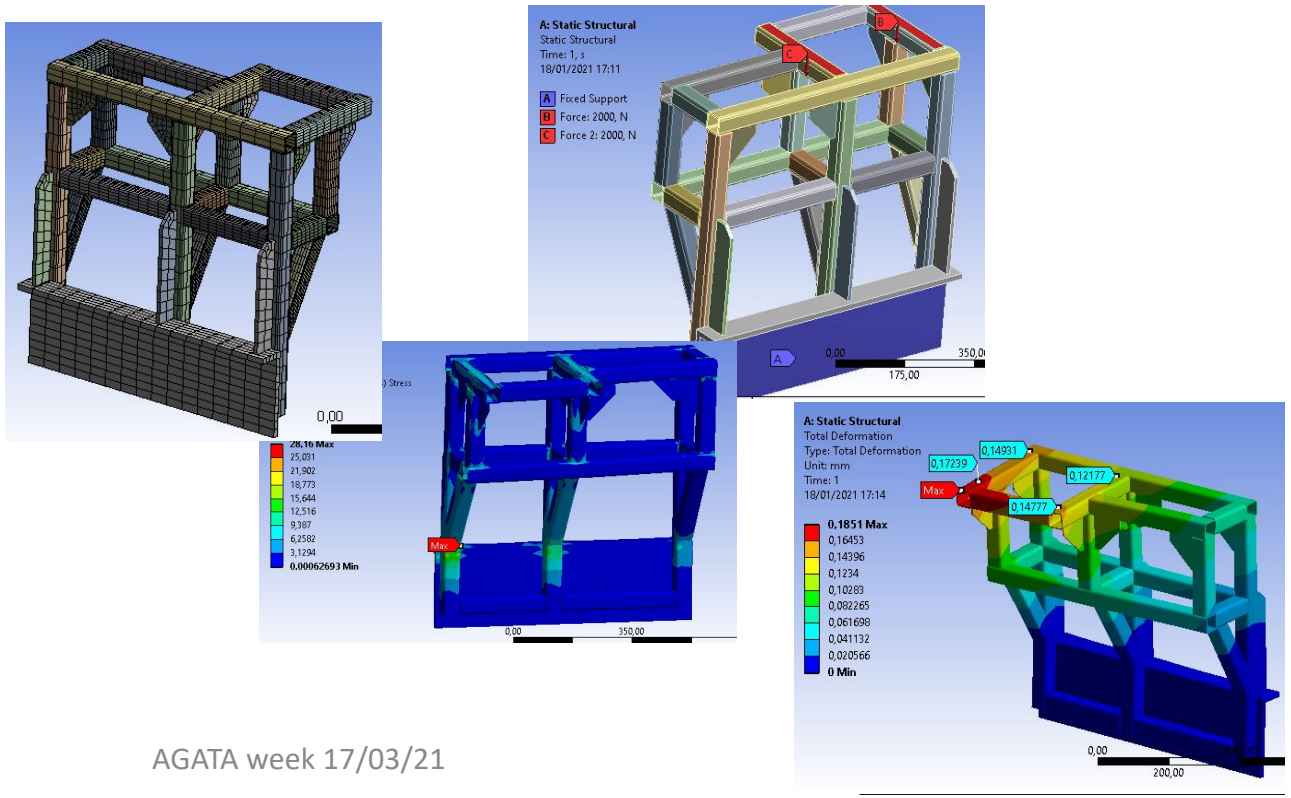
Detailed study of shielding of the expansion chamber to reduce background from beam dumps ➔ See F.Crespi

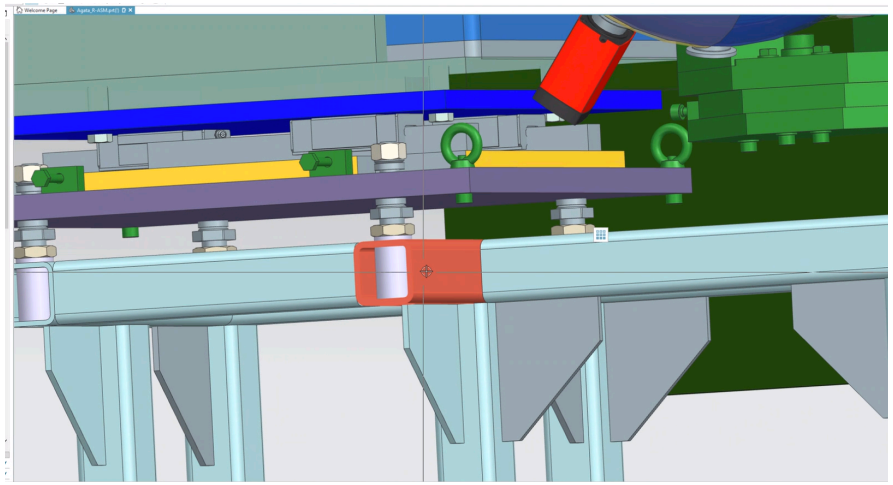


Holding structure and alignment

- Need to revise the holding structure to allow for high efficiency configuration
- Heavy structure (~500 kg) ➔ FEA analysis of deformation
- Foreseen 3D movements of the servce chamber for alignment of the structure



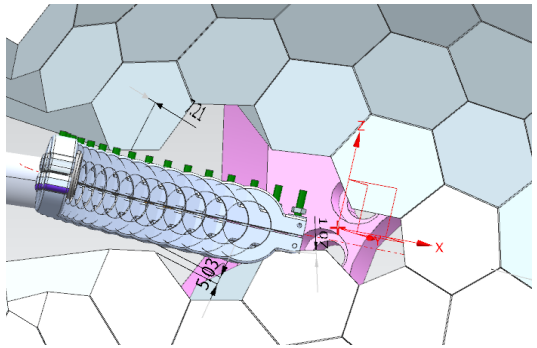




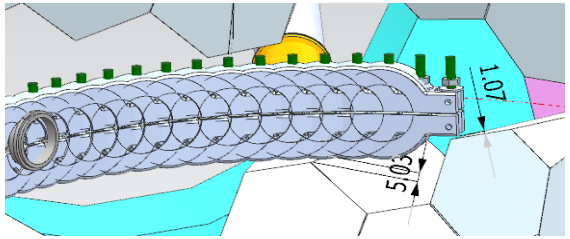
Details on angular coverage

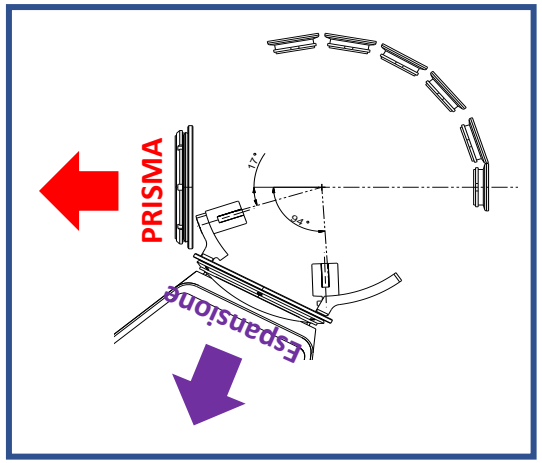
ID Shell	Central position	Range (+/- 13 deg)	180 deg rotation
1	40	27 ÷ 53	7 ÷ 33 (ref.20)
2	60	47 ÷ 73	
3	80	67 ÷ 88	

Small angles limitations:

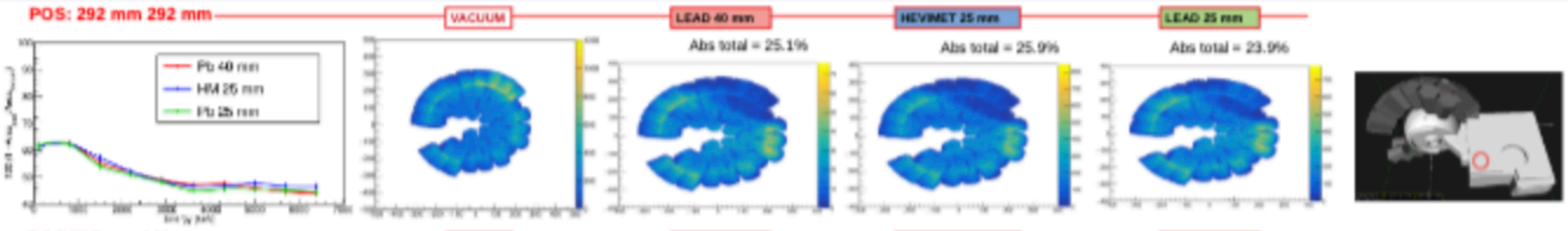


Mechanical clashes with beamline clamp up ~ 35 deg in high-efficiency configuration



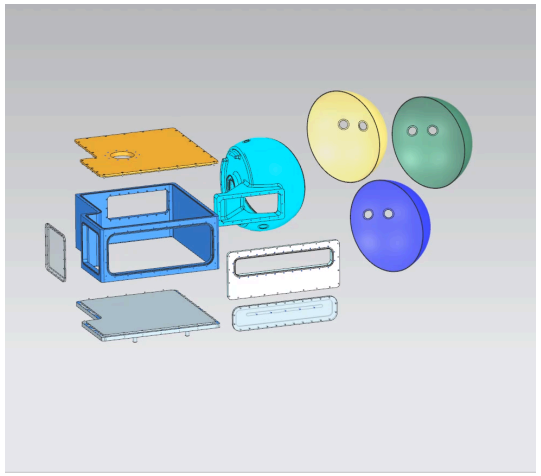


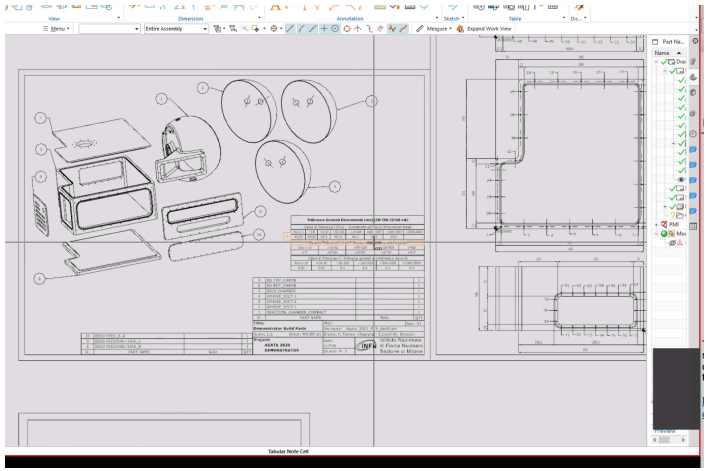
Location of the beamdumps inside the scattering chamber up to 45 deg, at ~80 mm distance from target

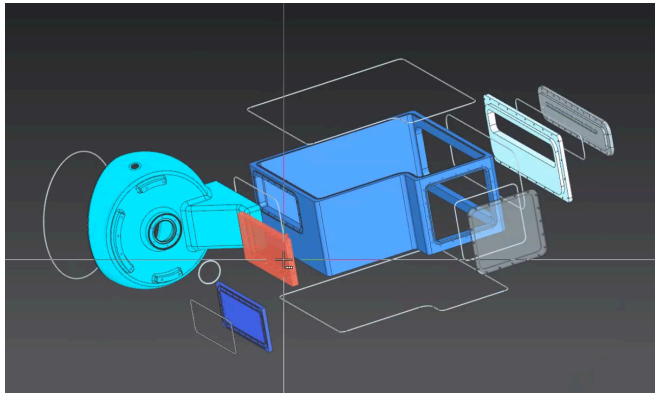


High bg when beamdump in forward position (45-53 deg)

Timeline and realisation







- Techincal drawings are ready for most of the components
- Already contacted manufacturers and check feasibility
- Supervision of existing PRISMA platform to finalise the support structure needed

Delivery of the full system in time for installation

Conclusions

Additional features of the system:

- Videocamera for beam centering
- Vacuum gauges in the 2 chambers
- Additional TMP pump on service chamber
- Multi position target stick

- Scattering chamber composed of 2 shells matching requirements of rotation with PRISMA
- Use of a second service chamber to host beamdumps and cables/electronics for ancillaries
- Shielding and effect of beamdump studied with simulations
- Revised hodling structure to sustain increased weight and allow for high-efficiency configuration
- FEA analysis on scattering chamber and holding structure
- Positioning and alignment procedures in definition

- Strong and useful interaction with many other WG and AGATA mechanics and infrastructure team