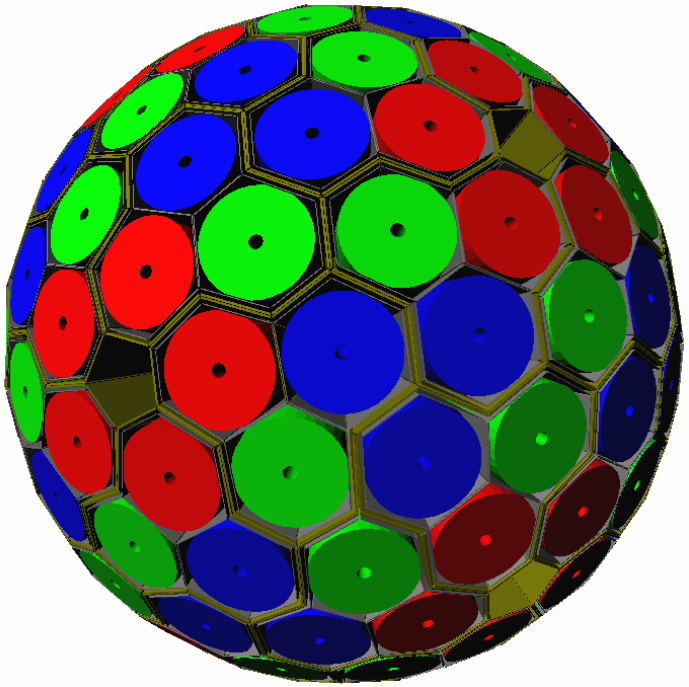
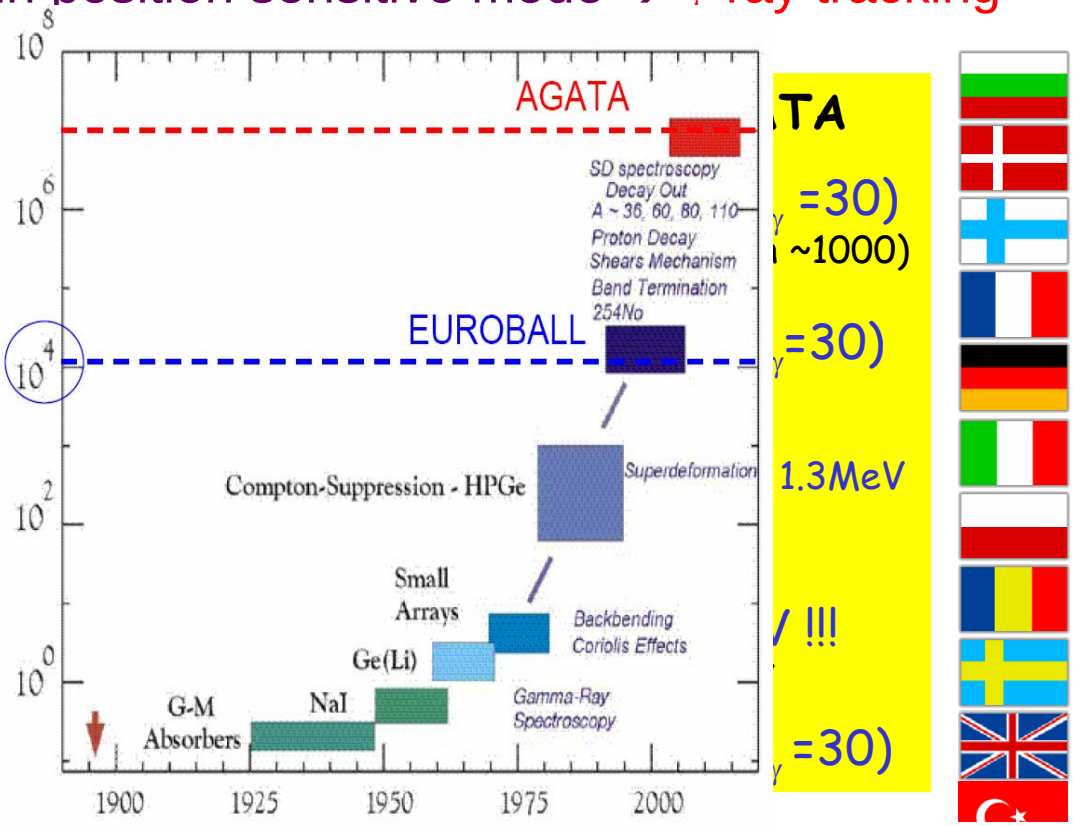
The AGATA spectrometer

- 180 large volume 36-fold segmented Ge crystals
- arranged in 60 identical triple-clusters
- Digital electronics and Pulse Shape Analysis algorithms
- Operation of Ge detectors in position sensitive mode → γ-ray tracking





A long term project :

1997-2002: R&D on highly segmented Ge detectors
2003-2009: AGATA demonstrator (6.5 M€ ; 250 m.y.)
2010-2014: AGATA 1/3 (12 M€ ; 200 m.y.)
2015-20xx: AGATA 4π (25 M€ ; 200 m.y.)

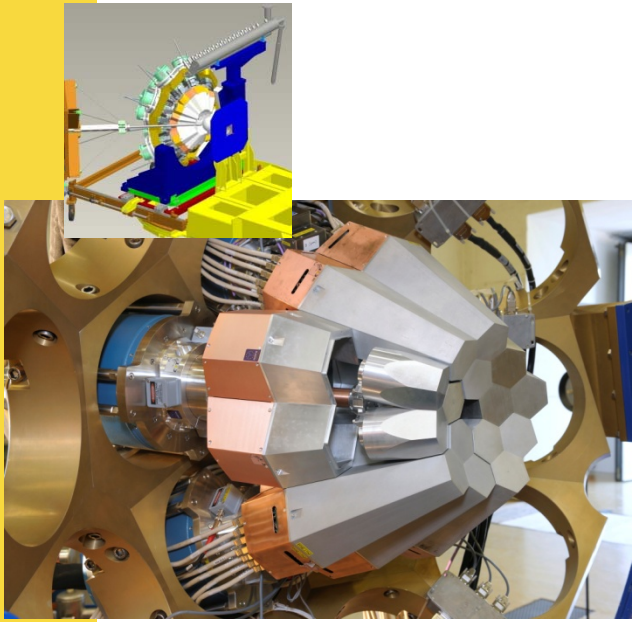
Experimental program

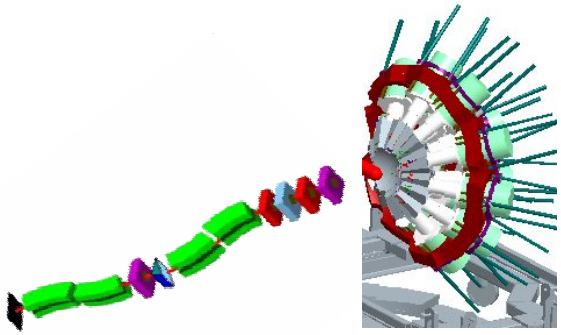
AGATA demonstrator towards AGATA 1π array

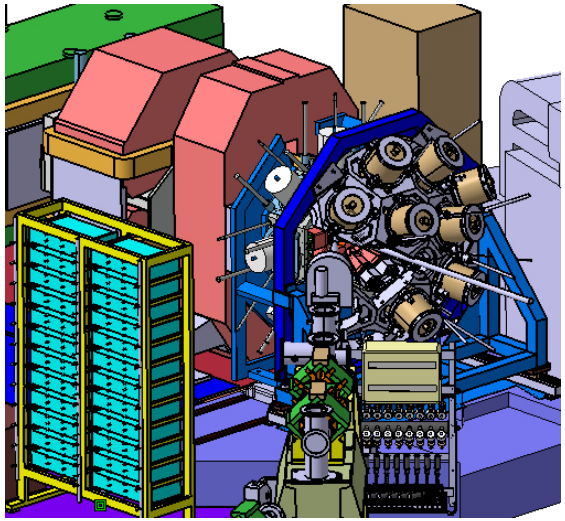
2010/11
→ LNL
≥5 ATC

2012/13
→ GSI/FRS
≥5 ATC + 5ADC

2014/15
→ GANIL/SPIRAL2
~15 ATC







AGATA Demonstrator + PRISMA

Total Eff. ~6%

AGATA @ FRS

Total Eff. > 10%

AGATA + VAMOS + EXOGAM

Total Eff. > 20%

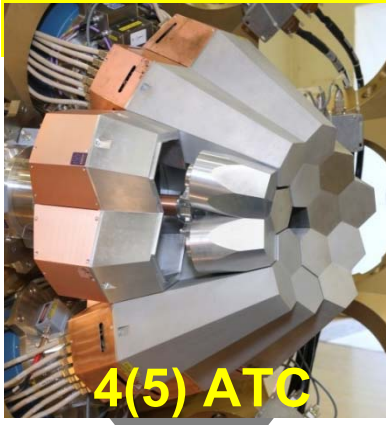
Status of AGATA at Legnaro National Lab. (Italy)

Irfu
cea
saclay

AGATA
ADVANCED GAMMA TRACKING ARRAY

1

Highly segmented



2

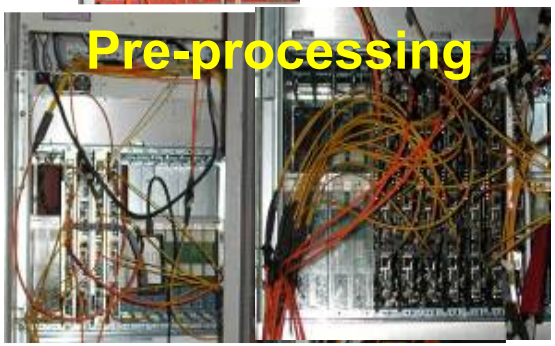
Digital electronics to record and process segment signals

Identified interaction

$(x,y,z,E)_i$

Pulse Shape Analysis to decompose recorded waves

3



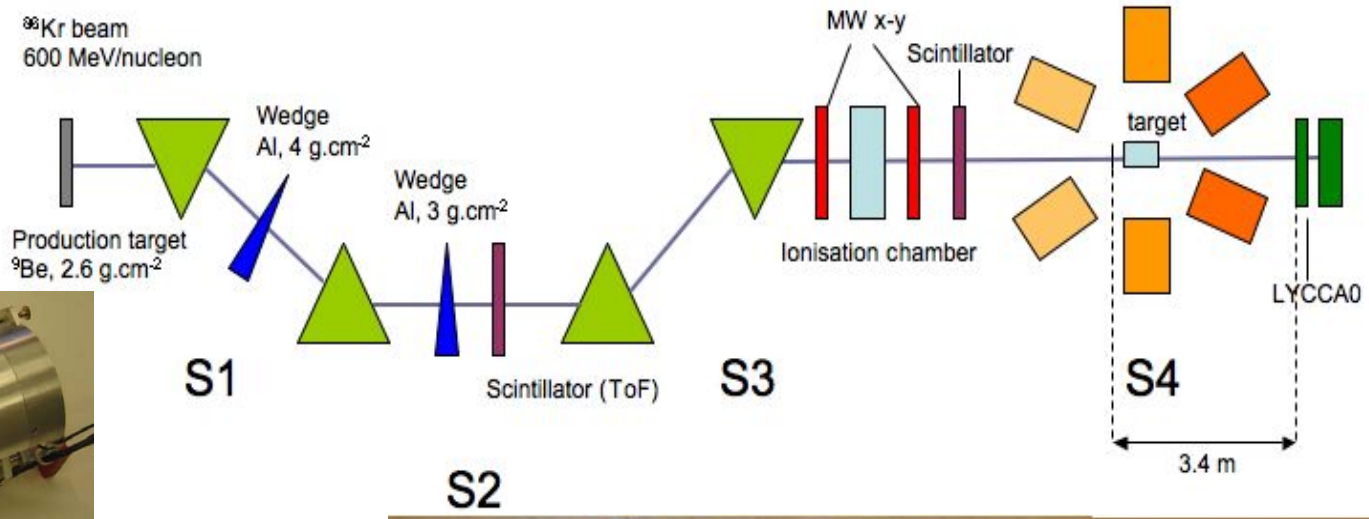
4

Reconstruction of scattering sequence from Compton vertices

AGATA at the GSI Fragmentseparator (2012/13)

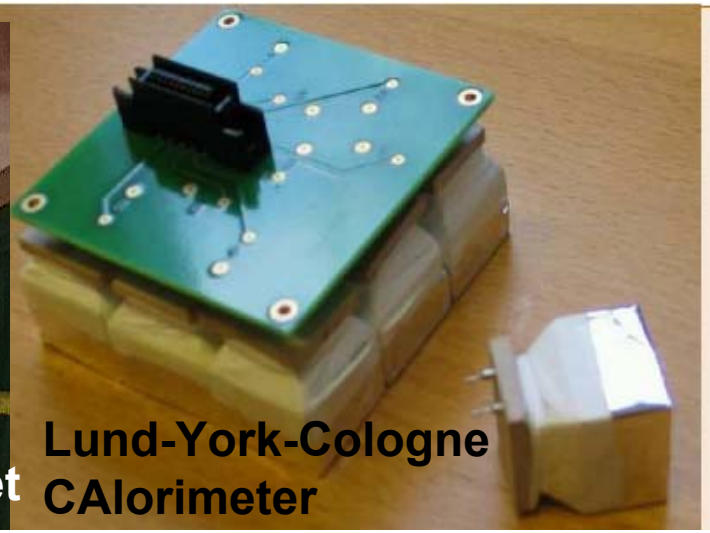
- Relativistic Coulomb and inelastic excitation, e.g. (p,p')
- Knock-out and fragmentation reactions
- Plunger lifetime measurements

Campaign spokespersons: M. Bentley & W. Korten

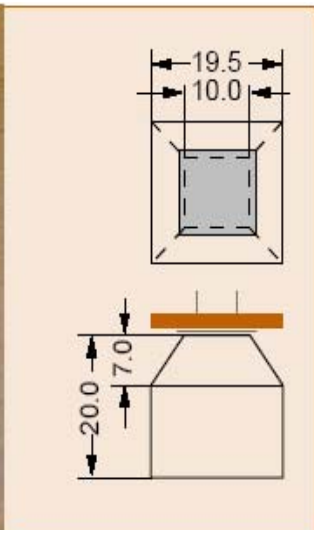


Cologne plunger

Saclay LH$_2$ target

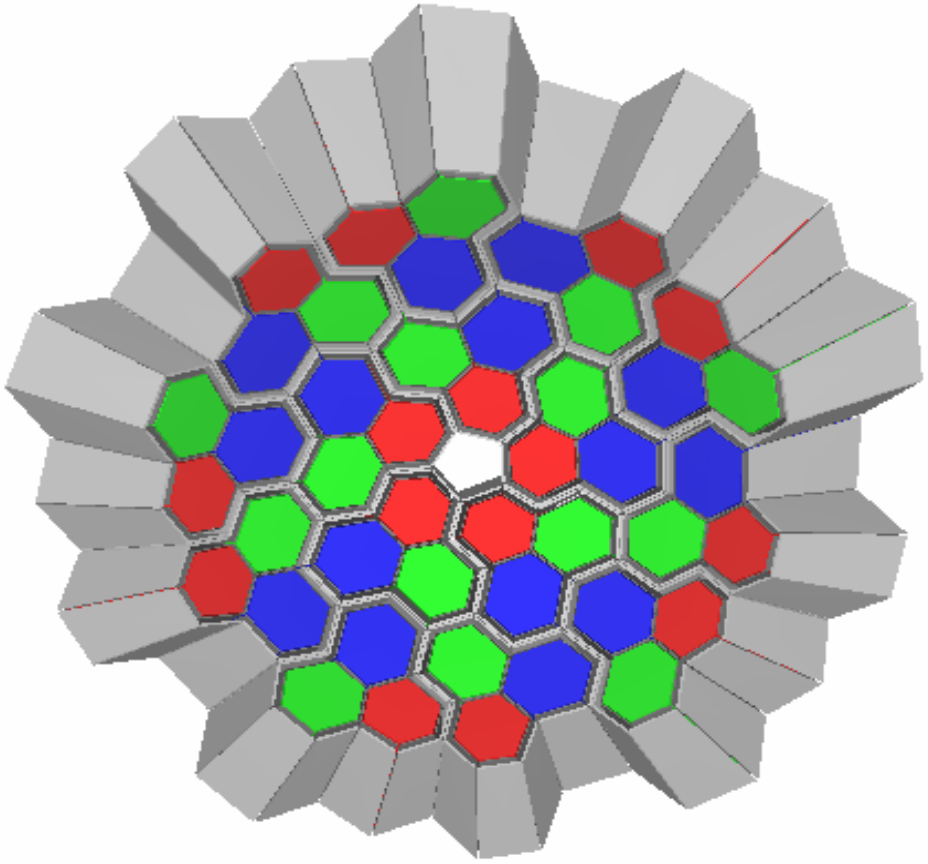


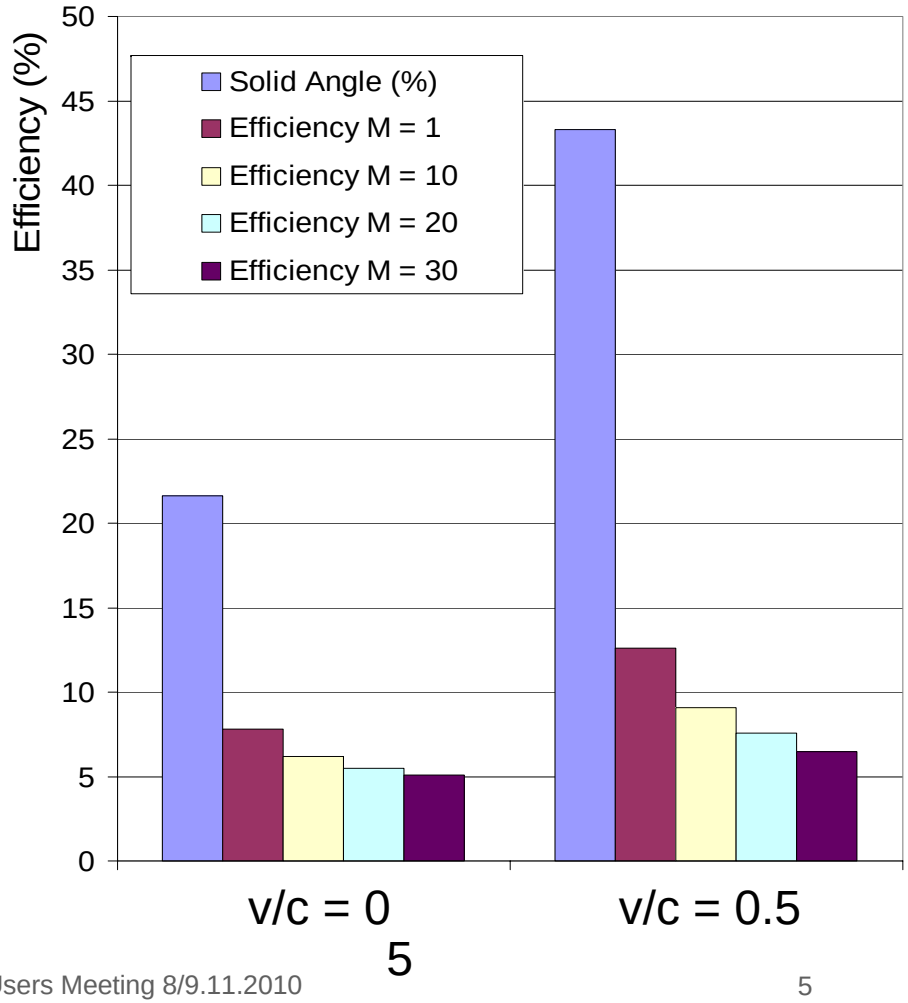
Lund-York-Cologne CAlorimeter



Some time ago: AGATA-15 at the GSI-FRS

Forward Quadrant with 45 crystals in 15 triple-clusters

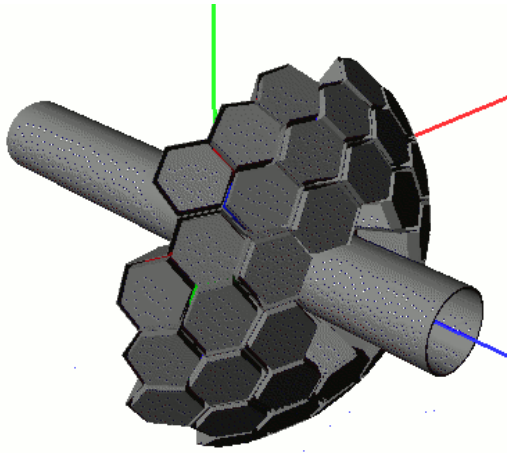


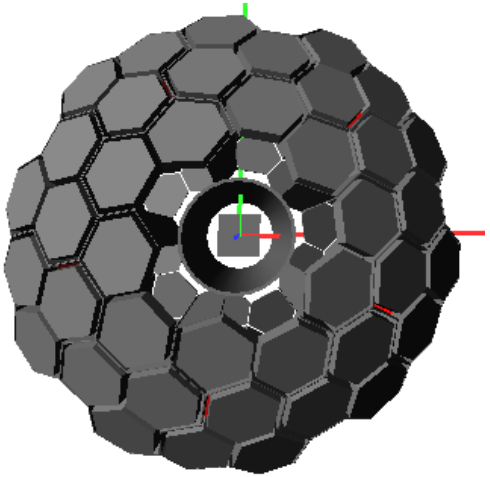


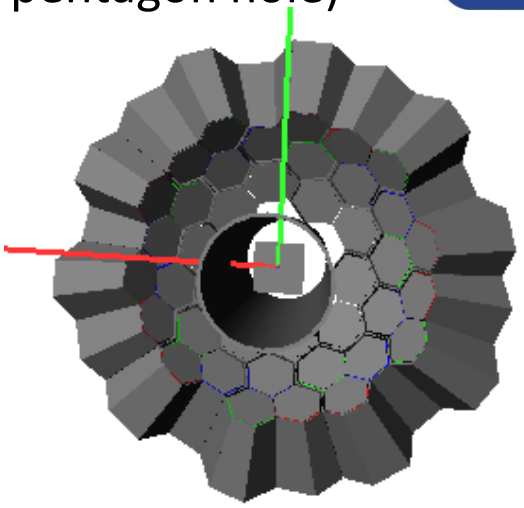
AGATA 1π array with double clusters

- 10 Triple Clusters (S2) + 5 Double Cluster detectors

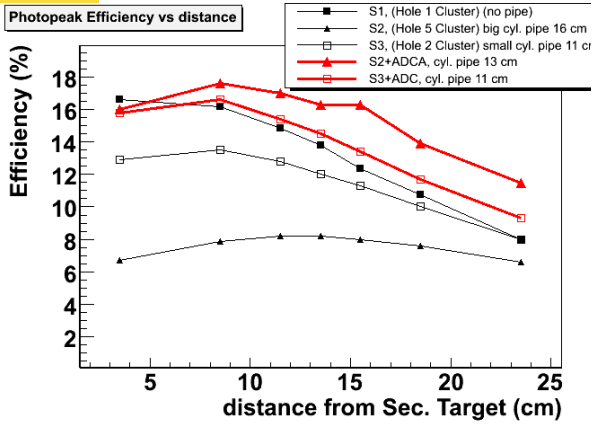
  ➔ beam pipe diameter ≈9-12cm (5 hexagons + pentagon hole)

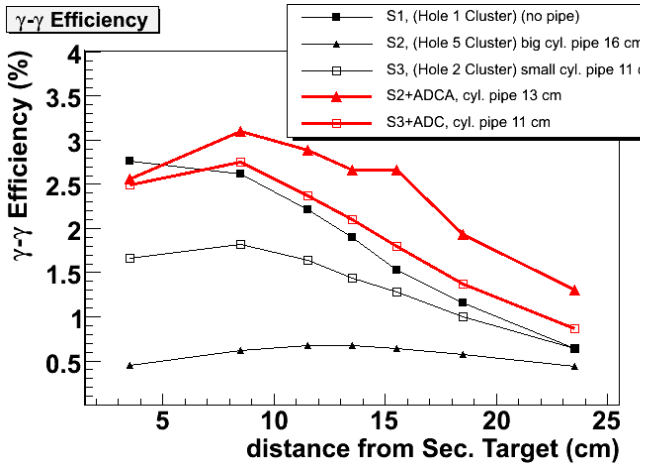


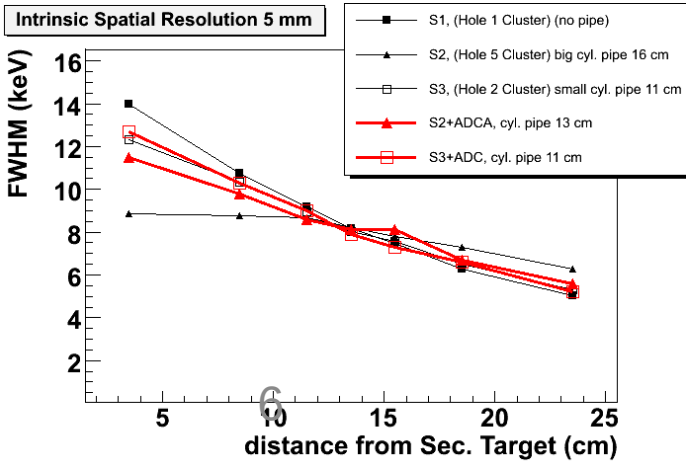




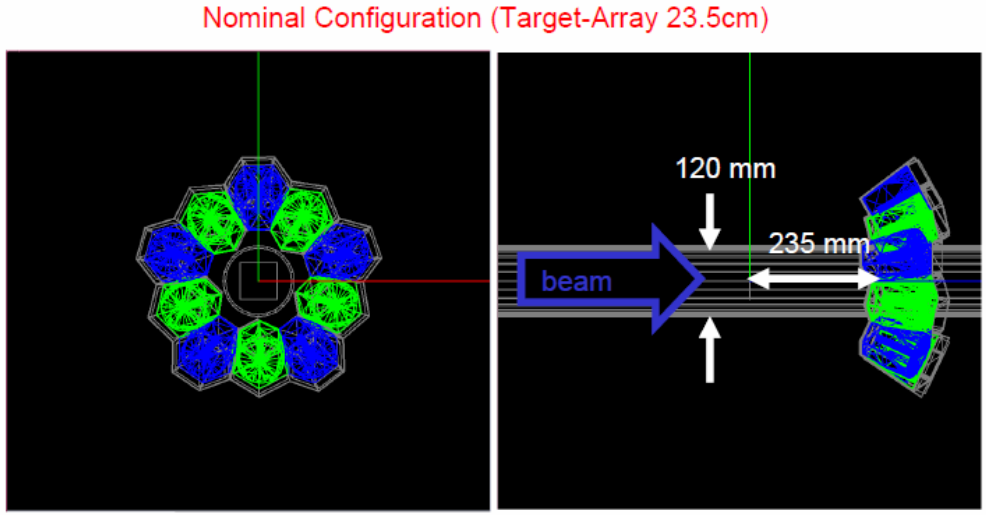
10 triple Cluster + 5 double Cluster = 45 Ge detectors

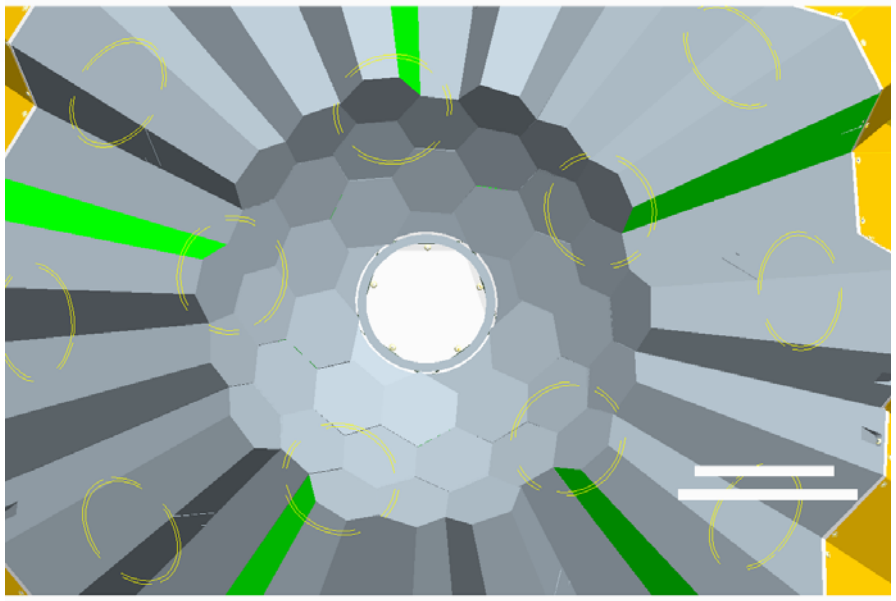




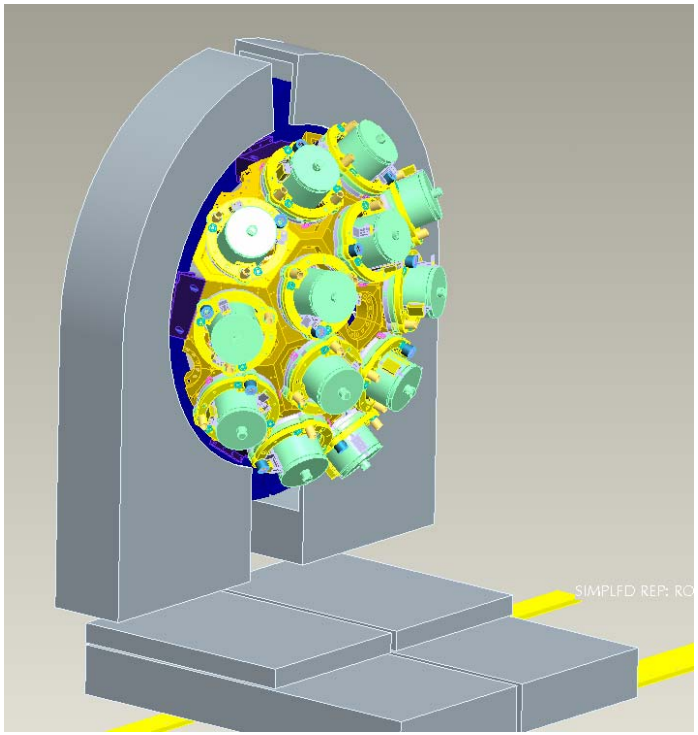


First designs of the AGATA@GSI geometry





Beamline view (showing 125mm OD beamtube)



Courtesy
J. Strachan STFC Daresbury
7

Physics program of AGATA-PreSpec campaign

- **34 LoI's received ; 6 major themes identified**

1) Nuclear structure effects near N=Z:

   The neutron-proton degree of freedom and the astrophysical rp-process

2) Shell evolution in light neutron-rich nuclei: N=40 and below

3) Nuclear structure studies towards ^{78}Ni and the evolution of the N=50 shell closure

4) Shape evolution and collective motion in nuclei far from stability

5) Nuclear structure studies approaching ^{100}Sn and the heaviest self-conjugate nuclei

6) Structure of nuclei in the astrophysically important region near ^{132}Sn

- **Many different experimental methods**
  - e.m. excitation and knock-out together with lifetime measurements (RDM & DSAM)
  - light ion induced reactions (p,p') , (p,d) , (p,xp)
  - angular correlations, high-velocity transient fields, …

Towards proposals for the AGATA-PreSpec campaign

- **Technical pre evaluation of all LoIs**
  - Local GSI group + coordinators
  - Feedback to all LoIs

- **Working group meetings (September to November 2010)**
  - Priorities for each theme (physics, feasibility, urgency,…)
  - Complete FRS simulations (rates, beam profile, …)
  - AGATA simulations (realistic w. background, RDM, DSAM,…)

- **Decision on priorities by end 2010**
  - First round submission in spring 2011
  - Second round submission in spring 2012