

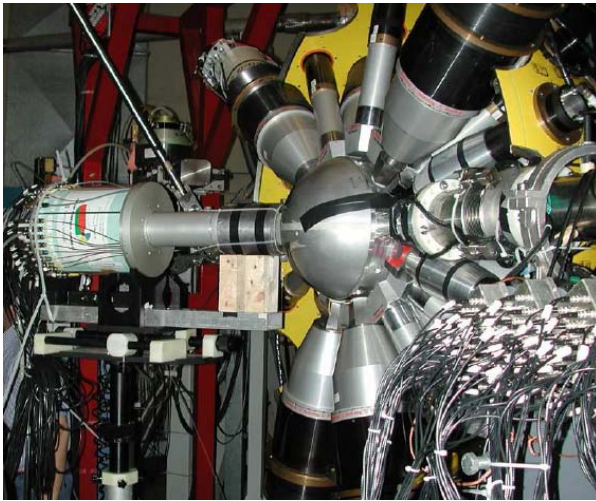
Report on the first **AGATA- DEMONSTRATOR** in-beam commissioning experiment

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F. Recchia, P.-A. Söderström

- To test the detector in real experiment conditions
- DAQ
 - Pre-processing electronics
 - On-line analysis
- Acquire useful data for off-line optimization of the system

The idea

“Standard” experiment: Doppler correction capabilities exploited to measure the position sensitivity



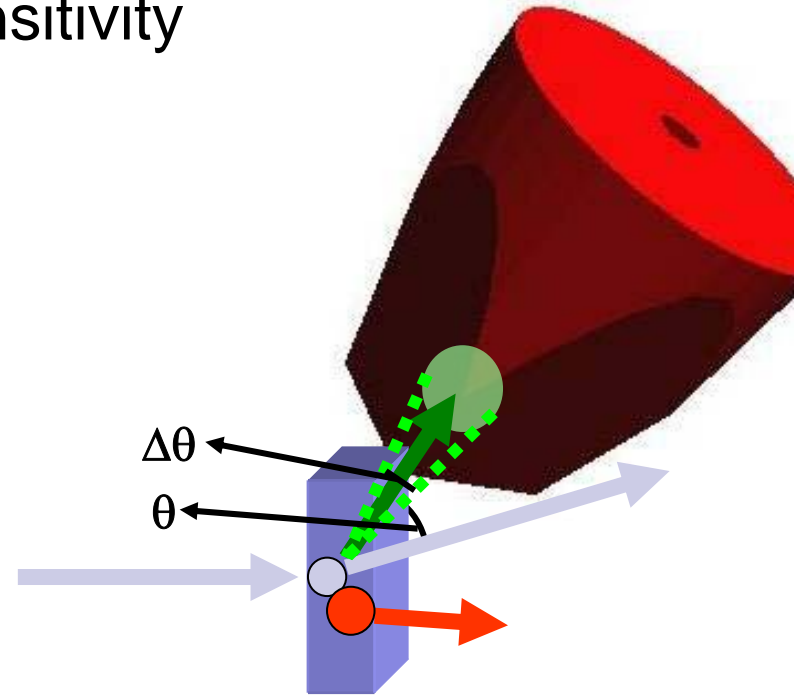
Position resolution



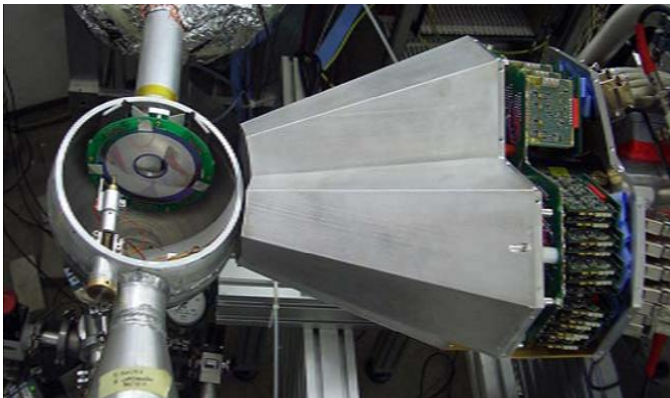
Angular resolution



Energy resolution

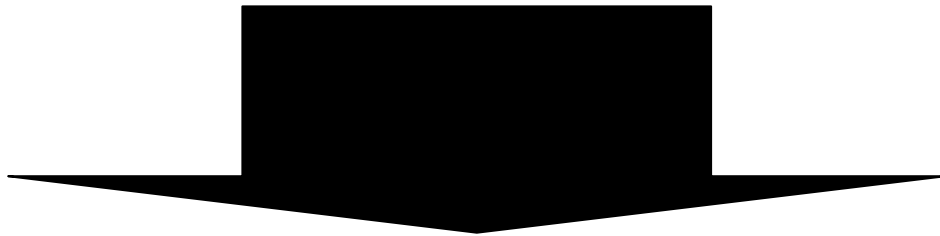


- No ancillaries have been used
- Measurement performed at 2 target-detector distances



TANDEM

- ^{80}Se @220MeV + ^9Be → Security: toxic
- ^{82}Se @256MeV + ^{12}C → TANDEM instability
- ^{49}Ti @120MeV + ^{12}C → Low current extracted from source



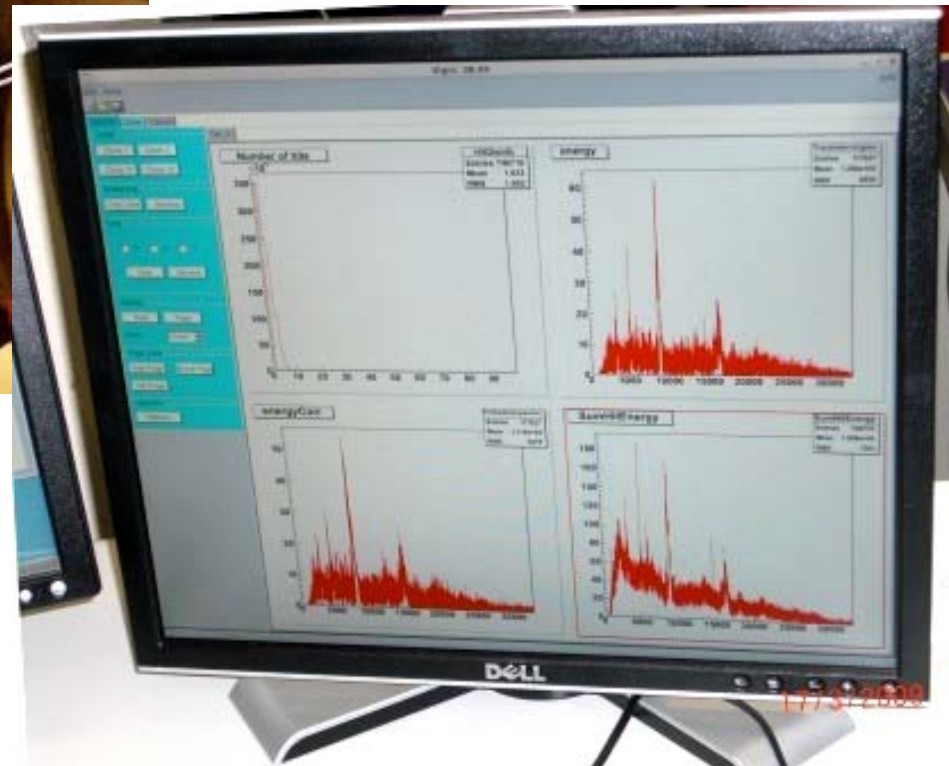
- ^{30}Si @70MeV + ^{12}C



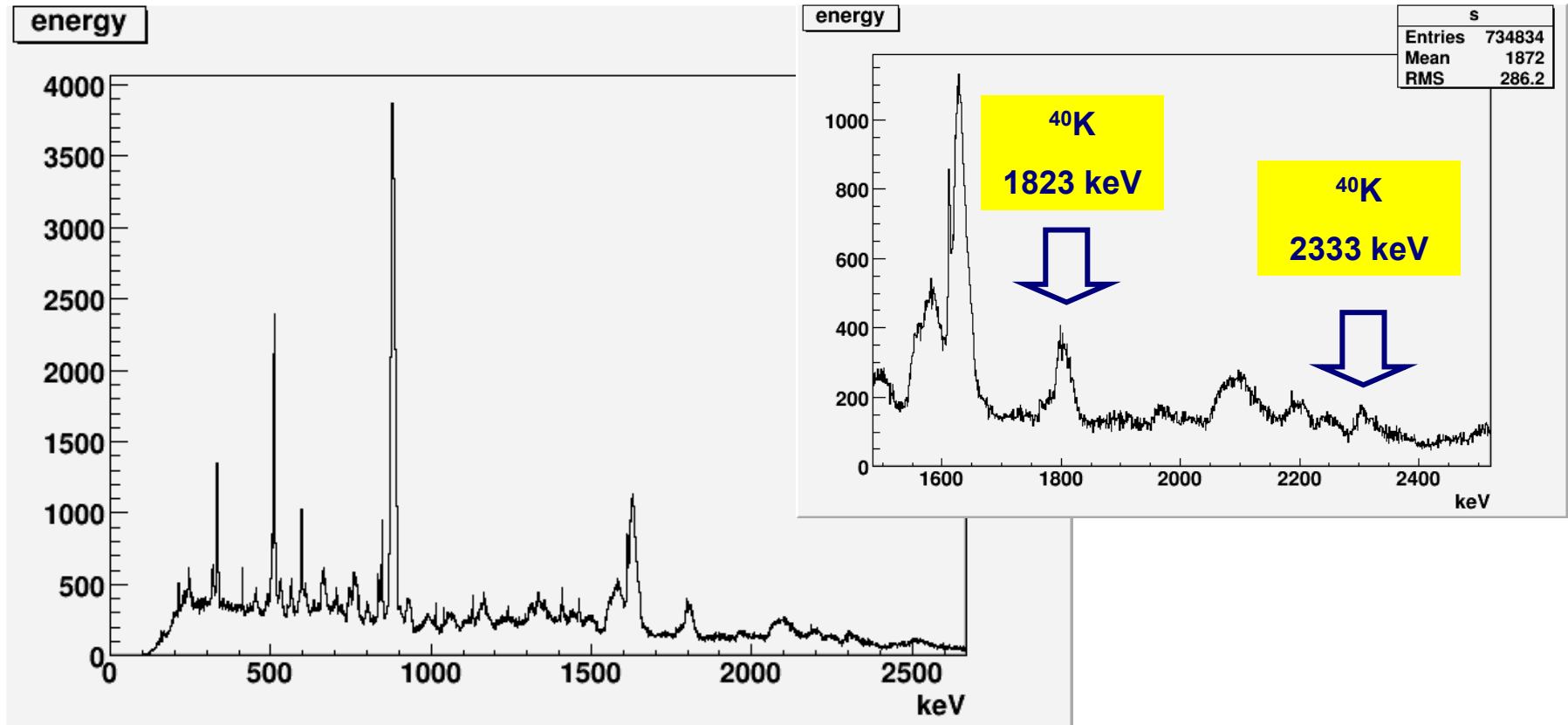
RUNNING!

11:42
17/03/2009

- Pre-processing
- PSA
- Tracking

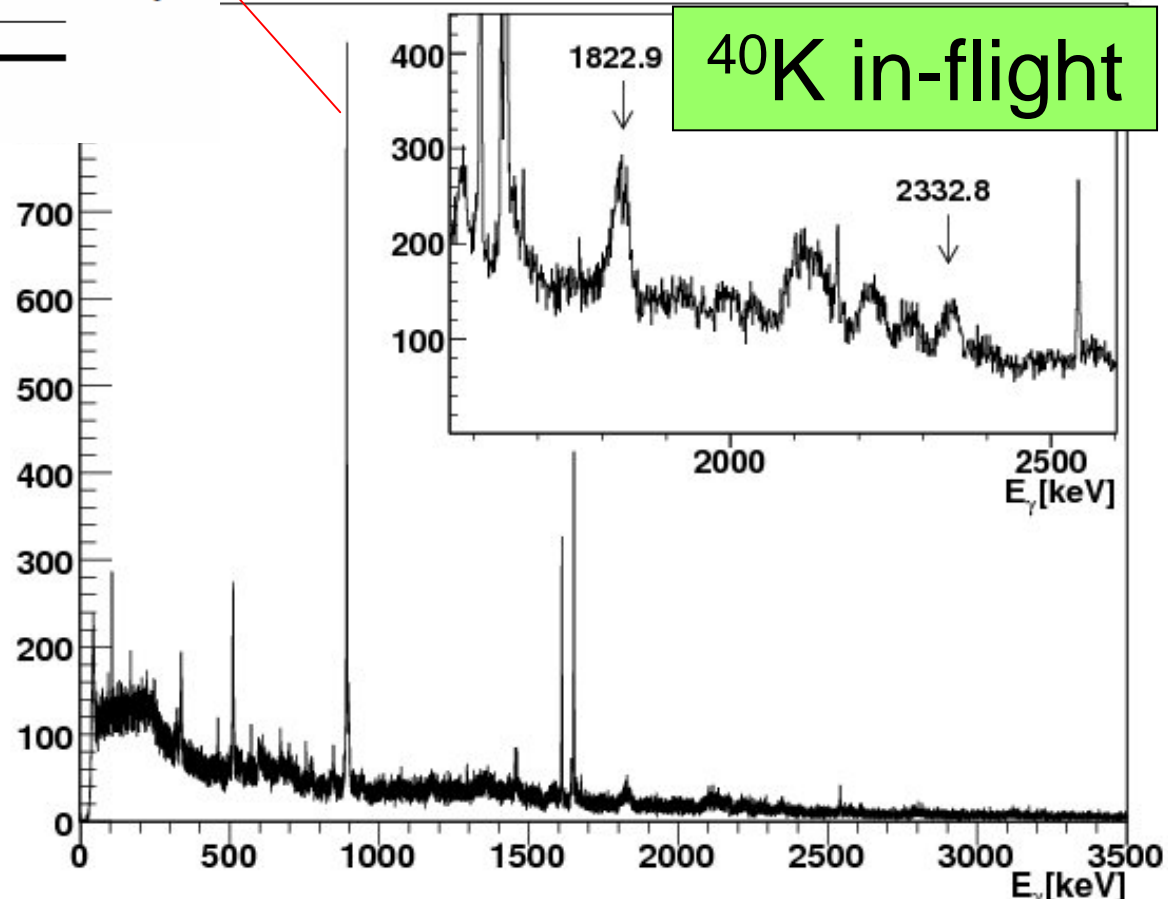
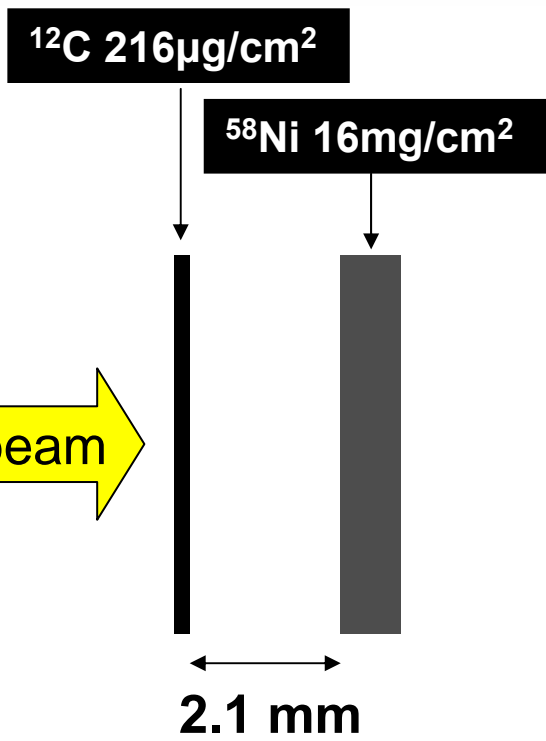
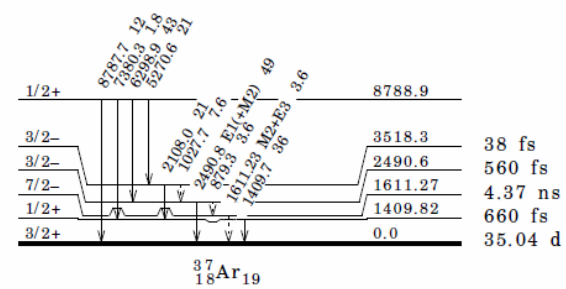
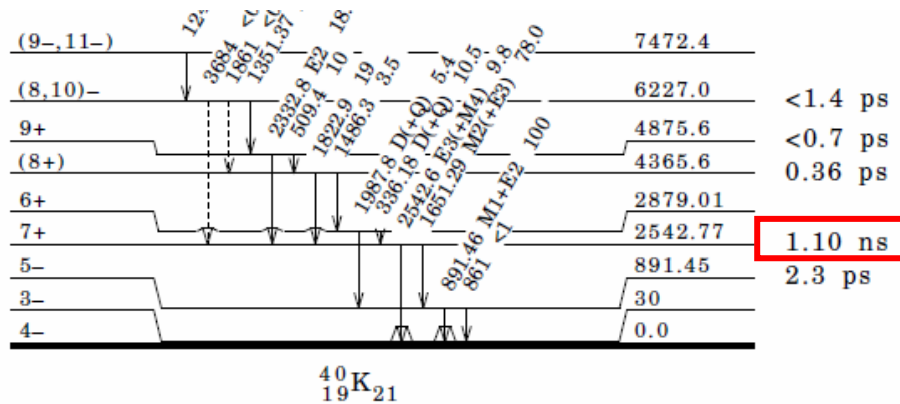


On-line analysis



- PSA
- Geometry

Measurement with stopper



Beam-time

	16mar	17mar	18mar	19mar	20mar	21mar	22mar
4.00	X	30Si beam preparation	5.5 cm				
8.00			Disturbs on detector + NARVAL not starting	5.5 cm	23.5 cm		5.5 cm
12.00	49Ti beam preparation	BEAM ON TARGET				5.5 cm	
16.00	82Se beam preparation	BEAM ON TARGET	5.5 cm				calibrations
20.00		Target + stopper		23.5 cm	5.5 cm		
24.00		5.5 cm					



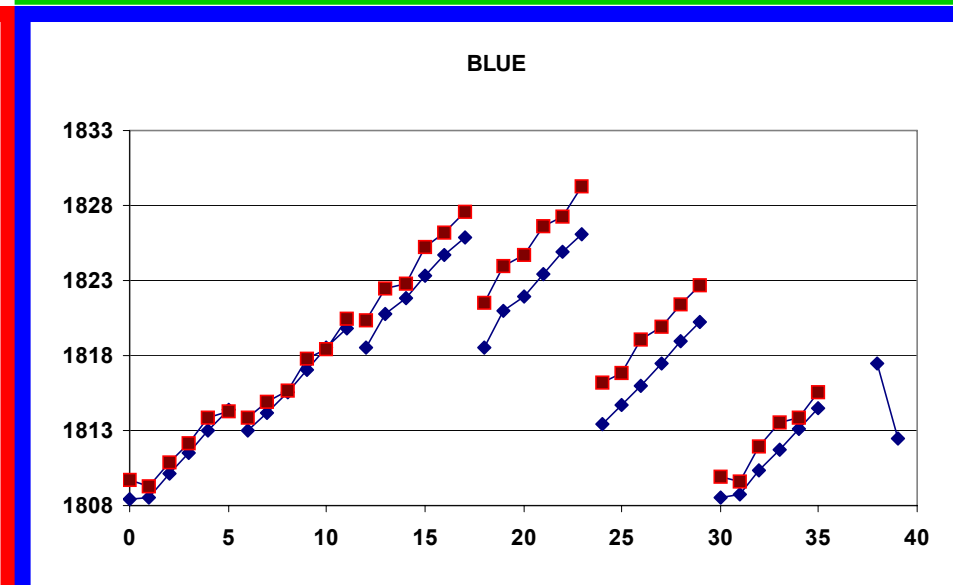
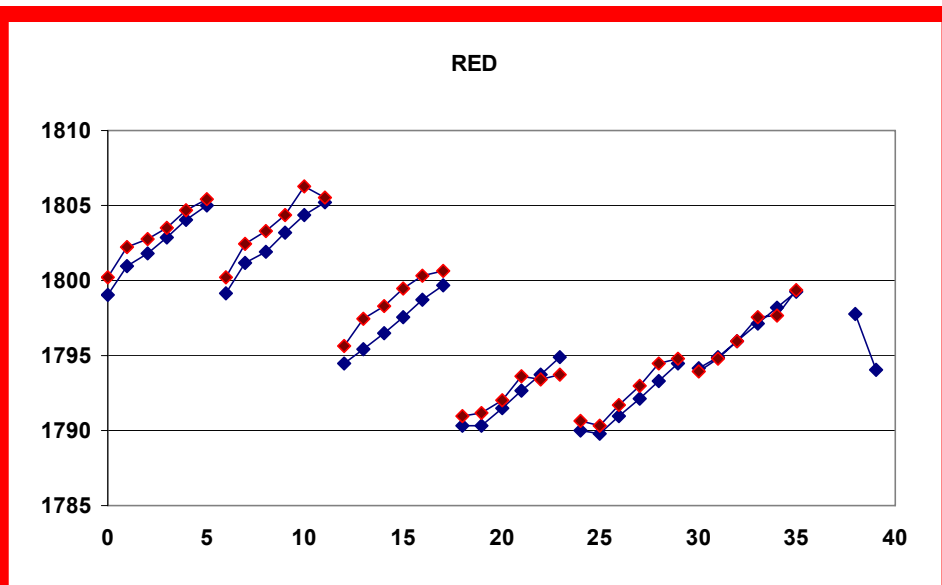
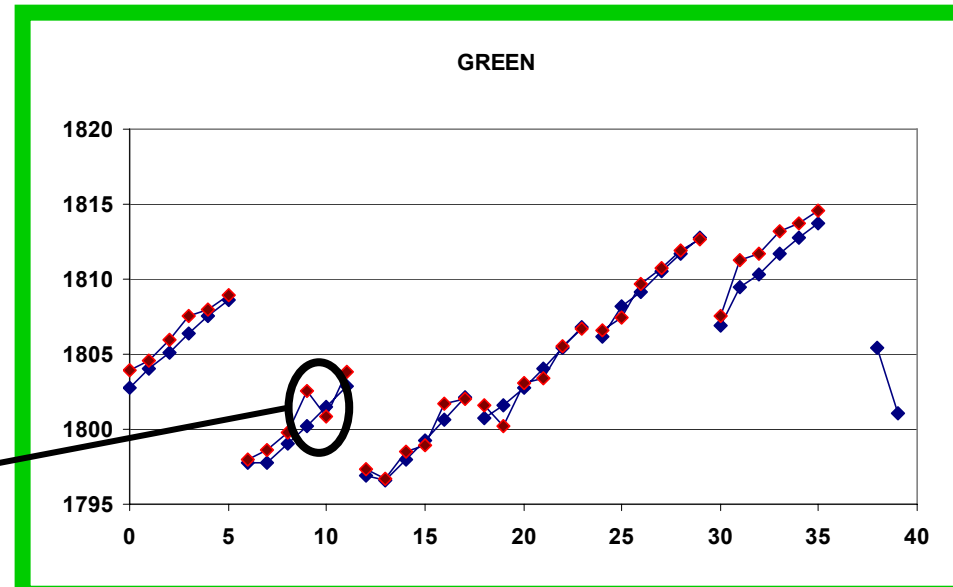
- Beam: 24h
- Setup the system + measurement with stopper: 24h
- DAQ restarts : 20h
- Close distance (5.5 cm): 54h
- Long distance (23.5 cm): 20h

- “Safe” acquisition rate: ~50 MB/s
 - 1.2 kHz / crystal
 - Common-dead-time missing
- 14 TB of data on disk
 - Pulse shapes recorded
- >1 million counts on 1823 keV peak
- ftp server as soon as possible

Off-line analysis on-going

- Relative positioning from the Doppler shifts of segments spectra

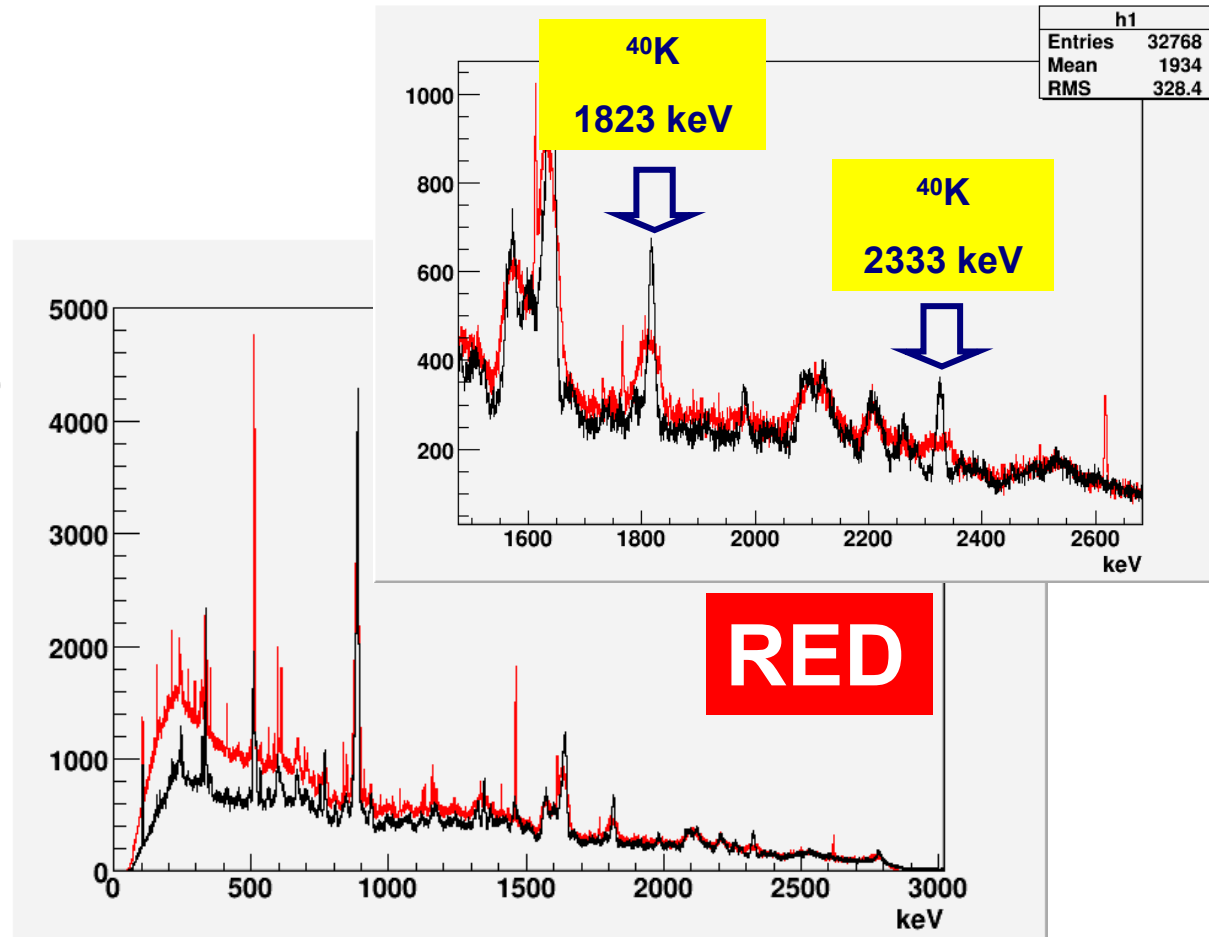
swap



Off-line analysis on-going

■ Optimize:

- positions
- PSA (+basis)
- tracking



Many thanks to all contributing people

AGATA 2009
advanced gamma
tracking array **week**

Cologne, Germany | March 30th – April 1st

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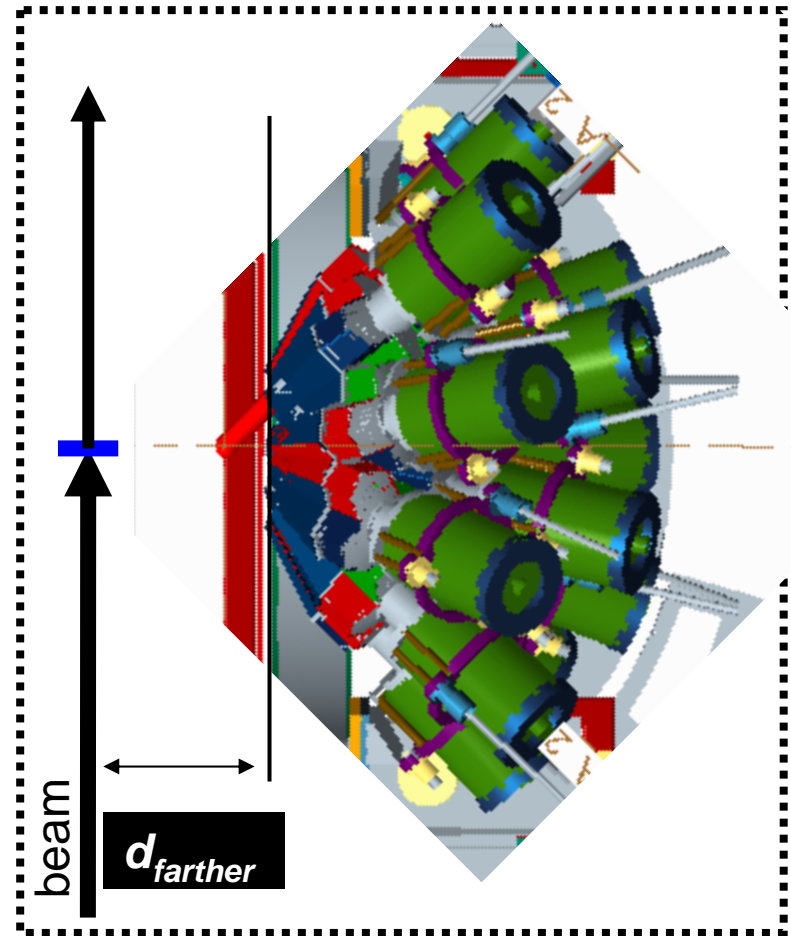
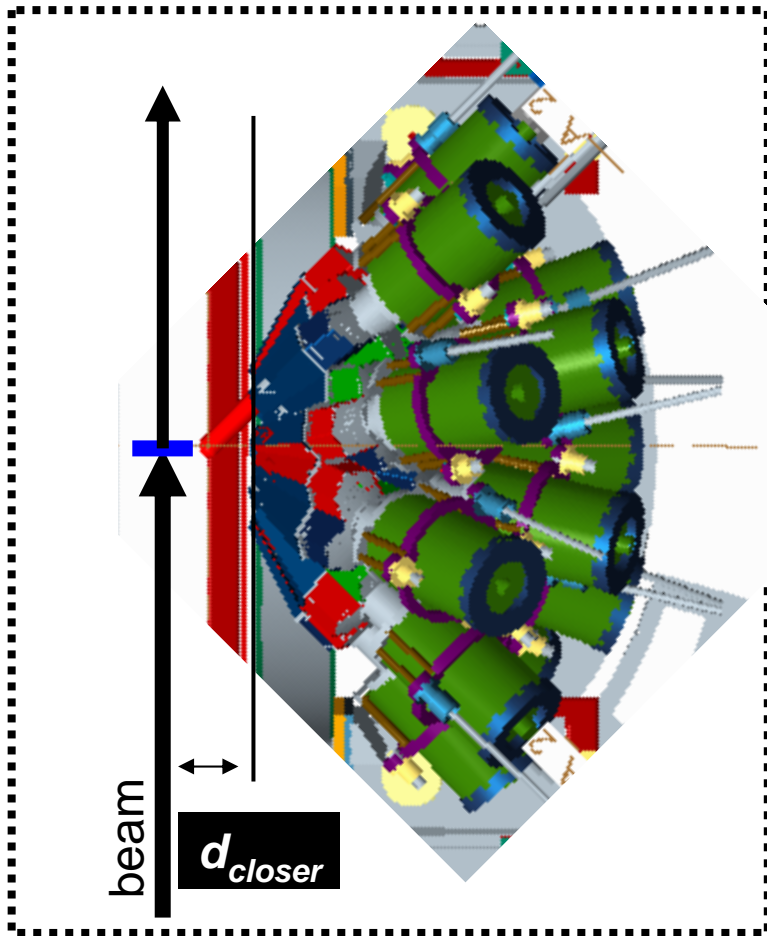


A new strategy (II)

~~Comparison of the experimental
result to simulation~~



Comparison of the experimental
results with the detectors at 2
different distances from the target



The estimation method for position resolution

- The only difference between the 2 positions is in the position uncertainty (once the count rate is adjusted)

$$\begin{aligned}\Delta E_{closer}^2 &= a^2 + k^2 \cdot \left(\frac{p}{d_{closer}}\right)^2 \\ \Delta E_{farther}^2 &= a^2 + k^2 \cdot \left(\frac{p}{d_{farther}}\right)^2\end{aligned} \quad k = E_\gamma \frac{\beta \sin \theta}{\sqrt{1-\beta^2}}$$

- p (the position resolution) can be estimated
- Inverting the error on the estimation of the position resolution it is possible to express a F.O.M. to choose the reaction:

$$FOM = \frac{E_\gamma \cdot \beta \sin \theta}{\sqrt{1-\beta^2}} \cdot \frac{1}{d_{closer}^2 \sqrt{\Delta E_{closer}^2 \cdot \sigma_{\Delta E_{closer}}^2 + \Delta E_{farther}^2 \cdot \sigma_{\Delta E_{farther}}^2}}$$

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