AGATA Data Analysis- Software update

Jérémie Dudouet
(On behalf of the Data Analysis Team)

Institut de Physique Nucléaire de Lyon

AGATA Week 2016: 03-07 October 2016

Outlines

Gammaware status

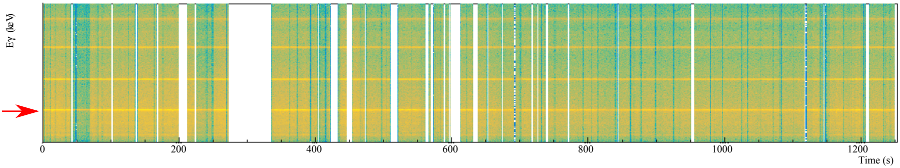
Gammaware utilities

- Online Watchers
- Offline Watchers

$\left.\begin{array}{l}\text{Online Watchers}\\ \text{Offline Watchers}\end{array}\right\}$ Stable during the campaign

- New tool to monitor the Crystal gains along time.

Crystal monitoring tool : Description



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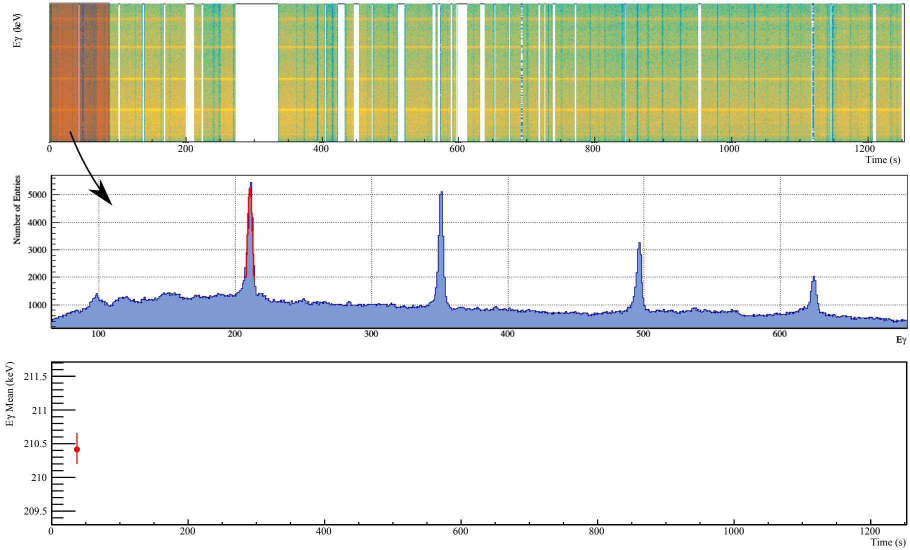

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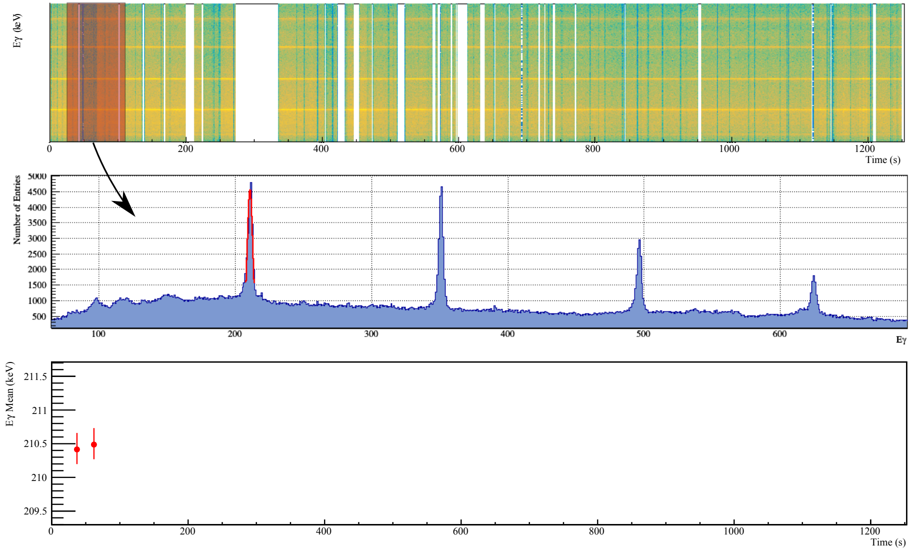

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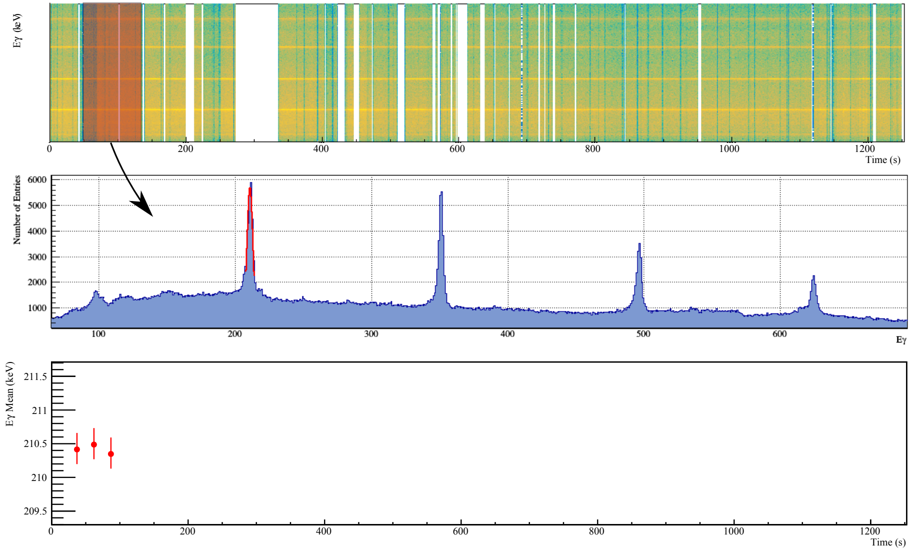

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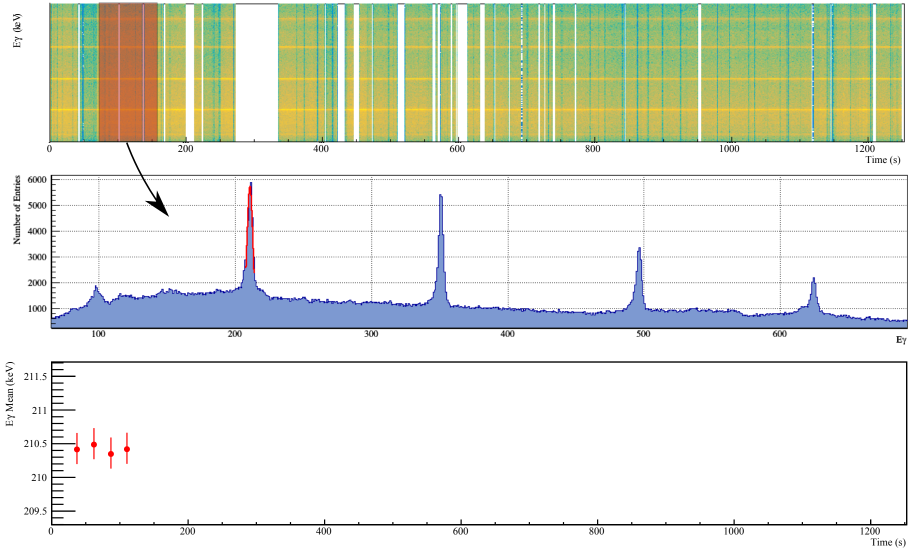

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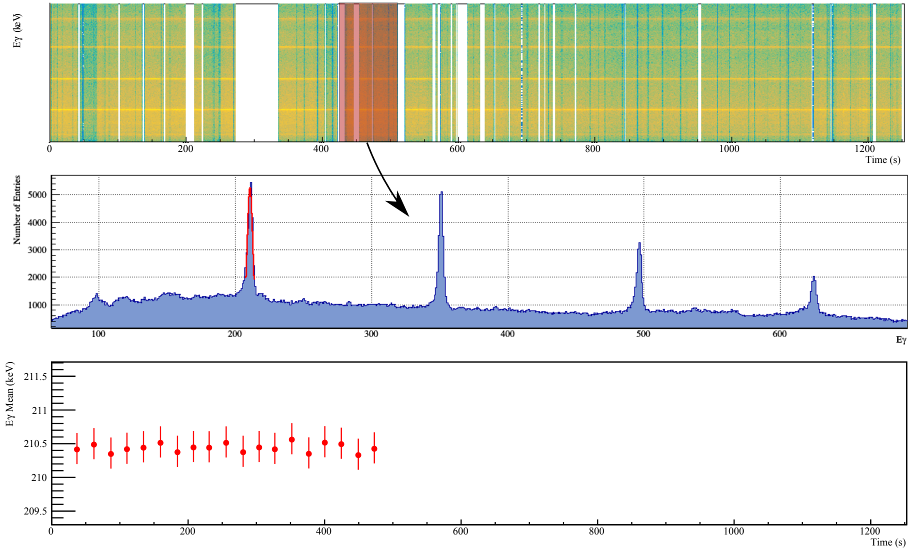

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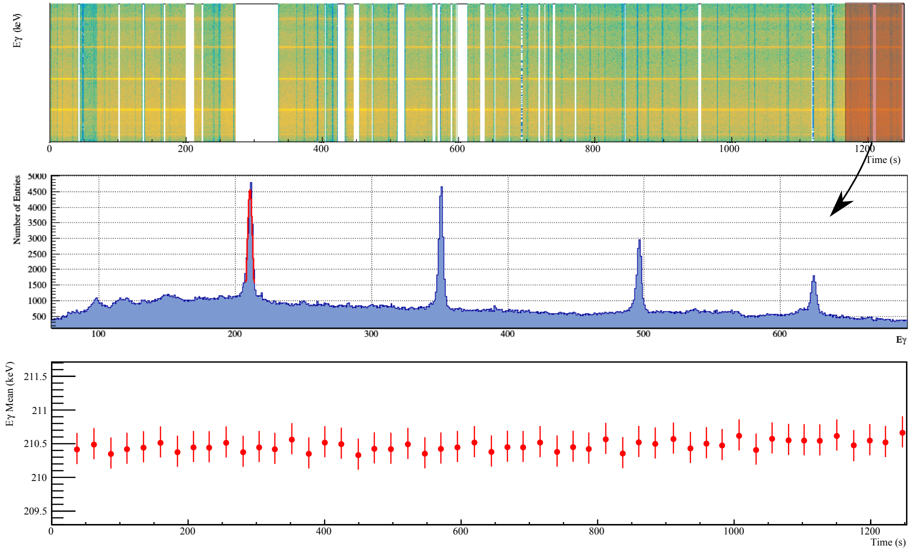
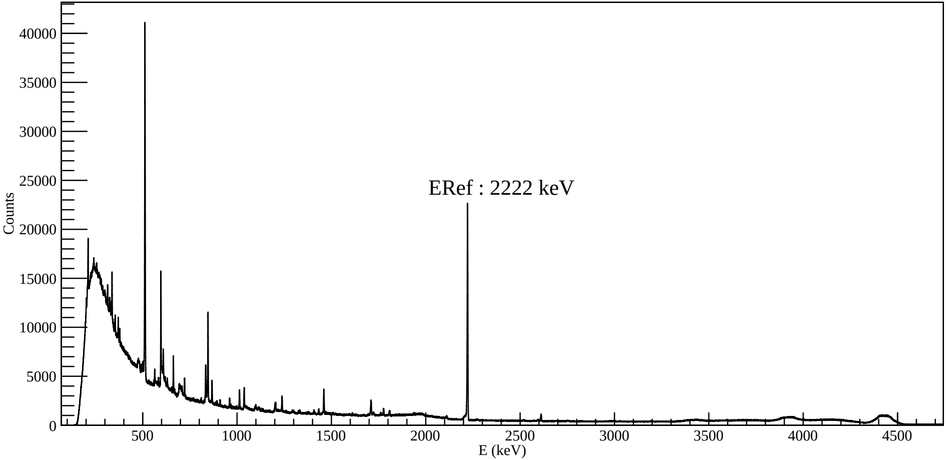


Crystal monitoring tool : Experimental results

e710 experiment : Calibration runs 15-18-25 AmBe(Fe), Core Low Gain



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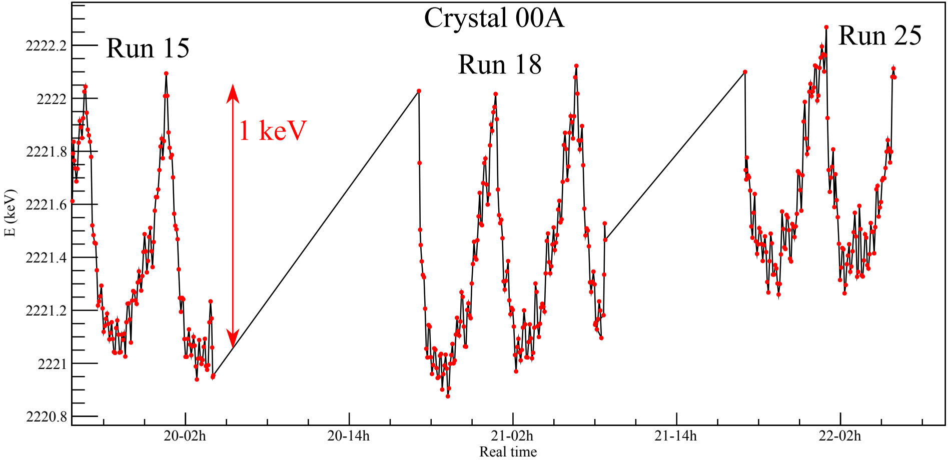

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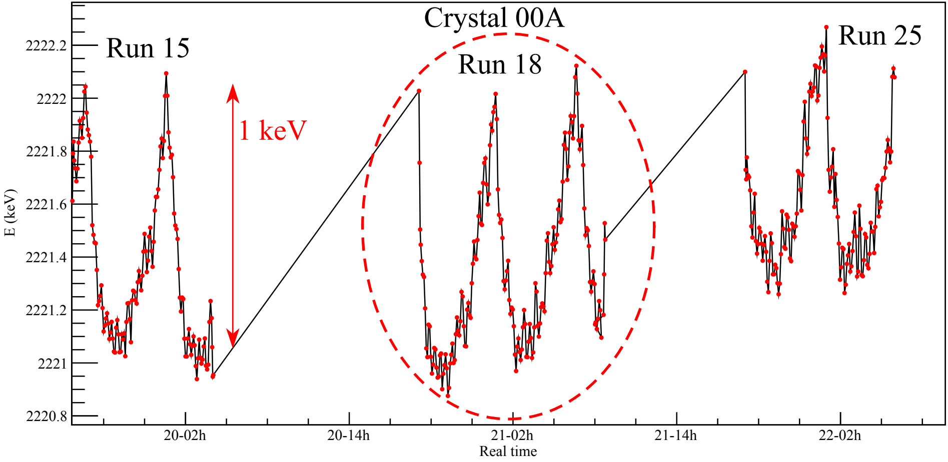

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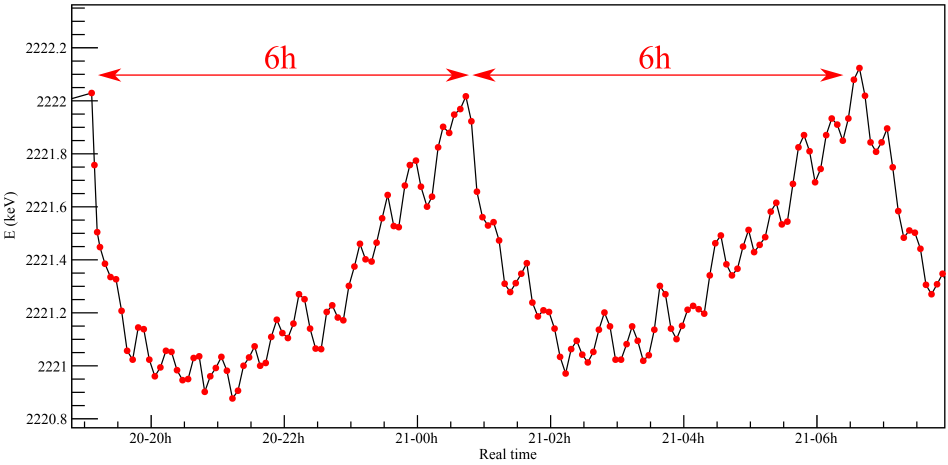

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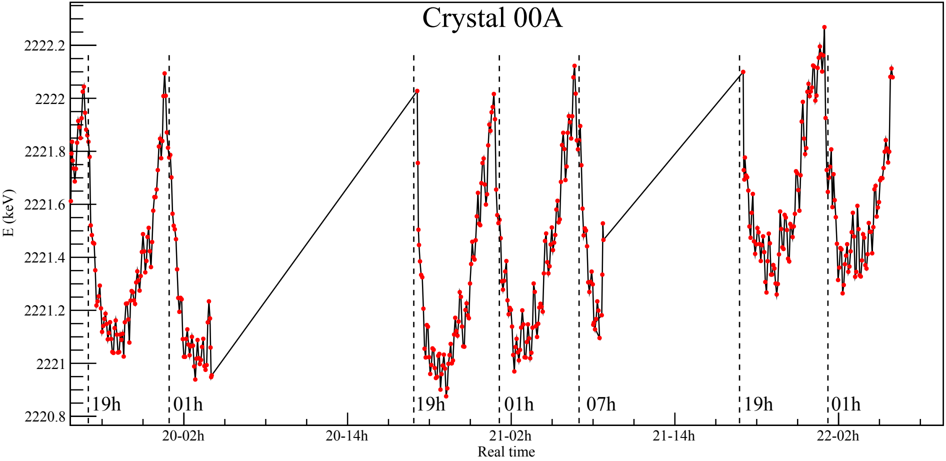

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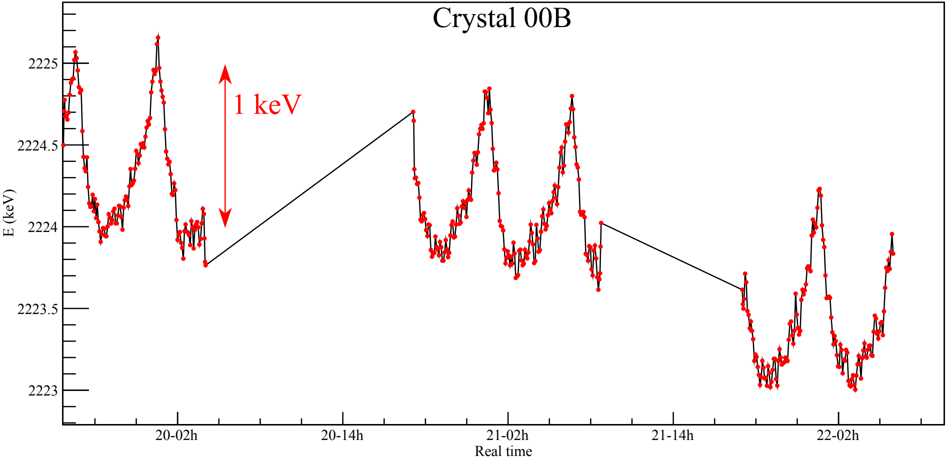

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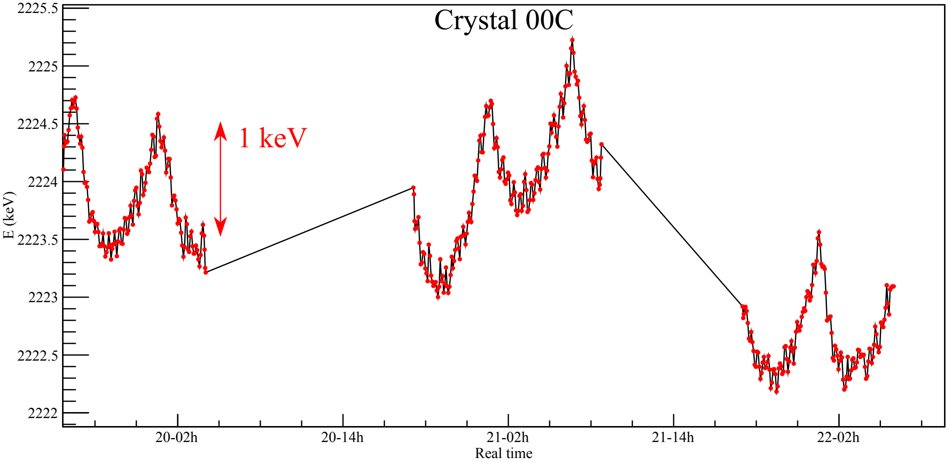

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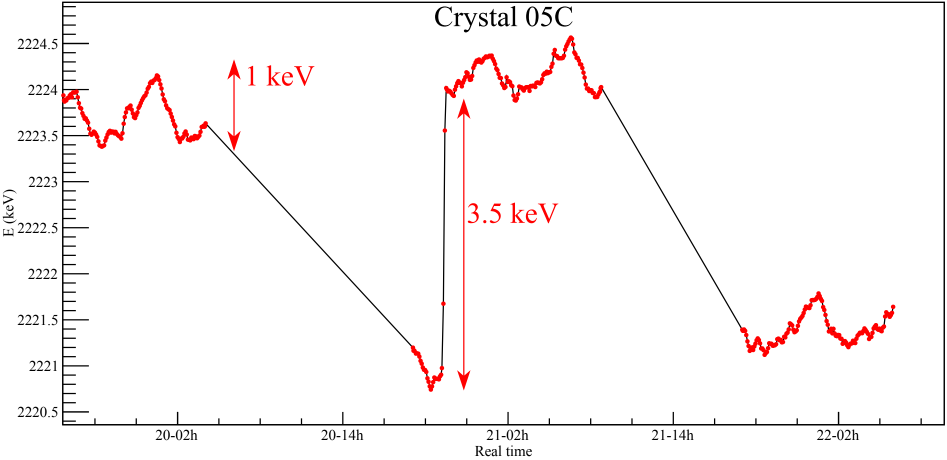

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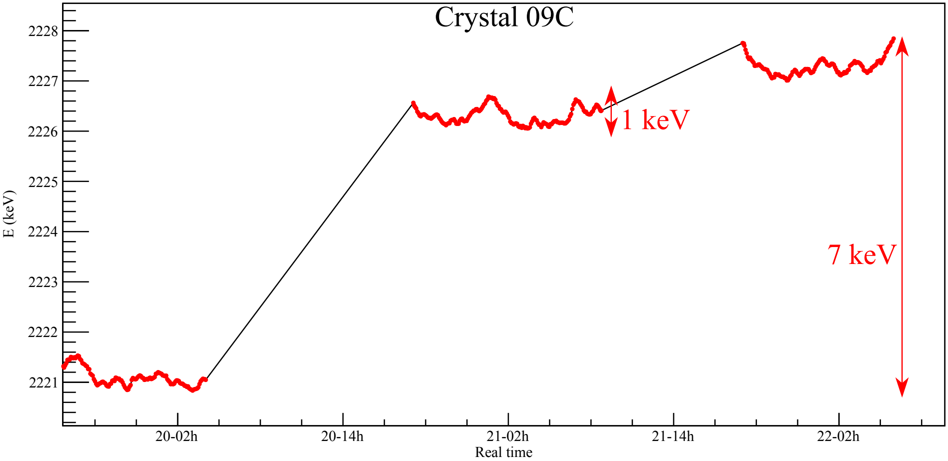


Outlines

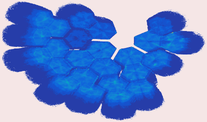
1. Gammaware status
2. Vamos Analysis
3. Cubix

Experimental setup

The E680 experiment @ GANIL

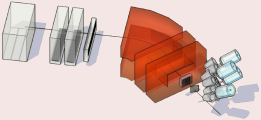
- Spokesperson: Gilbert Duchêne (IPHC, Strasbourg, France)
- Date : $14^{th} \rightarrow 28^{th}$ May 2015 (45 UT)
- Beam : ^{238}U@6.2 MeV/u, I$\sim$30 enA
- Target : ^{9}Be (1.85 mg/cm^2)
- Detectors : AGATA and VAMOS++

AGATA setup



- Detectors : 24 crystals
- Geometry : compact ($\sim$ 14 cm)
- Tracked eff.: $\sim$ 10%@1 MeV
- Trigger : VAMOS++

VAMOS++ setup



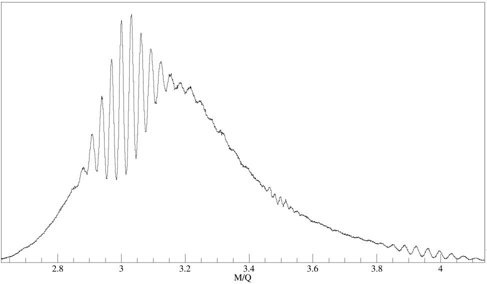
- VAMOS angle : 28°
- A, Z identified nuclei: 5×10^8
- Recoil velocity : $\beta \sim 0.11$
- Validation rate : $\sim$ 1.5 kHz

VAMOS++: Mass identification

Q vs M/Q matrix ⇒ Mass identification

$\left.\begin{array}{l}\Rightarrow \text{Trajectory reconstruction}\\ \Rightarrow \text{Time of flight measurement}\end{array}\right\}$ M/Q

$\left.\begin{array}{l}\Rightarrow \text{Total energy measurement}\end{array}\right\}$ Q



$$\frac{M}{Q} = \frac{B\rho}{3.105 \times \beta}$$

$$Q = \frac{2 \times E_{tot}}{931.5 \times \beta^2} \times \frac{Q}{M}$$

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M/Q
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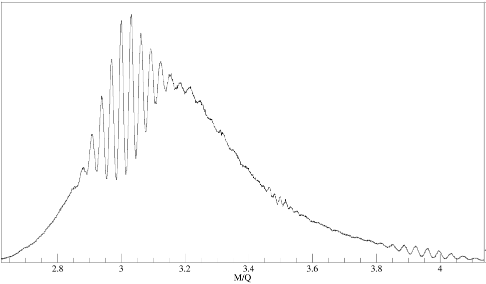

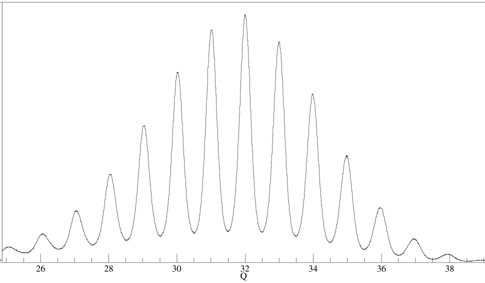

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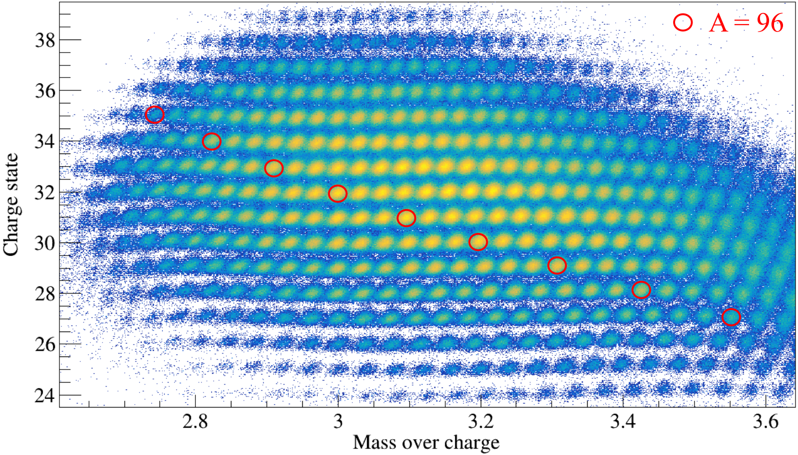
$$\left.\begin{array}{l}\left.\begin{array}{l}\Rightarrow \text{Trajectory reconstruction}\\ \Rightarrow \text{Time of flight measurement}\end{array}\right\} M/Q \\ \Rightarrow \text{Total energy measurement}\end{array}\right\} Q \Rightarrow M = M/Q \times Q \in [70;120]$$



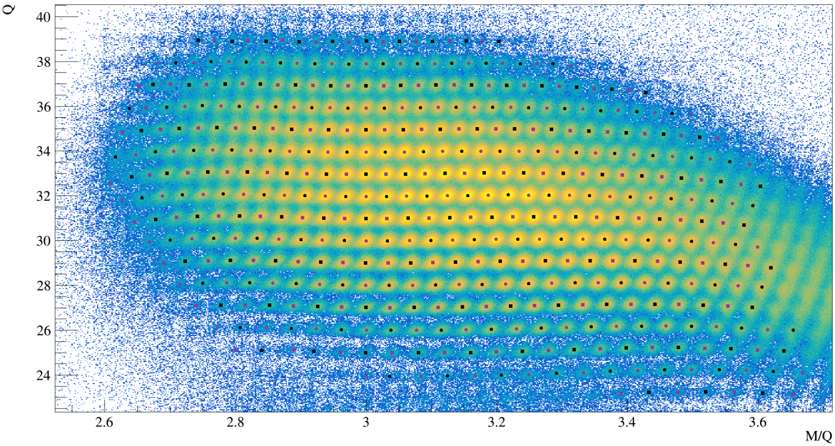
VAMOS++: Mass identification

Q vs M/Q matrix ⇒ Mass identification

⇒ Final identification is done using markers:

⇒ Q and M are the one of the closest marker.

⇒ Distance to marker is used as a quality factor (useful to identify contaminants).



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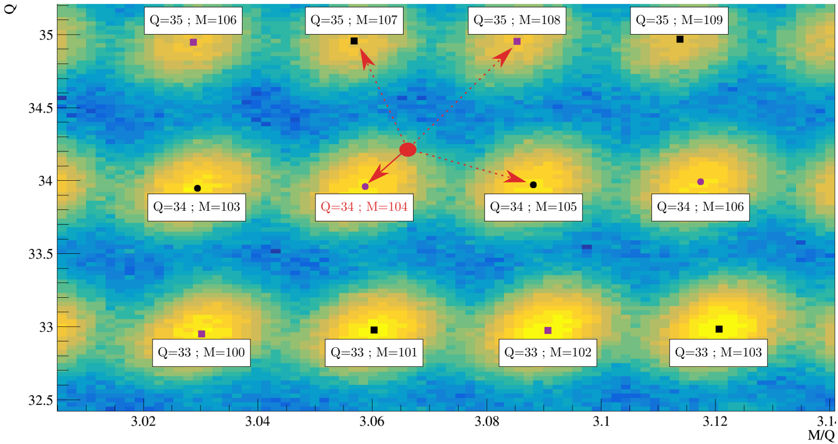

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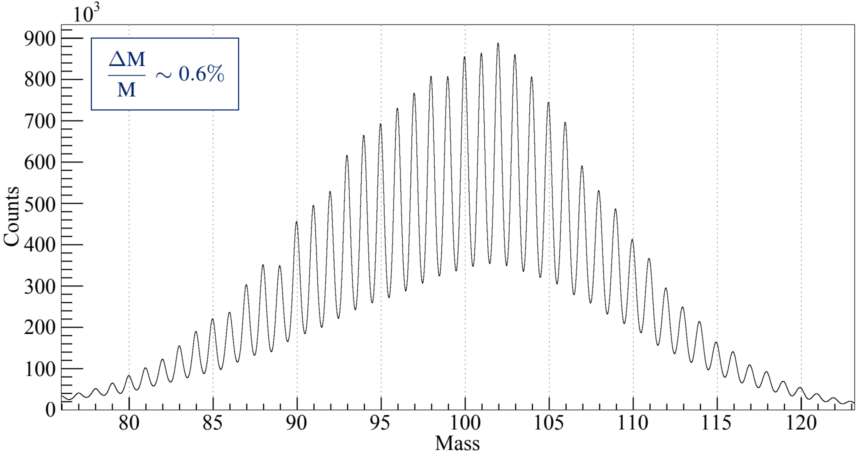
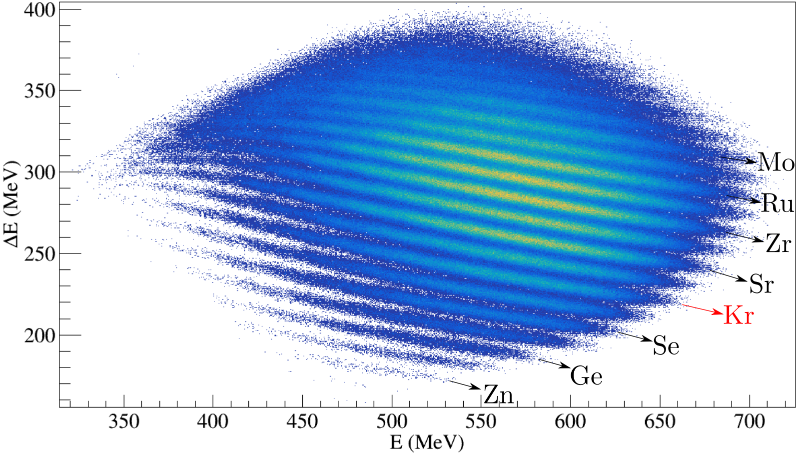


VAMOS++: Z identification

ΔE vs E matrix ⇒ Z identification

⇒ Z discrimination obtained from ΔE vs E matrix



VAMOS++: Z identification

ΔE vs E matrix ⇒ Z identification

⇒ Final identification is done using identification lines (INDRA style):

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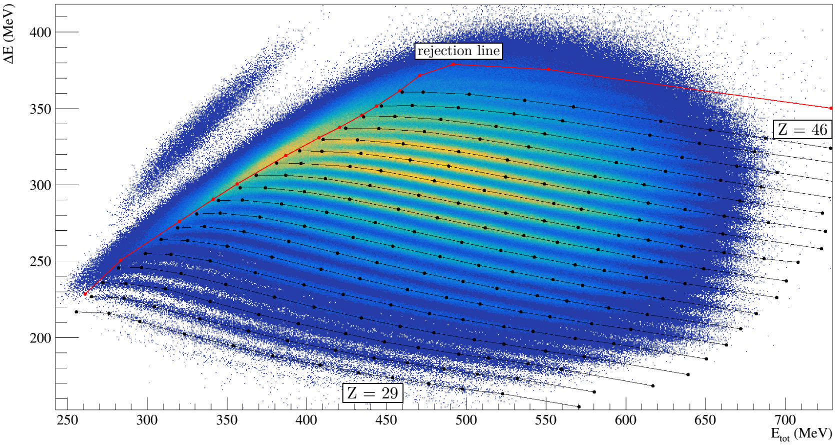

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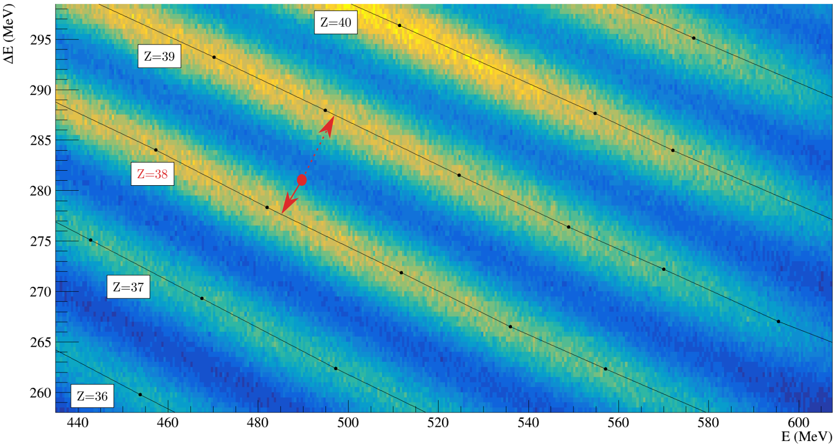

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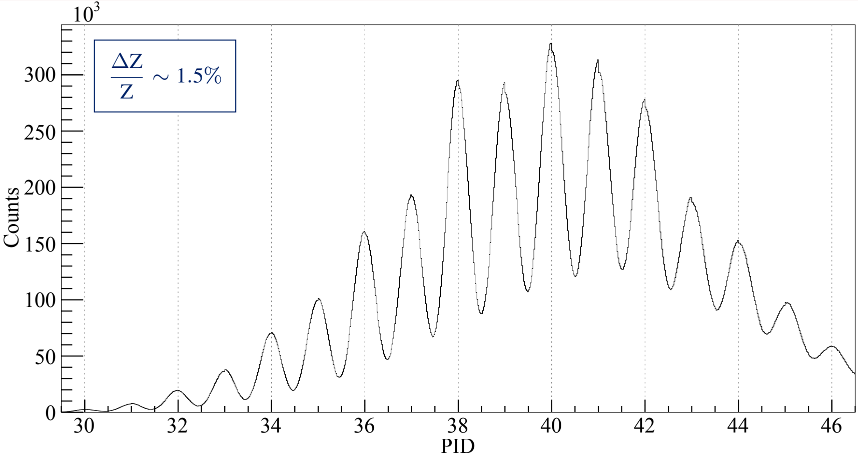
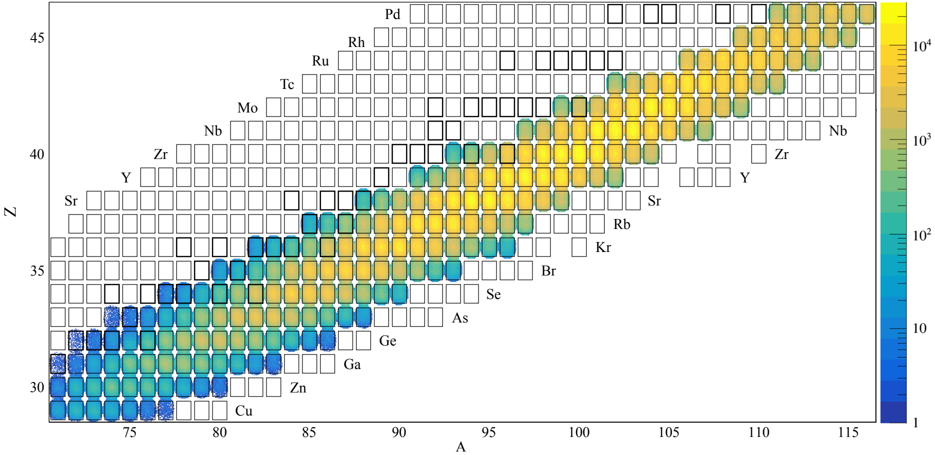


VAMOS++: Conclusions on VAMOS analysis

Results

⇒ A set of 205 “well identified” nuclei has been obtained



VAMOS++: Conclusions on VAMOS analysis

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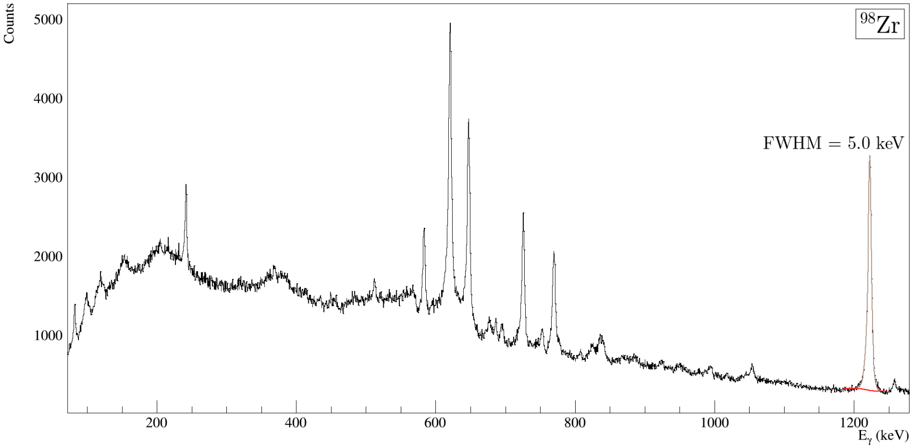
- ⇒ Very precise Doppler correction achieved → Agata FWHM = 5.0 keV@1.2 MeV (^{98}Zr)



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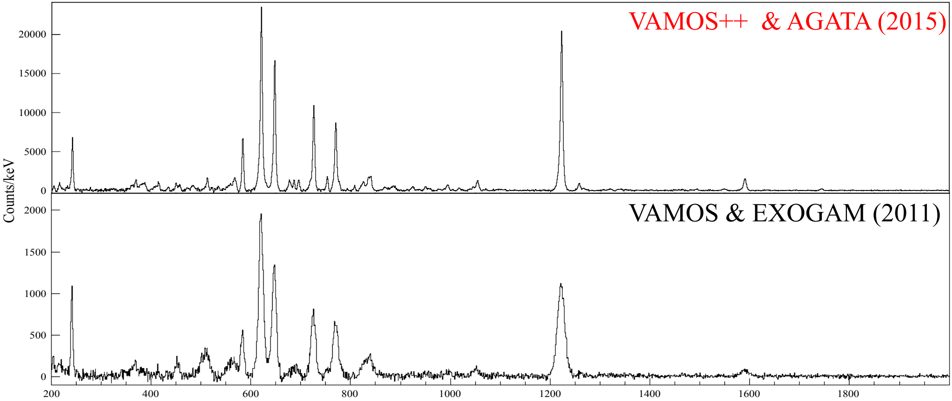

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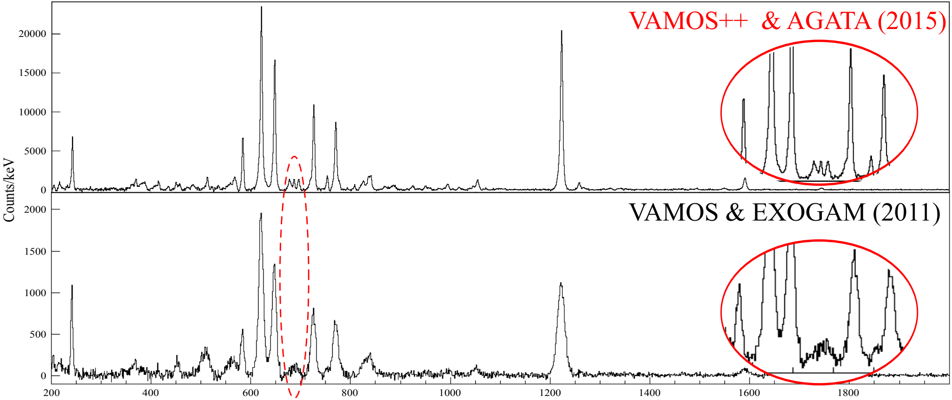

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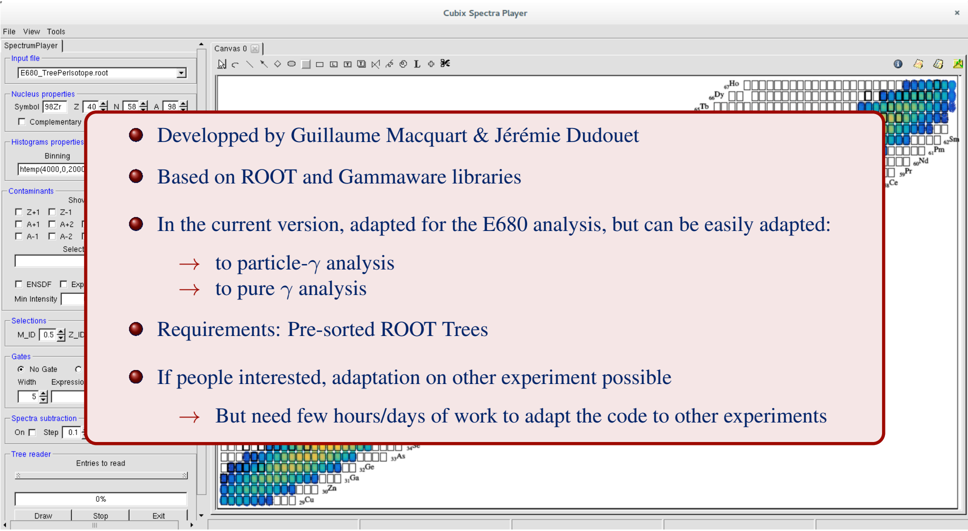
The Cubix software: An adaptable γ spectroscopy analysis tool



- Developped by Guillaume Macquart & Jérémie Dudouet
- Based on ROOT and Gammaware libraries
- In the current version, adapted for the E680 analysis, but can be easily adapted:
  - → to particle-γ analysis
  - → to pure γ analysis
- Requirements: Pre-sorted ROOT Trees
- If people interested, adaptation on other experiment possible
  - → But need few hours/days of work to adapt the code to other experiments

Thank you for your attention!