

Scan table data conversion and pulse shape analysis using NARVAL

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Converting scanning table data to ROOT format

Data format

Distribution of the data sets

Using scan table data for PSA

Interfacing with NARVAL

What's Next?

Scan Data Conversion

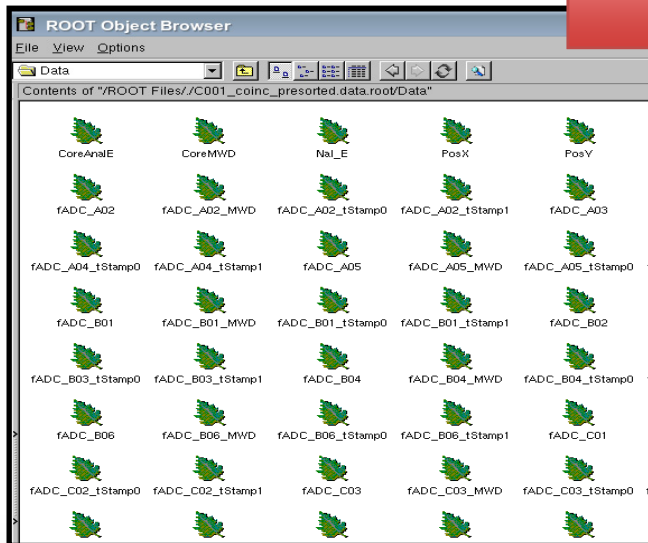
C001 Coincidence scan data:

- Eurogam format (Binary Format) – MIDAS
- Gretina Digitizers
- Typical data set:
 - **21 scan lines and 3 azimuthal scans**
 - **Raw Data ~ 34 Gbyte**

“The TTree class is **optimized to reduce disk space and enhance access speed**...can **hold all kind of data**, such as objects or arrays in addition to all the simple types.

A tree uses a **hierarchy of branches**, and each **branch can be read independently** from any other branch.”

Convert all data



ROOT File

TTree Data
TH1 1D Histograms
TH2 2D Histograms
TH3 3D Histograms

- **21 scan lines and 3 azimuthal scans**
- **Raw Data ~ 14 Gbyte**

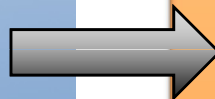
Presorting Scan Data

Presort Conditions

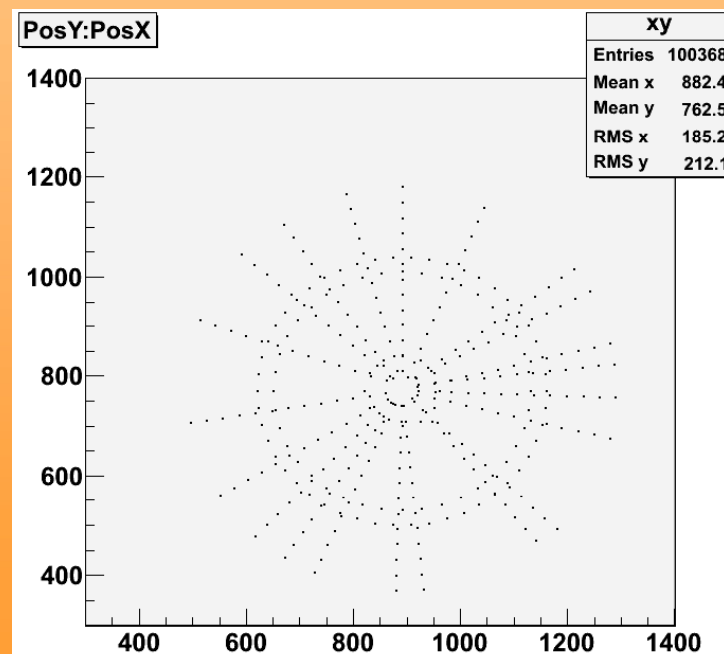
- Segment fold (net charge) = 1
- Scintillator fold = 1
- Energy gates (scintillator & segment)

Presort Code Options

- Derive extra variables (**Z Depth**, **identify rings** etc.)
- Write **baseline adjusted calibrated** or **raw** data.
- Adjust **number of samples** to write.



- **21 scan lines and 3 azimuthal scans**
- **Total data size (128 samples)**
= 308 Mbyte

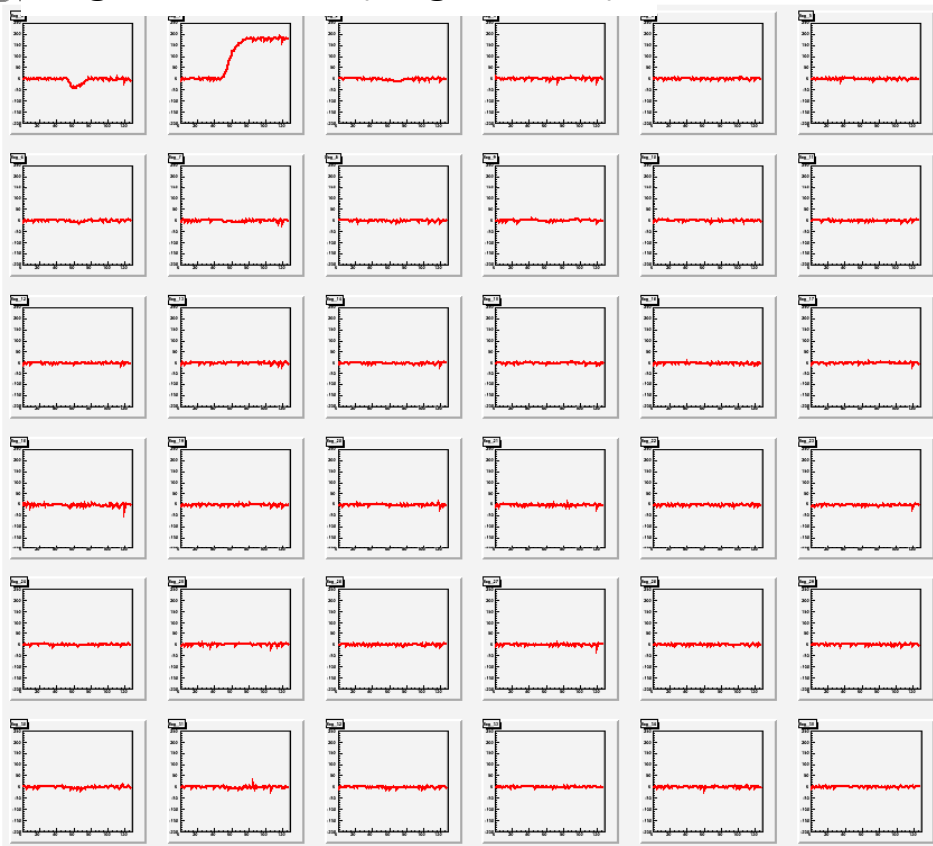


TTree format

PosX	: X position in 0.1 mm units	: Float_t
PosY	: Y position in 0.1 mm units	: Float_t
Tac	: Ge-NaI TAC	: UShort_t
CoreAna1E	: Central Contact Energy - Anal	: UShort_t
CoreMWD	: Central Contact Energy - MWD	: UShort_t
NaI_E	: NaI energy[15]	UShort_t[15]
fADC_Core	: Core Pulse[128]	: Short_t[128]
fADC_Core_MW	: Core MWD energy	: UShort_t
fADC_Core_tStamp0	: Core TimeStamp 0	: Double_t
fADC_Core_tStamp1	: Core TimeStamp 1	: Double_t
fADC_A01	: Seg A01 Flash ADC Sample[128]	: Short_t[128]
fADC_A01_MWD	: Segment A01 MWD energy	: UShort_t
fADC_A01_tStamp0	: Segment A01 TimeStamp0	: Double_t
fADC_A01_tStamp1	: Segment A01 TimeStamp1	: Double_t
.	.	.
.	.	.
.	.	.
fADC_F06_tStamp1	: Segment F06 TimeStamp1	: Double_t
PosZ	: Z position in 0.1 mm units	: Float_t
foldSeg	: Segment Fold	: UShort_t
foldNaI	: NaI and BGO Fold	: UShort_t
foldRing	: Ring Fold	: UShort_t
seg_id	: Hit segment number	: Short_t
ring_id	: Hit ring number	: Short_t
nai_id	: Hit NaI number	: Short_t

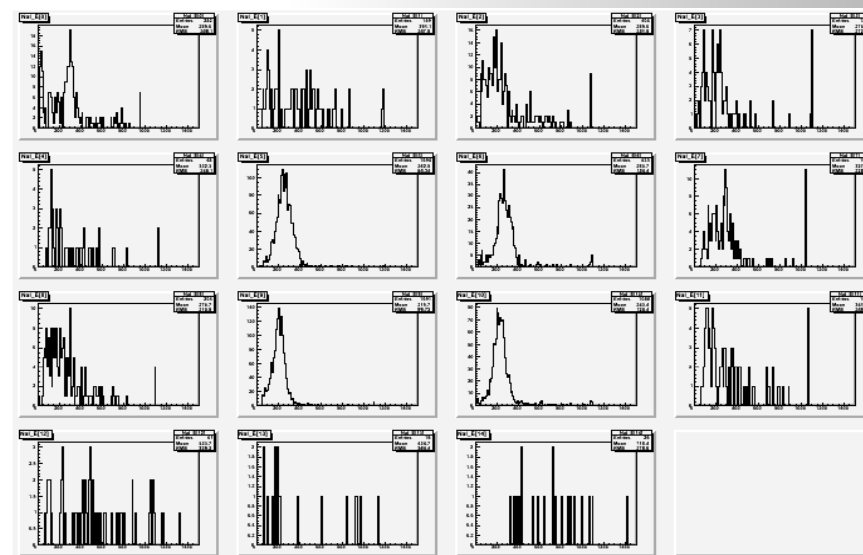
Derived
Variables
(Presort)

Segment Traces (single event):

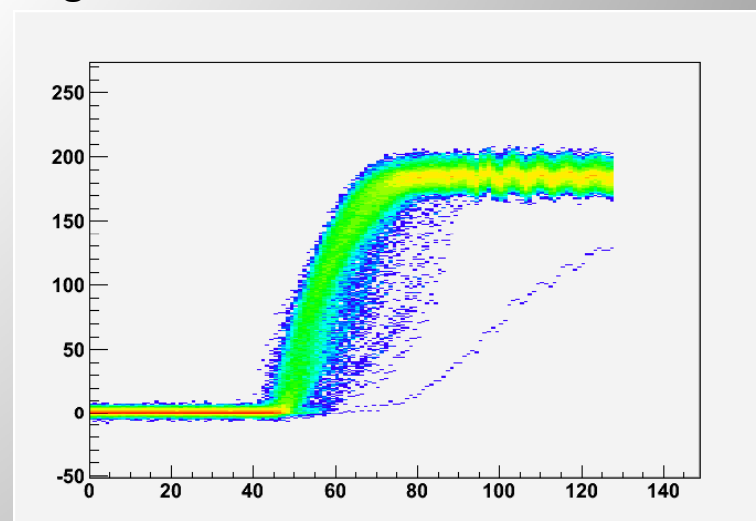


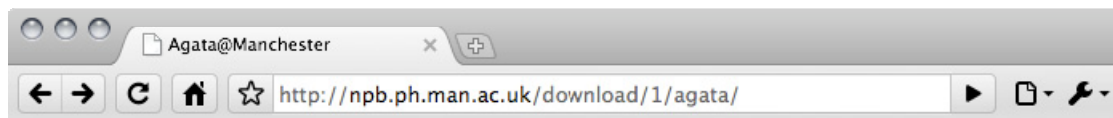
Sample Data

Scintillators:



Segment 1:





Index of /download/1/agata/C001_coincidence

AGATA scan t

	Name	Last modified	Size	Description
C001 Coinciden	Parent Directory		-	
	C001_Runs.pdf	11-Nov-2009 17:03	128K	
	calibration.dat	12-Nov-2009 09:55	5.3K	
	presort-calibrated/	11-Nov-2009 17:08	-	
	presort-raw/	12-Nov-2009 09:50	-	
	raw/	12-Nov-2009 11:29	-	
	readme.txt	12-Nov-2009 12:04	1.1K	
	scan2ROOT/	19-Nov-2009 15:03	-	

Apache/2.0.43 Server at npb.ph.man.ac.uk Port 80

- ✓ Raw Data
- ✓ Presorted Data
- ✓ Calibration coefficients
- ✓ Description of scan
- ✓ Source code
- ✓ Sample macros

npb.ph.man.ac.uk/download/1/agata/

Available Data

Coincidence Data	21 scan lines and 3 azimuthal scans	^{137}Cs	14 GB (Raw: 128 samples) 300 MB (Presorted)	Online Now
Singles Data	1mm front face scan, side scan, high statistics side scan and planar scan	^{137}Cs	1 TB (Raw: 128 samples)	Data is available: not yet on server

Questions:

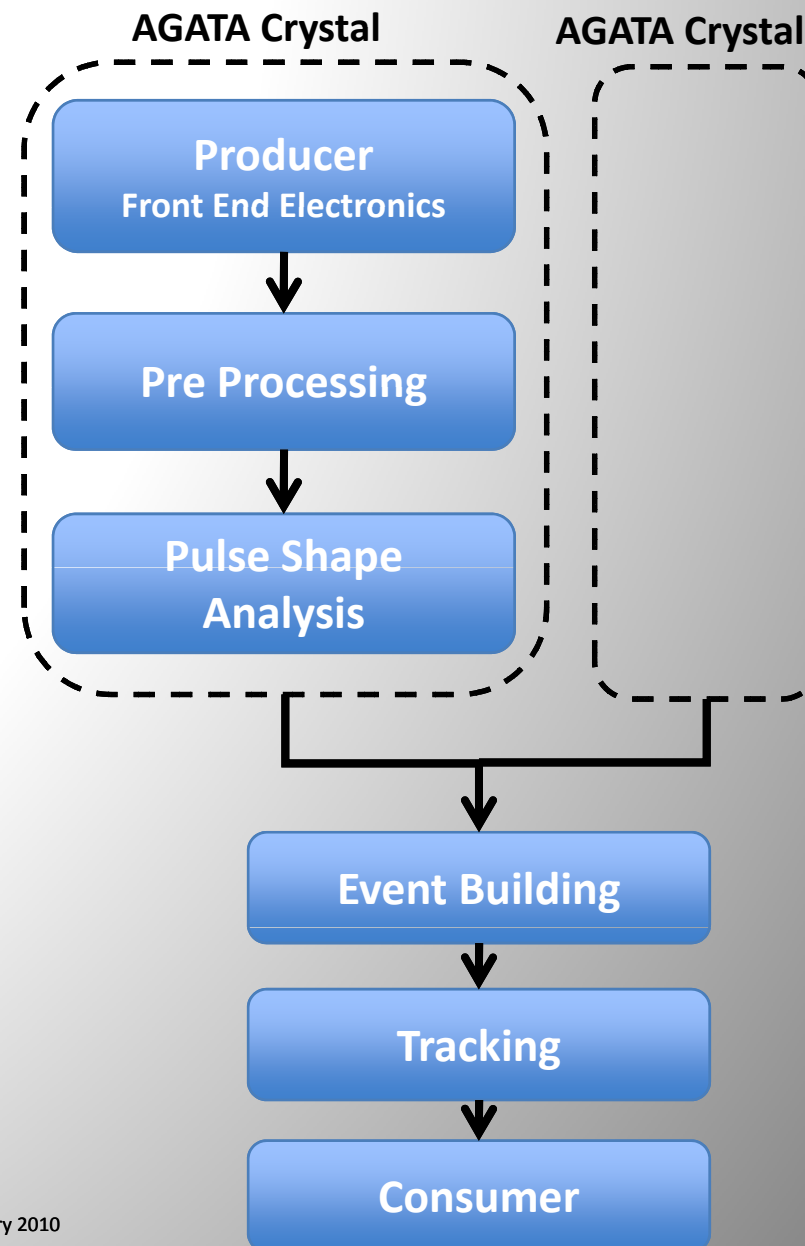
andrew.paul.robinson@manchester.ac.uk
cu@ns.ph.liv.ac.uk

npb.ph.man.ac.uk/download/1/agata/

- Data acquisition system **used online** with AGATA.
- Can run **distributed processes** (actors) on multiple **networked CPUS**.
- Can also be used **offline** – work with raw data (traces) written out from Front End Electronics (FEE).

- Use the **Narval** framework to analyse **scan table** data.
- ✓Take advantage of existing work.
- ✓Ensure **future developments** are **compatible with online** systems.

NARVAL



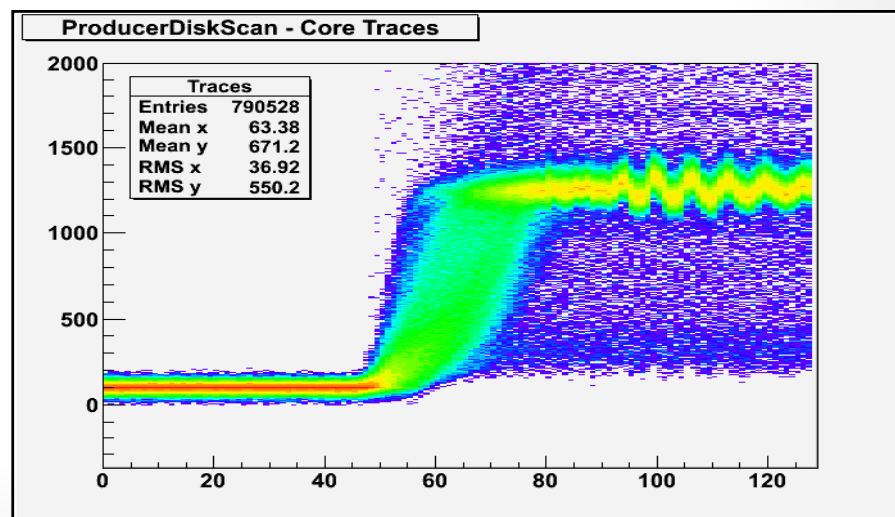
Scan Data Producer

Producer

New Producer for
Scan Data

1. Read in data in converted ROOT format.
2. Pass data as crystal frame to rest of Narval processing chain.

1st version is now ready...



AGATA Week - 20th January 2010
LNL

AGATA Crystal

Producer
Front End Electronics

Pre Processing

Pulse Shape
Analysis

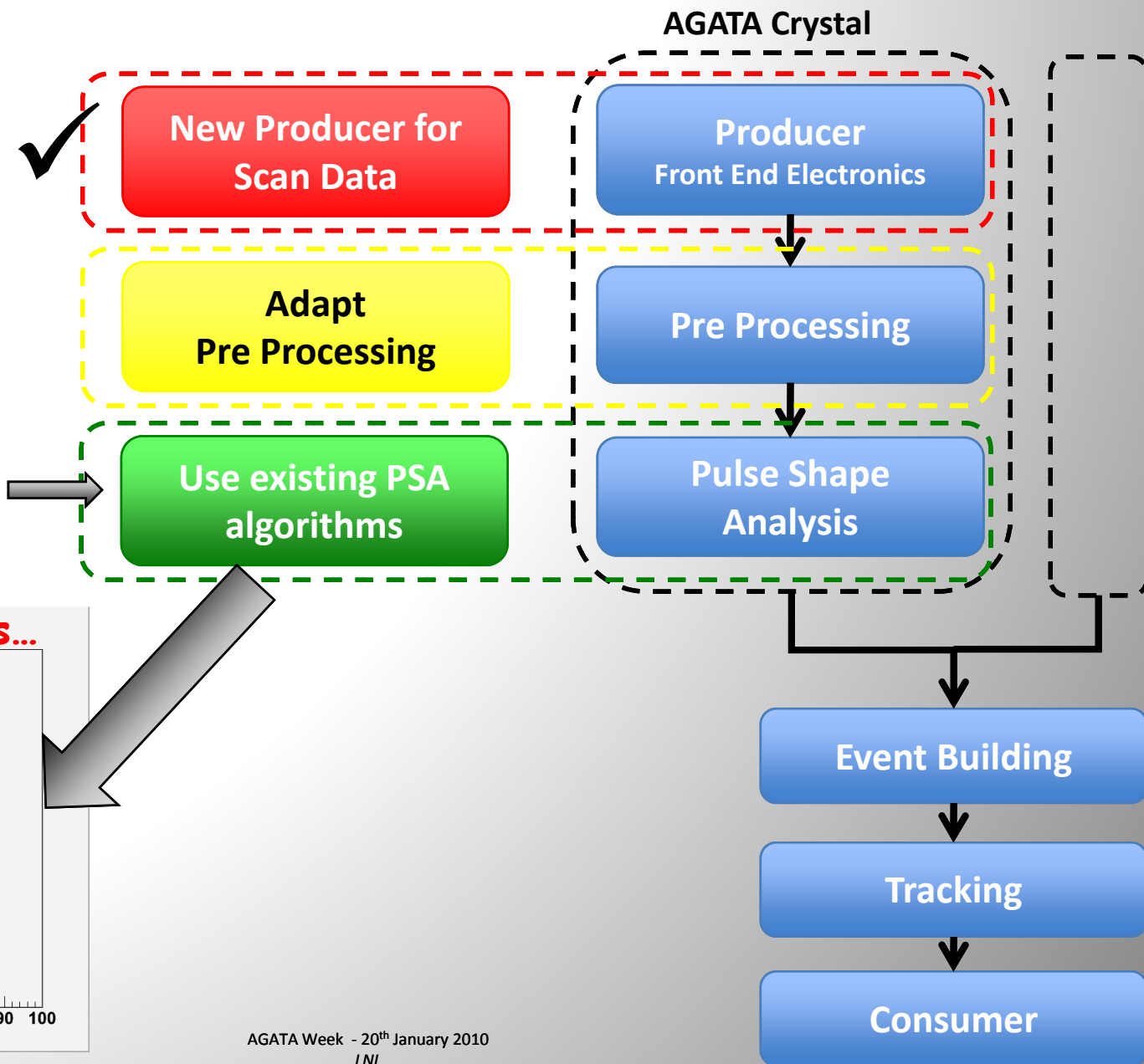
Event Building

Tracking

Consumer

PSA Algorithms

Simple Grid Search
Adaptive Grid Search
Jass Basis
MGS Basis

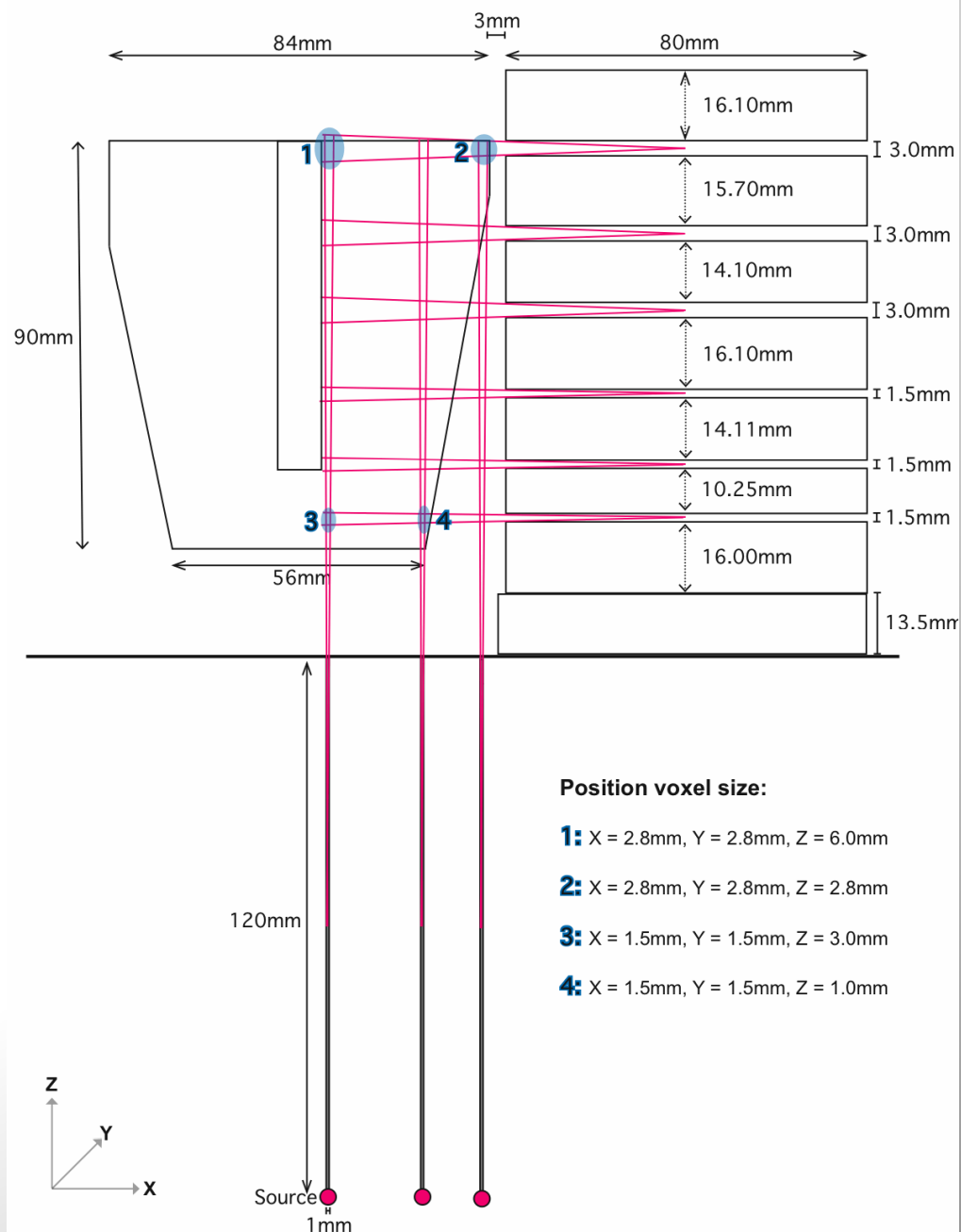


What's Next?

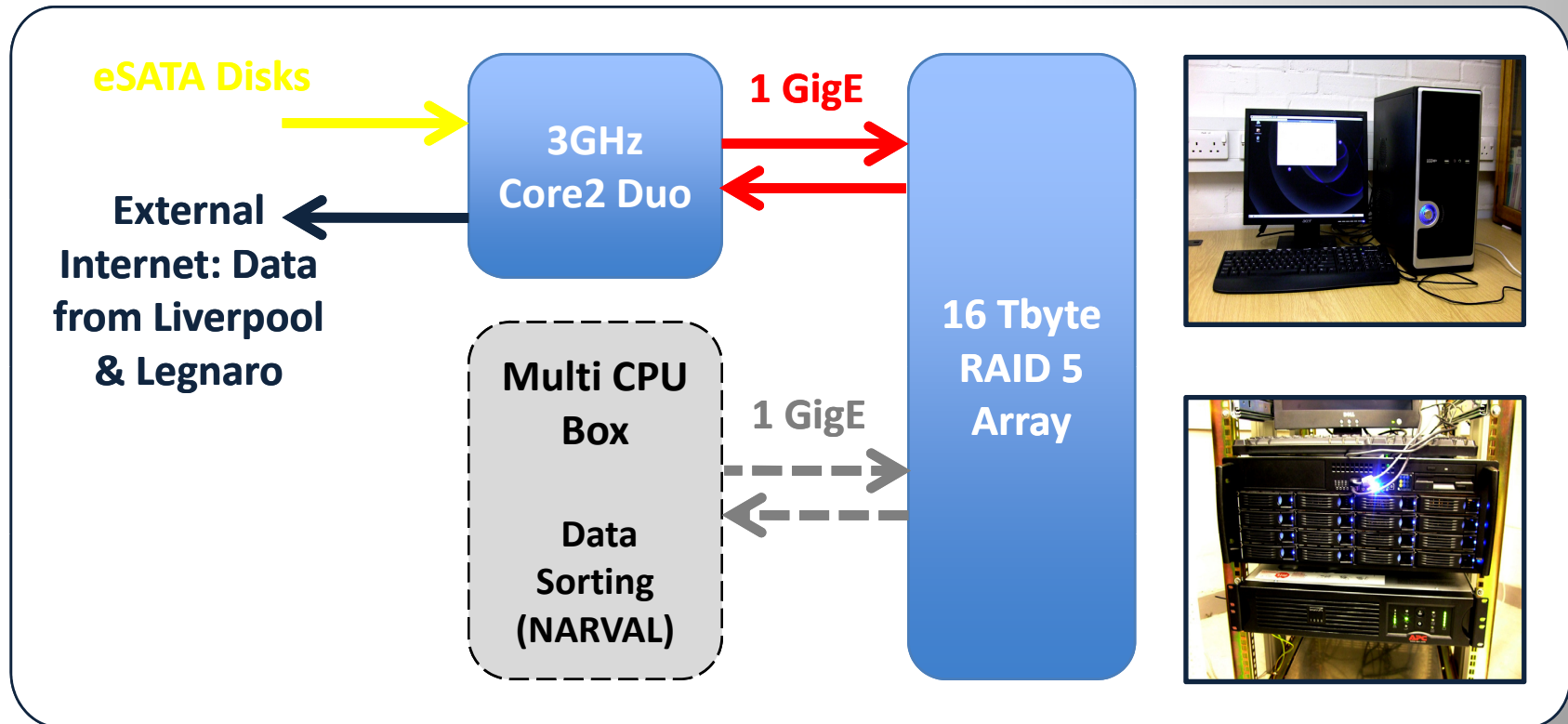
- ✧ Make **C001 singles data** available online.
- ✧ **Convert** scan data for next **crystal (A6)** – procedure is now in place.
- ❑ Test Scan Data Producer actor with latest actors (**Adaptive grid search**).
- ❑ C001 **flood source measurements** – pencil beam reconstruction.
- ❑ C001 coincidence scan measurements (reproduce known positions of interaction)
- ❑ **Improve PSA algorithms** (new algorithms ?)

New scan data actor is available to those who are interested.





Data Analysis System



- AGATA produces **a lot of data**, raw traces needed for PSA development.
- **14 Tbytes of data** produced from 1 week in beam test !
- Detector scan data is also large (**~2 Tbytes per full scan**).
- Pulse Shape Analysis is **extremely CPU intensive**.