



# Data Analysis & Reprocessing status

Jérémie Dudouet

on behalf of the **AGATA Data processing working group**

Institut de Physique des deux infinis de Lyon (**IP2I**)

**AGATA Week 2025, GSI**

## Team goals

- Support on data processing:
  - ➡ Organization of workshops dedicated to data analysis
    - The last one at Lyon in January 2025



## Team goals

- Support
- ➡ Org
- ➡





## Team goals

- Support on data processing:
  - ➡ Organization of workshops dedicated to data analysis
    - The last one at Lyon in January 2025
    - When should we organise the next one ? September 2026 ?
  - ➡ Software update and support
  - ➡ Providing documentation
- Support on data transfer management:
  - ➡ script and documentation to simplify data transfer from the grid



# Software in AGAPRO

- Energy drift correction procedure:
  - ➡ Work of Matus Balogh, that will be presented on Friday

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ELSEVIER

Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment

Volume 1004, 11 July 2021, 165368

Automated method for offline correction of spectrometry data affected by time instability

M. Balogh <sup>a</sup>, A. Herzáň <sup>a</sup>, V. Matoušek <sup>a</sup>, M. Sedlák <sup>a</sup>, M. Beňo <sup>b</sup>, J. Dobrovodský <sup>b</sup>, G. Kantay <sup>a</sup>, P. Konopka <sup>a</sup>, P. Noga <sup>b</sup>, A. Repko <sup>a</sup>, A. Špaček <sup>a</sup>, D. Vaňha <sup>b</sup>, M. Venhart <sup>a</sup>, S. Vielhauer <sup>a</sup>

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https://doi.org/10.1016/j.nima.2021.165368

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Abstract

A new automated method has been developed with the aim to correct measured spectra for sudden gain and offset drifts due to temporal instrumentation instabilities. It is based on discrete cross-correlation that alleviates the need for Gaussian-shaped peaks and is capable of correcting spectra that change their shape in time. Potential of this method has been tested on decay and in-beam  $\gamma$ -ray spectroscopy data measured with an array of three n-tune coaxial High-Purity Germanium detectors albeit its use is not limited only

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Minwoo Nam

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FEEDBACK

# Software in AGAPRO

- Energy drift correction procedure:
  - ➡ Work of Matus Balogh, that will be presented on Friday
- New replay emulator (DAEMule) working on cluster:
  - ➡ Tested on site: factor 10 in processing time (talk of G. Baulieu)

The screenshot shows the Portainer.io interface. The sidebar on the left contains navigation links: Home, Dashboard, Templates, Stacks, Services, Containers, Images, Networks, Volumes, Configs, Secrets, and Swarm. The main area displays two tables of running containers.

Status	Task	Actions	Slot	Node	Last Update
running	tux501nqeallrbftt08mizljn	[Icons]	1	agata-analysis-6	2025-07-01 10:44:30

Status	Task	Actions	Slot	Node	Last Update
running	1w0mlb4etmynn2zv6stwyvuv	[Icons]	6	agata-analysis-6	2025-07-01 10:44:40
running	2apgy1qxulpkdktfyuwbyfgo	[Icons]	9	agata-analysis-8	2025-07-01 10:44:40
running	8oncw3mya4jvblxolgtkezy2b	[Icons]	2	agata-analysis-8	2025-07-01 10:44:40
running	afmcv3i7ihz35flqphm97k682	[Icons]	10	agata-analysis-8	2025-07-01 10:44:40
running	cn8f4dsqpm6cna2ktmg9lgkrf	[Icons]	5	agata-analysis-7	2025-07-01 10:44:40
running	j7jzdpd2fz14uiu2amd7acefq	[Icons]	1	agata-analysis-6	2025-07-01 10:44:40
running	tkokogplj5gglgwlqm2p4535z	[Icons]	4	agata-analysis-7	2025-07-01 10:44:40
running	w4rx96do7xnu1fe3hgnxd1ccp	[Icons]	11	agata-analysis-7	2025-07-01 10:44:40
running	xdxmvj081e3yw6w73nj6bc3wc	[Icons]	8	agata-analysis-6	2025-07-01 10:44:40
running	xqjjwoveqwoi4f1ajvlt71vn	[Icons]	3	agata-analysis-8	2025-07-01 10:44:40

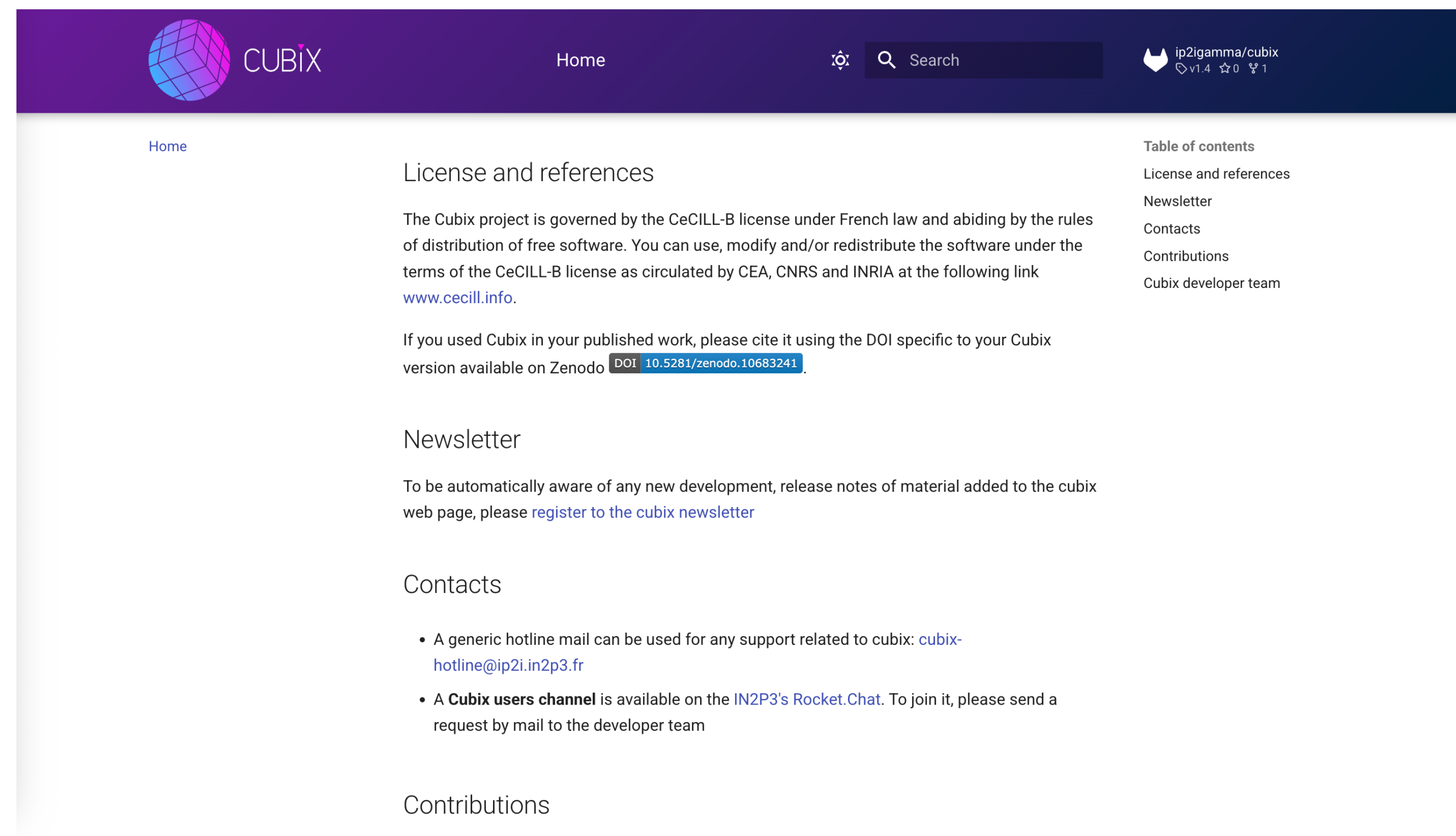
On the right side of the interface, there is a stylized logo of a donkey's head with the word "DAEMULE" written below it.



## Other software

### ► Cubix:

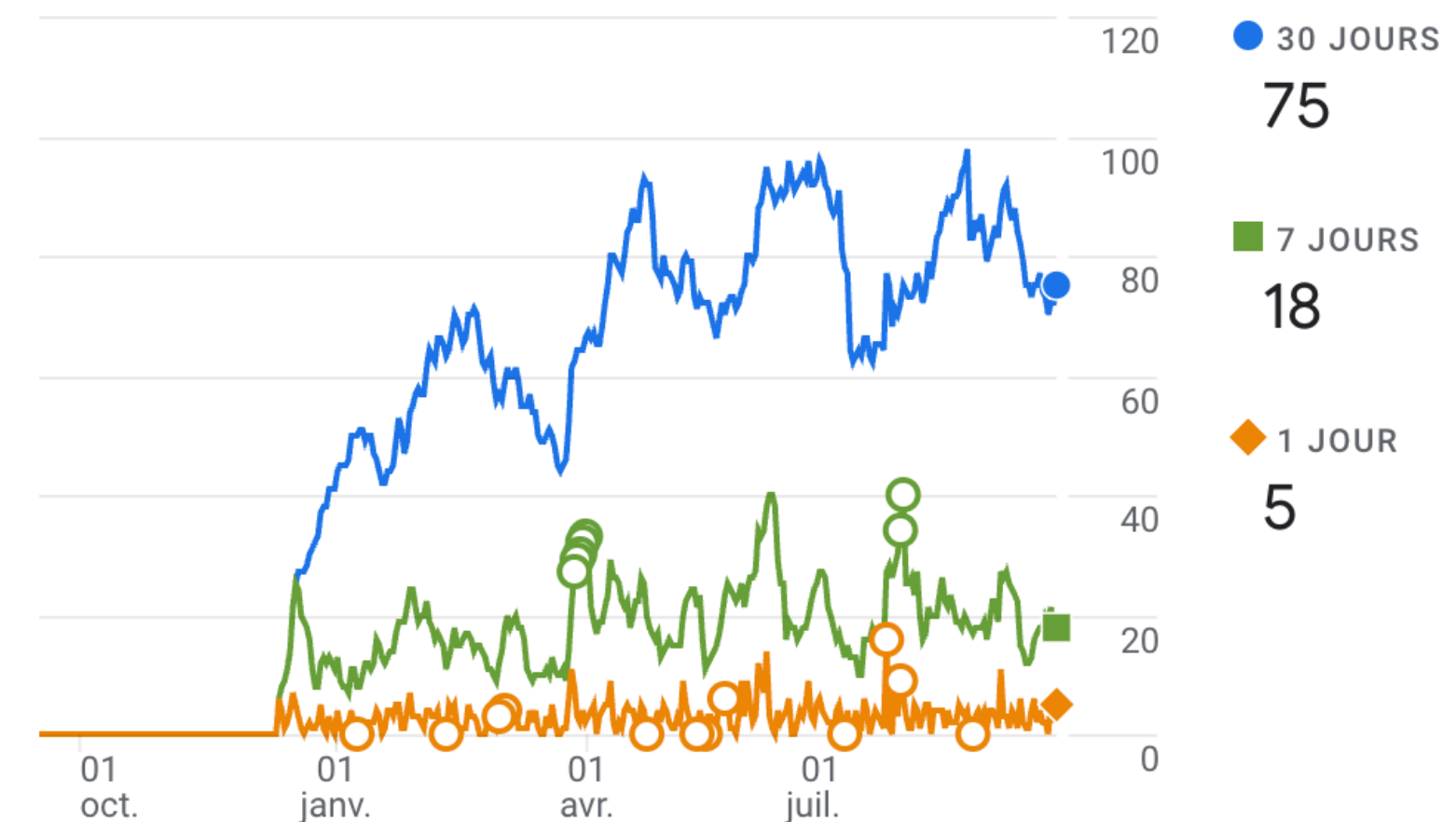
- ➡ Last release: v1.4 (06/2025)
- ➡ Several new tools and optimisation: check the release notes
- ➡ Full documentation and release notes on <https://cubix.in2p3.fr>



## Other software

► Cubix:

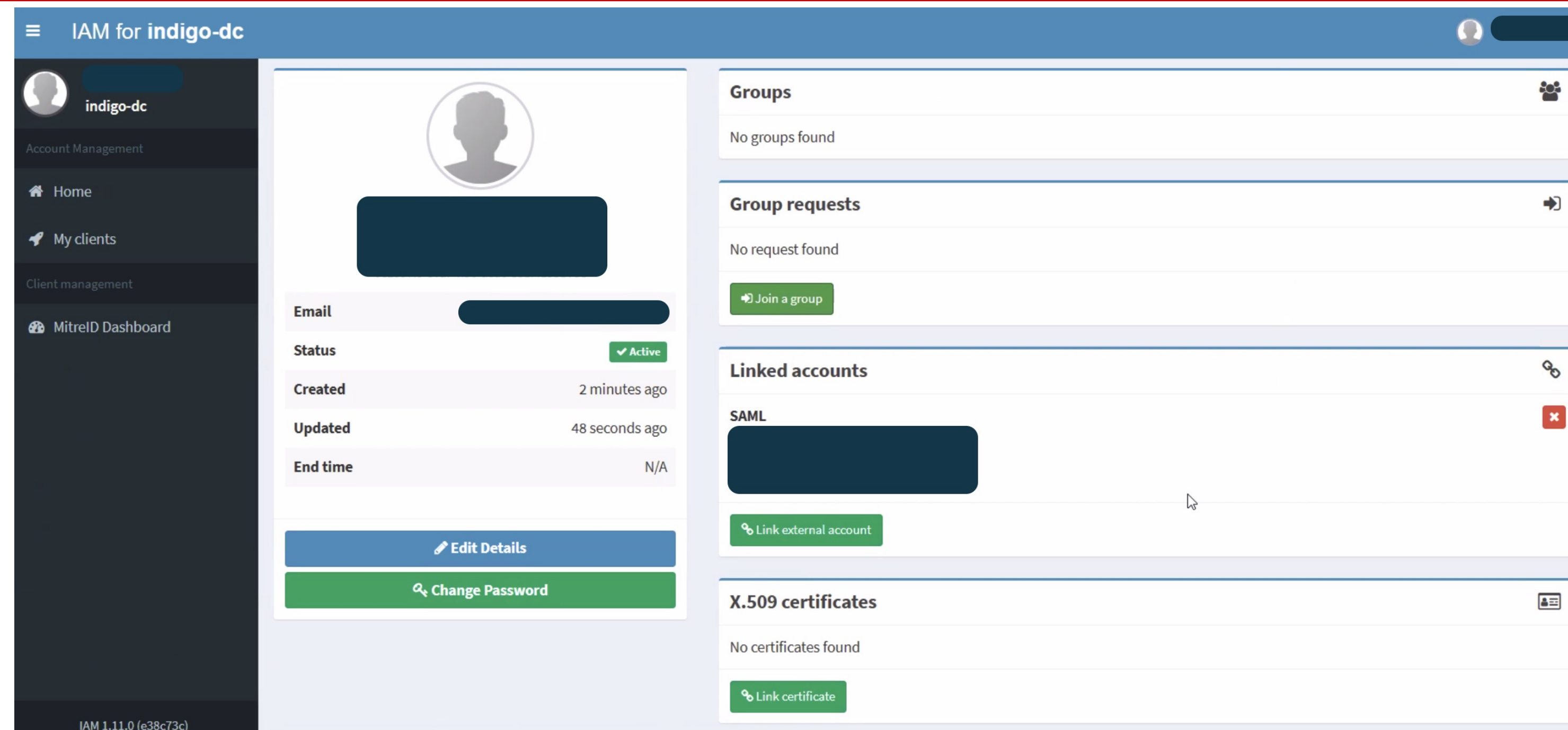
- ➔ Last release: v1.4 (06/2025)
- ➔ Several new tools and optimisation: check the release notes
- ➔ Full documentation and release notes on <https://cubix.in2p3.fr>





# Grid access

- **Migration to indigo IAM:**
  - ➔ VOMS no more maintained at CC



# Grid access

- **Migration to indigo IAM:**
  - ➡ VOMS no more maintained at CC
- **Documentation for GRID data access updated on the AGATA handbook web page**
- **Docker image updated**

<https://agata.pages.in2p3.fr/handbook/data/grid/grid/>

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ip2igamma

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Data download from the grid

Preparation

The Grid is a cooperation of many different clusters and research organizations, and as such, there is no centralized user management. Yet, there must be a way for the system to identify you and your work. This is why **Grid certificates** and **Virtual Organizations** (VOs) are introduced.

Your digital identity starts with a private key. Only you are allowed to know the contents of this key. Next, you need a Grid certificate, which is issued by a Certificate Authority (CA). The Grid certificate contains your name and your organization, and it says that the person who owns the private key is really the person mentioned, and that this is certified by the Certificate Authority.

Now this is your identity. Big international collaborations do not want to deal with every user individually. Instead, users become part of Virtual Organizations. To give an analogy, the Grid certificate provides authentication (identity, e.g., like a passport) and the VO provides authorization (approval, e.g., like a visa).

In order to access to the Grid, you have to make three essential steps:

1. **Get a Grid certificate**, so that you can be identified on the Grid.

2. **Join the AGATA Virtual Organization (VO)**, so that you can access to the Grid.

You need then a User Interface (UI) that provide the proper environment to interact with the Grid. This user interface can be either installed by your IT services, or obtained from the AGATA Grid

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Presentation of the different options on the script

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AGATA Grid docker image #

Download docker image

The AGATA collaboration is sharing a docker image with the Grid UI installed. This docker image generation is done [here](#)

For the following, the docker application needs to be installed.

To install the AGATA Grid docker image:

```
docker pull gitlab-registry.in2p3.fr/ip2igamma/docker_images:agata_grid_IAM
```

Start docker image

You then need to define two environment variables: - CERTIF\_DIR: repository on you computer containing your certificate in .p12 format. This is only required once, to produce the certificated in the .pem format, required by the grid UI. It will mount this folder in the /root folder of the docker image. - DATA\_DIR: repository where the data will be downloaded

Assuming CERTIF\_DIR is /path/to/my/certificates and DATA\_DIR is /path/to/data , apply:

```
export CERTIF_DIR=/path/to/my/certificates
export DATA_DIR=/path/to/data
```

Then, the docker image is stared using:

```
docker run -it --rm -v ${CERTIF_DIR}:/root -v ${DATA_DIR}:/data gitlab-registry.in2p3.fr/ip2igamma/docker_images:agata_grid_IAM
```

The docker image should start in the /opt/AgataGrid where the following files must be present:

```
root@:/opt/AgataGrid$ ls -l
```

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Presentation of the different options on the script

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proxy\_status:

from\_LYON:

from\_CNAF:

show\_conf:

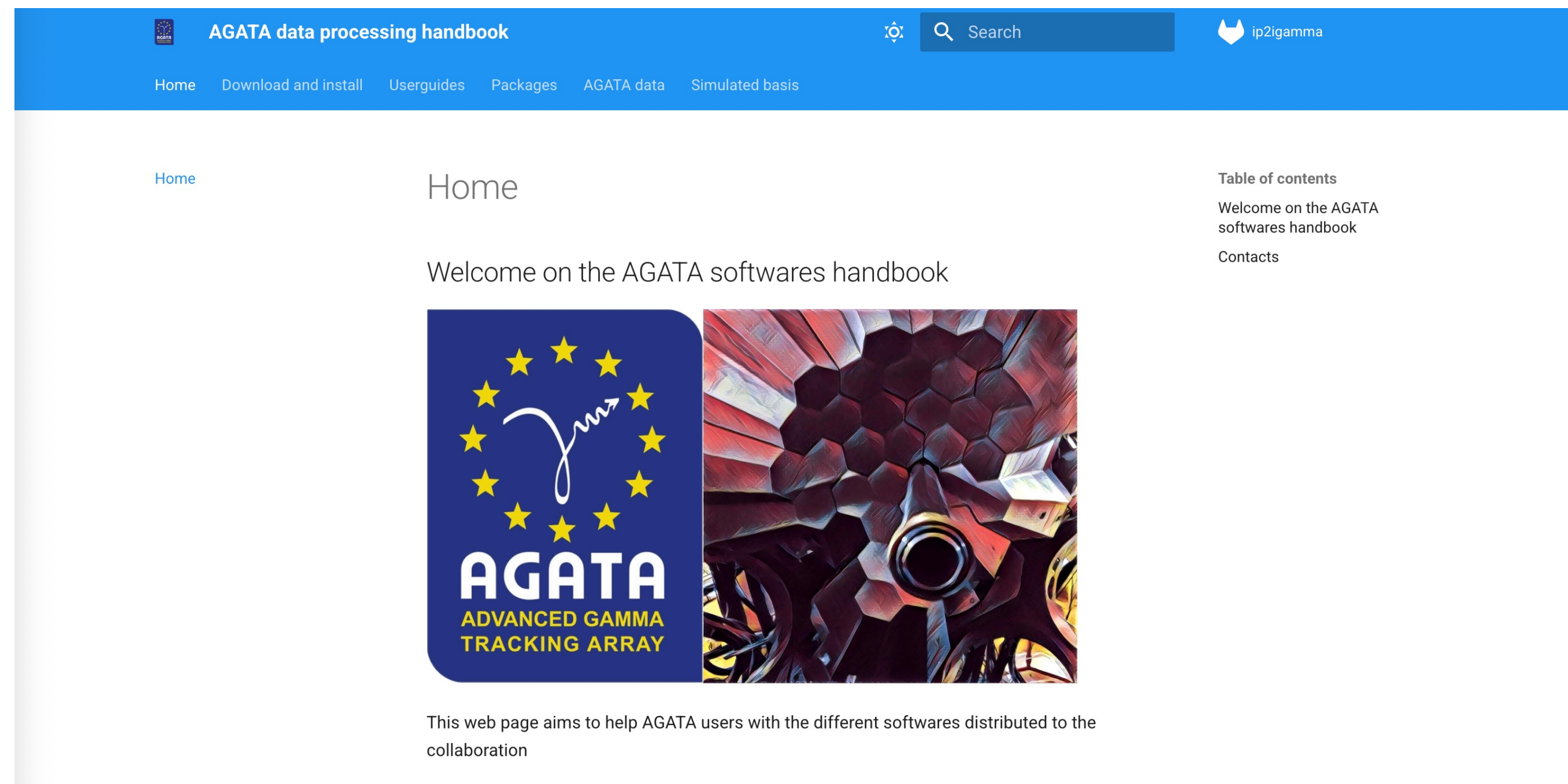
ls\_dir:

input\_dir:



# Documentation

➤ AGATA user guide web site: <https://agata.pages.in2p3.fr/handbook>



# Documentation

- AGATA user guide web site: <https://agata.pages.in2p3.fr/handbook>  
➡ software installations

The screenshot shows the 'AGATA data processing handbook' website. The header is blue with a search bar and the 'ip2igamma' logo. The navigation bar includes links for Home, Download and install, Userguides, Packages, AGATA data, and Simulated basis. The main content area is titled 'Download and install' and includes a sidebar with a 'Table of contents' listing: Download and Installation, Prerequisites, Operating systems, Basic software, Getting the sources, ADF, Prisma (needed for the LNL campaign), AGAPRO (including FEMUL), and Sourcing the environment. The main text under 'Download and install' includes a section for 'Prerequisites' and 'Operating systems', stating that Linux (Ubuntu, Scientific Linux, CentOS, Debian, ...) and MacOS X are supported, while Windows is not. It lists required tools: git, cmake, python3, a C++11 compiler, and ROOT. The 'Getting the sources' section mentions that software can be installed using a python script.

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Download and install

Download and Installation

Prerequisites

**Operating systems**

Linux (Ubuntu, Scientific Linux, CentOS, Debian, ...) and MacOS X operating systems are supported. No support for Windows.

**Basic software**

You will need :

- [git](#) to download the sources
- [cmake](#) to configure the build ( $\geq 3.5$ )
- [python3](#) ( $\geq 3.$ )
- a compiler supporting C++11 ([Compiler support for C++11 - cppreference.com](#))
- For the softwares using [ROOT](#), a ROOT version at least version 6.16

Getting the sources

The different softwares developped for the AGATA collaboration can be installed using a python script. The first step is to install this script:

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ADF

Prisma (needed for the LNL campaign)

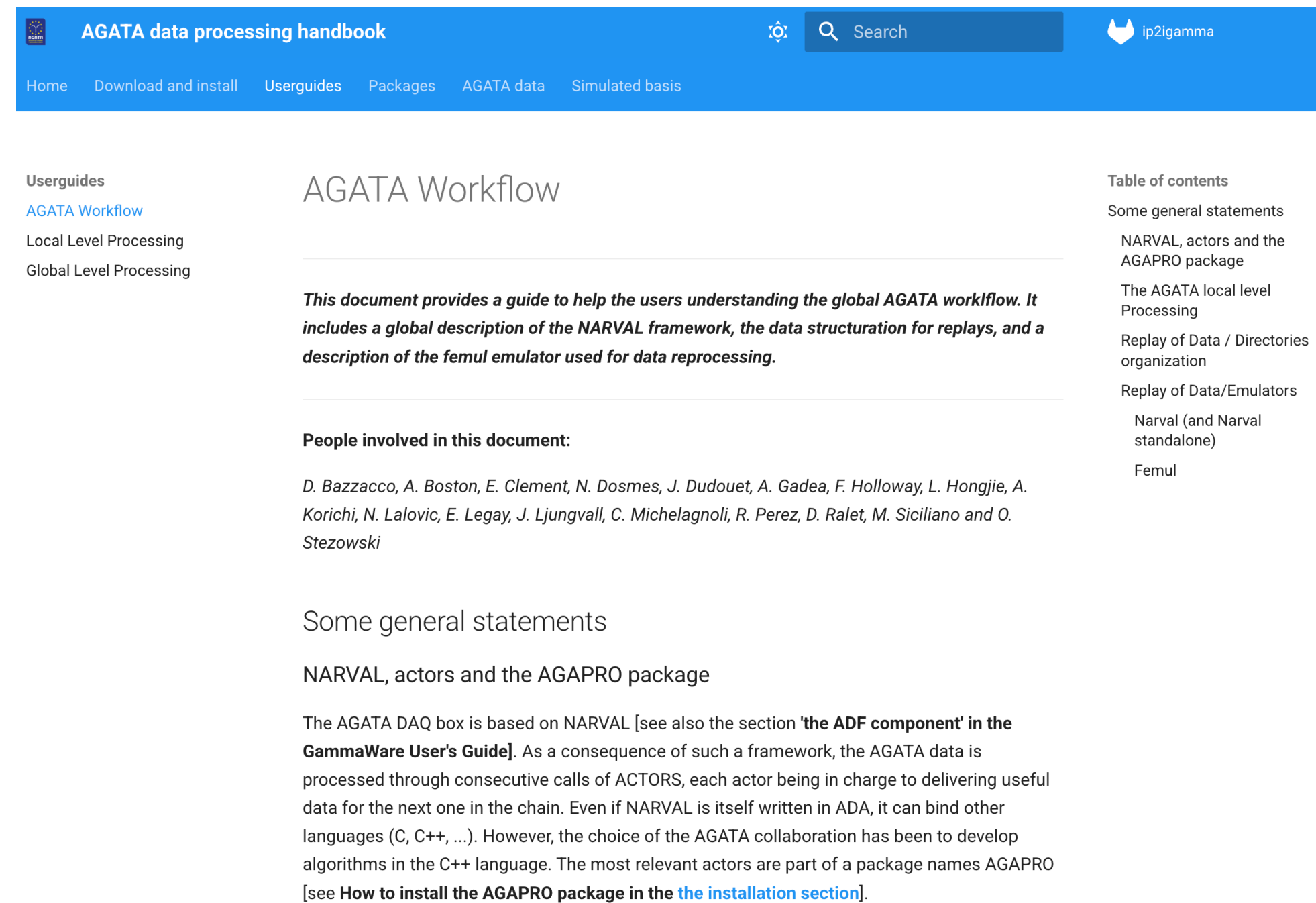
AGAPRO (including FEMUL)

Sourcing the environment



# Documentation

- AGATA user guide web site: <https://agata.pages.in2p3.fr/handbook>
  - ➡ software installations
  - ➡ AGAPRO user guide



**AGATA data processing handbook**

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Userguides  
[AGATA Workflow](#)  
 Local Level Processing  
 Global Level Processing

## AGATA Workflow

***This document provides a guide to help the users understanding the global AGATA workflow. It includes a global description of the NARVAL framework, the data structuration for replays, and a description of the femul emulator used for data reprocessing.***

**People involved in this document:**

*D. Bazzacco, A. Boston, E. Clement, N. Dosmes, J. Dudouet, A. Gadea, F. Holloway, L. Hongjie, A. Korichi, N. Lalovic, E. Legay, J. Ljungvall, C. Michelagnoli, R. Perez, D. Ralet, M. Siciliano and O. Stezowski*

Some general statements

NARVAL, actors and the AGAPRO package

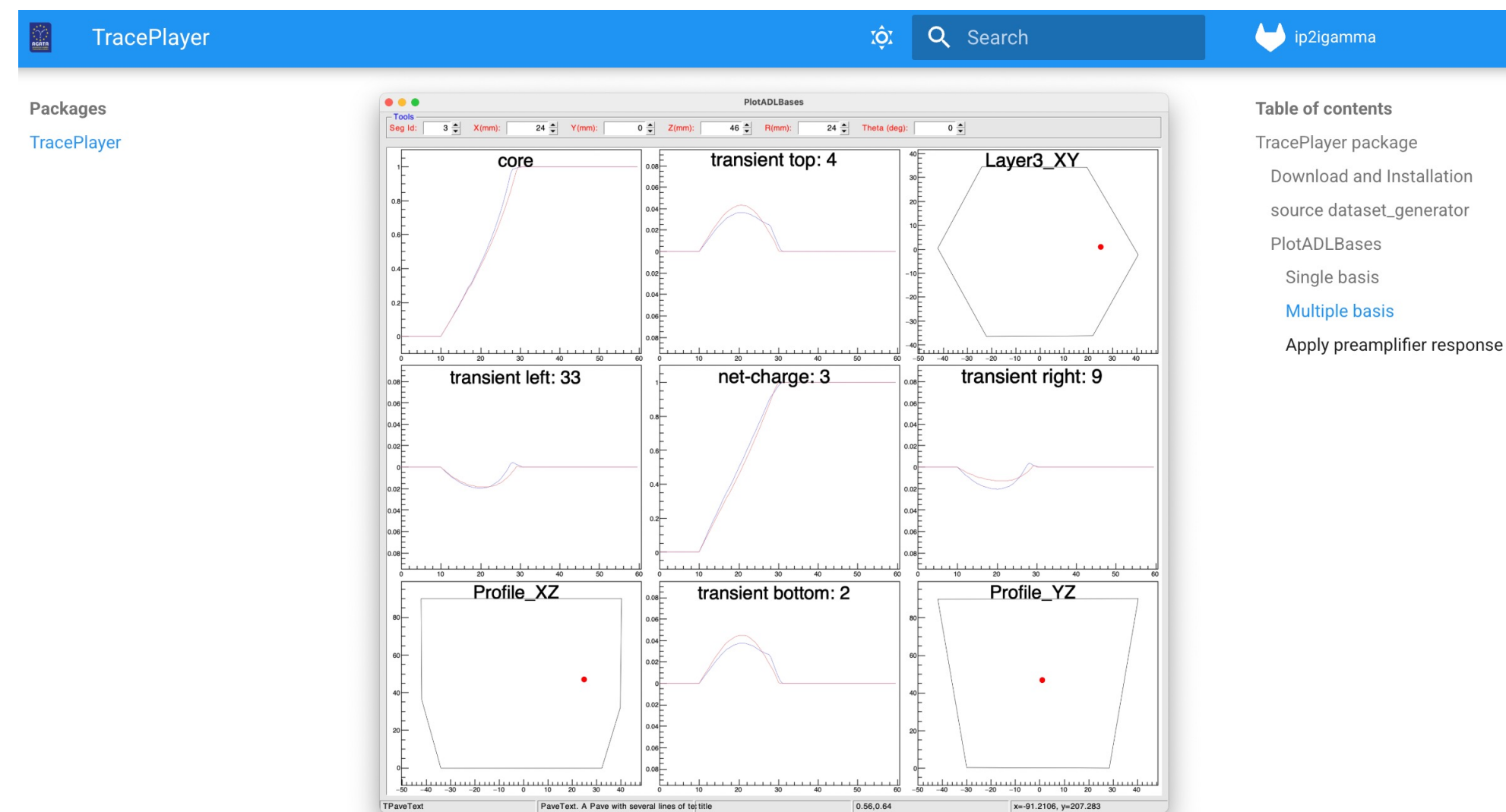
The AGATA DAQ box is based on NARVAL [see also the section '**the ADF component**' in the **GammaWare User's Guide**]. As a consequence of such a framework, the AGATA data is processed through consecutive calls of ACTORS, each actor being in charge to delivering useful data for the next one in the chain. Even if NARVAL is itself written in ADA, it can bind other languages (C, C++, ...). However, the choice of the AGATA collaboration has been to develop algorithms in the C++ language. The most relevant actors are part of a package names AGAPRO [see **How to install the AGAPRO package in the [the installation section](#)**].

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- Replay of Data/Emulators
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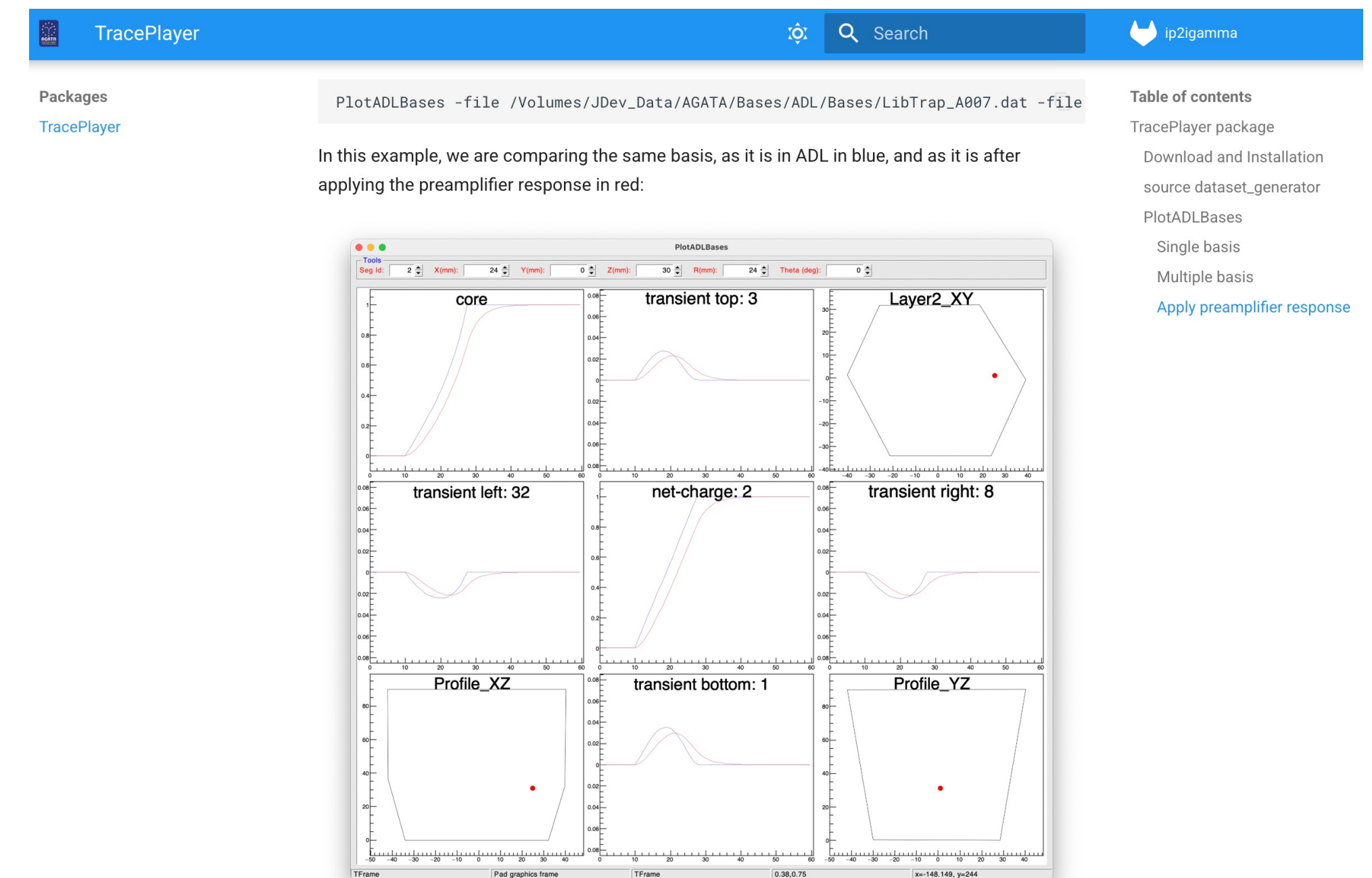
# Documentation

- AGATA user guide web site: <https://agata.pages.in2p3.fr/handbook>
  - ➔ software installations
  - ➔ AGAPRO user guide
  - ➔ access to AGATA-linked packages (TracePlayer: plot ADL format bases)



## Apply preamplifier response

This is possible to ask the code to apply the preamplifier response on the traces as it is done in the AGATA PSA actor. For this use the `-preamp` option after the basis file:





# Documentation

- AGATA user guide web site: <https://agata.pages.in2p3.fr/handbook>
  - ➡ software installations
  - ➡ AGAPRO user guide
  - ➡ access to AGATA-linked packages (TracePlayer)
  - ➡ access to AGATA data (grid, benchmark datasets, scanned data...)

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AGATA Benchmarks

Different docker images are provided as a way to build and/or use the different softwares on any system.

PSA Benchmarks

Doppler correction optimization on <sup>98</sup>Zr (E680 data)

CONCEPT

A dataset has been extracted from the E680 fission data to contain raw traces of the <sup>98</sup>Zr nucleus, having the good idea to have an isolated and strong  $\gamma$ -ray transition at high energy (1.2 MeV).

In this experiments, the fission fragments are emitted with velocities of  $\beta \sim 10$ , making the resolution of such transition strongly dependant on the quality of the Doppler correction, and consequently on the PSA precision.

After the full analysis of the data, a timestamp list has been extracted corresponding to each <sup>98</sup>Zr event. This timestamp list has been used for reprocessing the raw data from the traces level using the TSFilter actor of the AGAPRO package. As a result, we obtain as output ADF files at the producer level, but containing only the traces for <sup>98</sup>Zr events.

An other file has been produced containing for each of these timestamps, the required

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PSA Benchmarks

Doppler correction optimization on 98Zr (E680 data)

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The IPHC scanning table

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NUCLÉAIRE & PARTICULES

Pulse Shape Comparison Scanning (PSCS)

The IPHC scanning table is using the Pulse Shape Comparison Scanning (PSCS) method. In this technique, two singles scans are performed: one with the detector positioned horizontally relative to the collimator and one positioned vertically. In singles scanning, the position of the collimator constrains the position of the  $\gamma$ -ray interaction in the detector. Horizontal and vertical scans are therefore used to determine the (X, Z) and (X,Y) positions of the interaction, respectively. The signals from both scans are then compared using the PSCS method.

The scanning table setup is shown below. The 170 kg heavy collimator sits on two motorized perpendicular axes  $X_T$  and  $Y_T$  that allow it to move within a range of 300 mm in both directions with a precision of about 10  $\mu m$ . Above the collimator, two fixed plates allow the placement of the crystal in the vertical and horizontal positions. Most importantly, a laser alignment system is mounted on the collimator's mechanical support to maintain the detector's relative alignment when switching between vertical and horizontal positions.




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Pulse Shape Comparison Scanning (PSCS)

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- AGATA user guide web site: <https://agata.pages.in2p3.fr/handbook>
  - ➡ software installations
  - ➡ AGAPRO user guide
  - ➡ access to AGATA-linked packages (TracePlayer)
  - ➡ access to AGATA data (grid, benchmark datasets, scanned data...)
  - ➡ simulated basis manual (AGATAGeFEM)

The screenshot shows the 'AGATA data processing handbook' website. The header is blue with a search bar and the 'ip2igamma' logo. The navigation bar includes links for Home, Download and install, Userguides, Packages, AGATA data, and Simulated basis. The main content area is titled 'AGATAGeFEM' and includes a sidebar with 'Simulated basis' and 'AGATAGeFEM' links. The main text describes the AGATAGeFEM simulation framework, preparation steps, and provides Docker commands for downloading and running the container. A table of contents is visible on the right side.

**AGATA data processing handbook**

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Simulated basis  
AGATAGeFEM

## AGATAGeFEM

### AGATAGeFEM simulation framework

#### Preparation

Details on the code and its installation can be found [here](#)

The reference paper of AGATAGeFEM is available [here](#)

A docker container is provided to have the full environment ready. The following manual is based on the docker usage.

#### Download/update the docker image

```
docker pull gitlab-registry.in2p3.fr/ip2igamma/docker_images:agatagefem
```

#### Download/update the docker image

You can then run the AGATAGeFEM command-line interface from a folder where the basis will be created with:

```
docker run --rm -it \
  --user ${id -u}:${id -g} \
  -v ${PWD}:/data \
  gitlab-registry.in2p3.fr/ip2igamma/docker_images:agatagefem \
  cd /data
```

# --rm to delete the container after use  
# to share the user/group with the host  
# to link to current directory  
# name of the docker image  
# move in the /data directory

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AGATAGeFEM simulation framework

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- Download/update the docker image
- Download/update the docker image

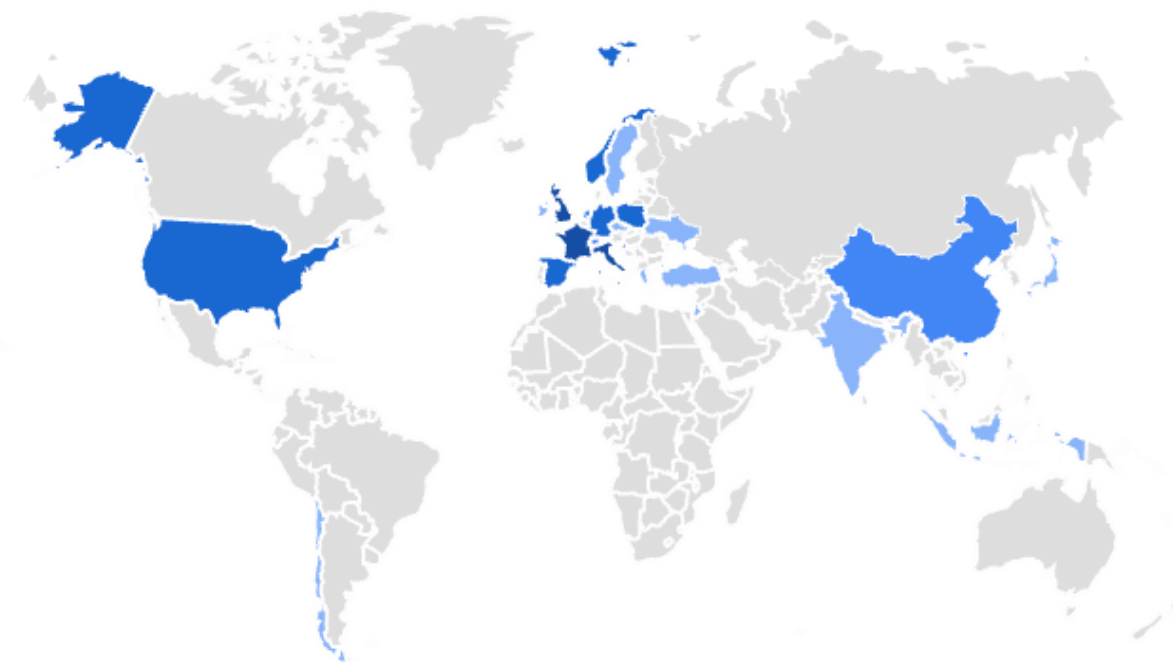
Example of crystal basis creation

- 1 - Define geometry
- 2 - Calculate electric field and the weighting fields
- 3 - Calculate pulses
- 4 - calculate neutron damage correction coefficients
- 5 - Produce a basis in with AGAPRO format

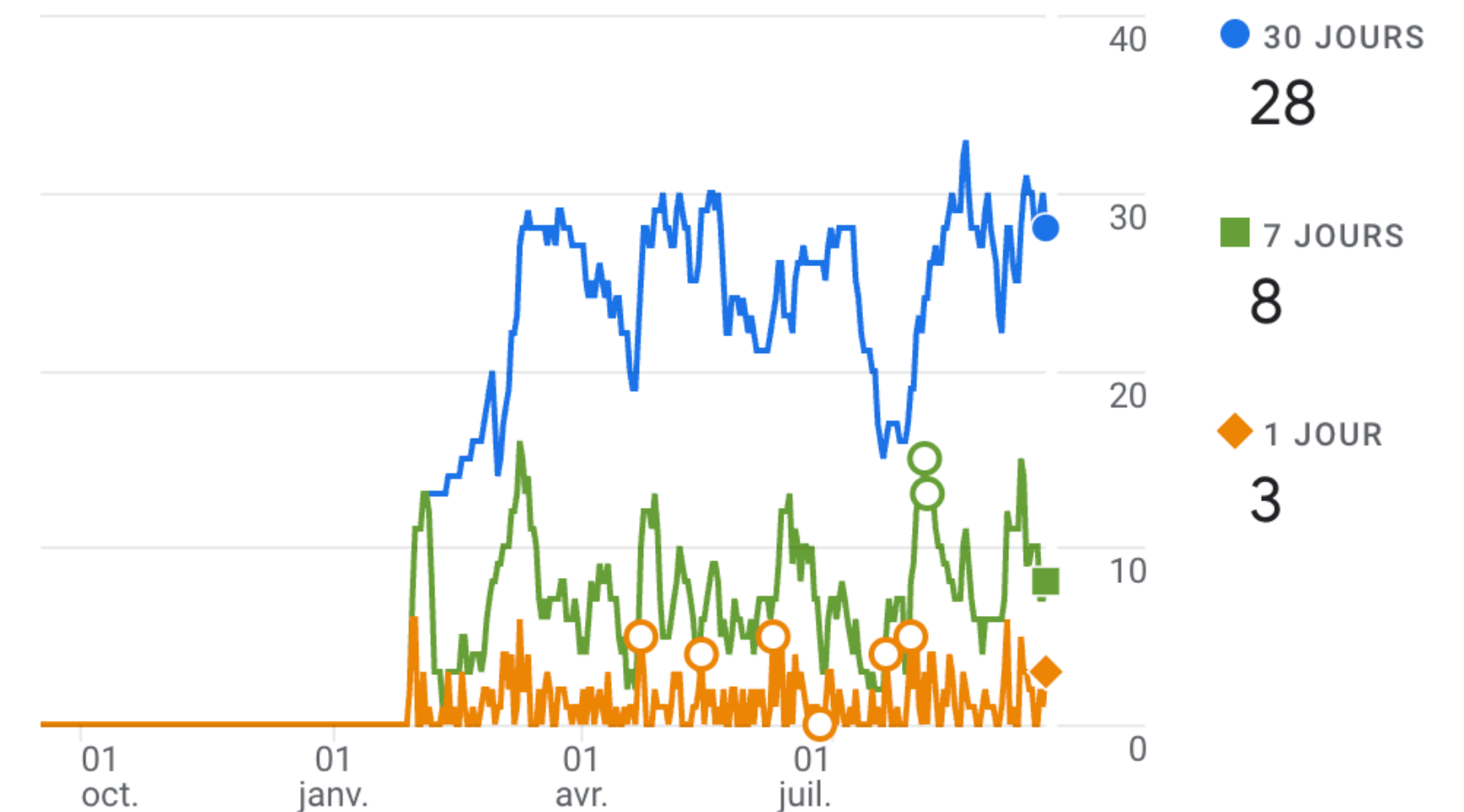


# Documentation

- AGATA user guide web site: <https://agata.pages.in2p3.fr/handbook>
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# Documentation for experts

- New AGATA **experts** user guide web site: <https://agata.pages.in2p3.fr/handbook/expert-only/>
  - Designed to prevent unrestricted access during experiments to web pages containing commands reserved for experts.
  - ➡ Installation of the “Phase 2” version of AGATA Software (still under development)

The screenshot shows the 'Phase 2' section of the AGATA data processing handbook. The page is titled '[EXPERT-ONLY] AGATA data processing handbook' and includes a search bar and a navigation menu with links to Home, Download and install, and Packages. The main content area is titled 'Phase 2' and 'Download and Installation'. It lists prerequisites and operating systems supported (Linux and MacOS X). A list of required tools is provided, including git, cmake, python3, a C++17 compiler, boost, and ROOT. The page also includes a table of contents on the right side.

**[EXPERT-ONLY] AGATA data processing handbook**

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Download and install  
Phase 2

## Phase 2

### Download and Installation

#### Prerequisites #

#### Operating systems

Linux (Ubuntu, Scientific Linux, CentOS, Debian, ...) and MacOS X operating systems are supported. No support for Windows.

#### Basic software

You will need :

- [git](#) to download the sources
- [cmake](#) to configure the build ( $\geq 3.5$ )
- [python3](#) ( $\geq 3.$ )
- a compiler supporting C++17 ([Compiler support for C++17 - cppreference.com](#))
- [boost](#) ( $\geq 1.75.0$ ), mandatory for the agapro package
- For the softwares using [ROOT](#), a ROOT version at least version 6.16

#### Getting the sources

The different softwares developped for the AGATA collaboration can be installed using a python

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# Documentation for experts

- New AGATA **experts** user guide web site: <https://agata.pages.in2p3.fr/handbook/expert-only/>
  - Designed to prevent unrestricted access during experiments to web pages containing commands reserved for experts.
  - ➡ Installation of the “Phase 2” version of AGATA Software (still under development)
  - ➡ Packages dedicated to expert use

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**Binaries**

**ADF2UDPServer**

ADF2UDPServer.exe is a binary built in the ./bin folder of the AGAPRO package. It is an emulator reproducing the behaviour of a STARE card. It will load ADF data from an ADF file and send these data to a SQM client through ethernet using UDP packets. It will loop infinitely over the data, automatically increasing the timestamp of each data frame.

**Configuration**

At startup, the program will look for a ADF2UDPServer.conf file in the current folder. The content of the configuration file is the following (the default value is used in case of missing information) :

LIST OF PARAMETERS

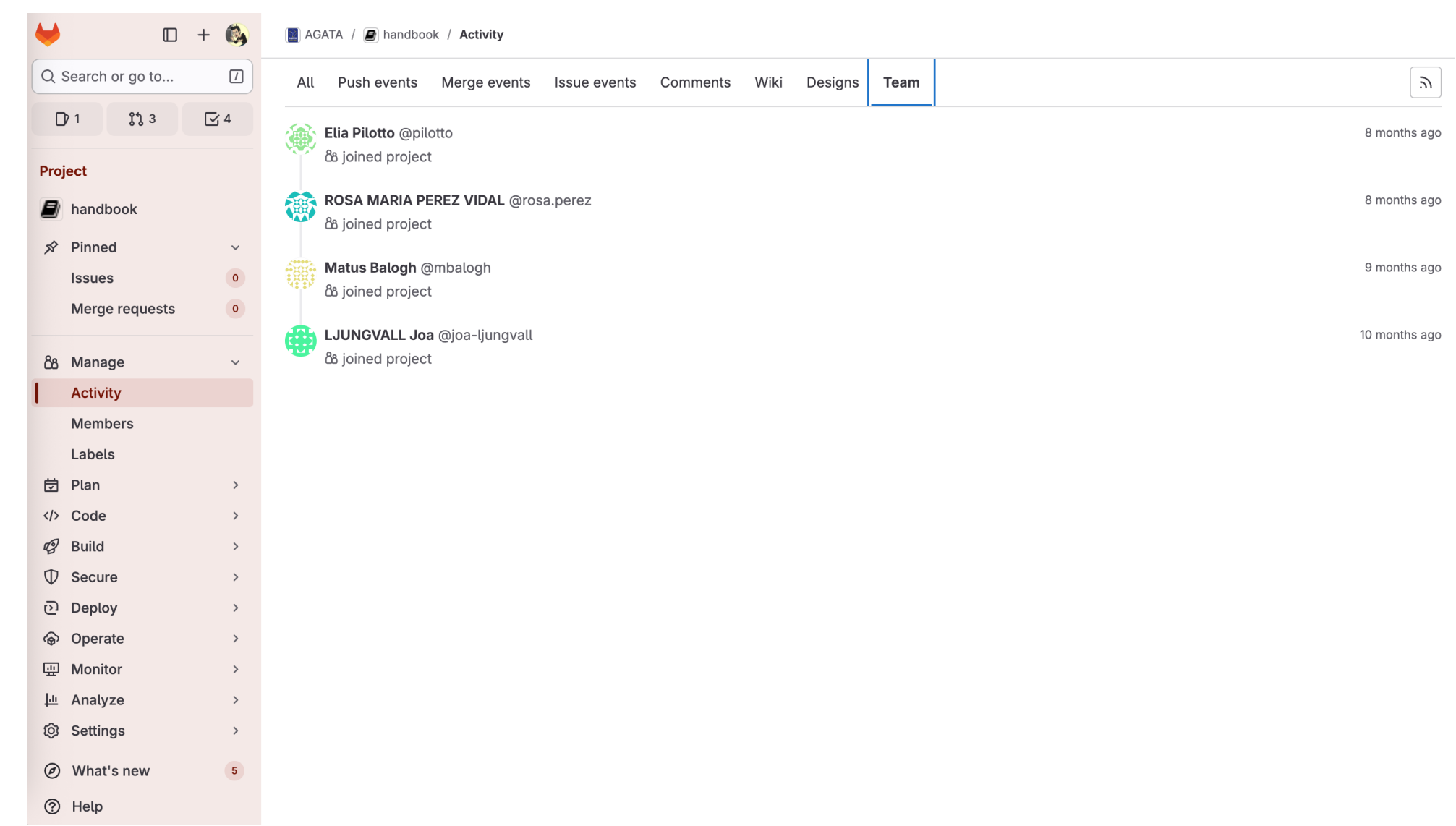
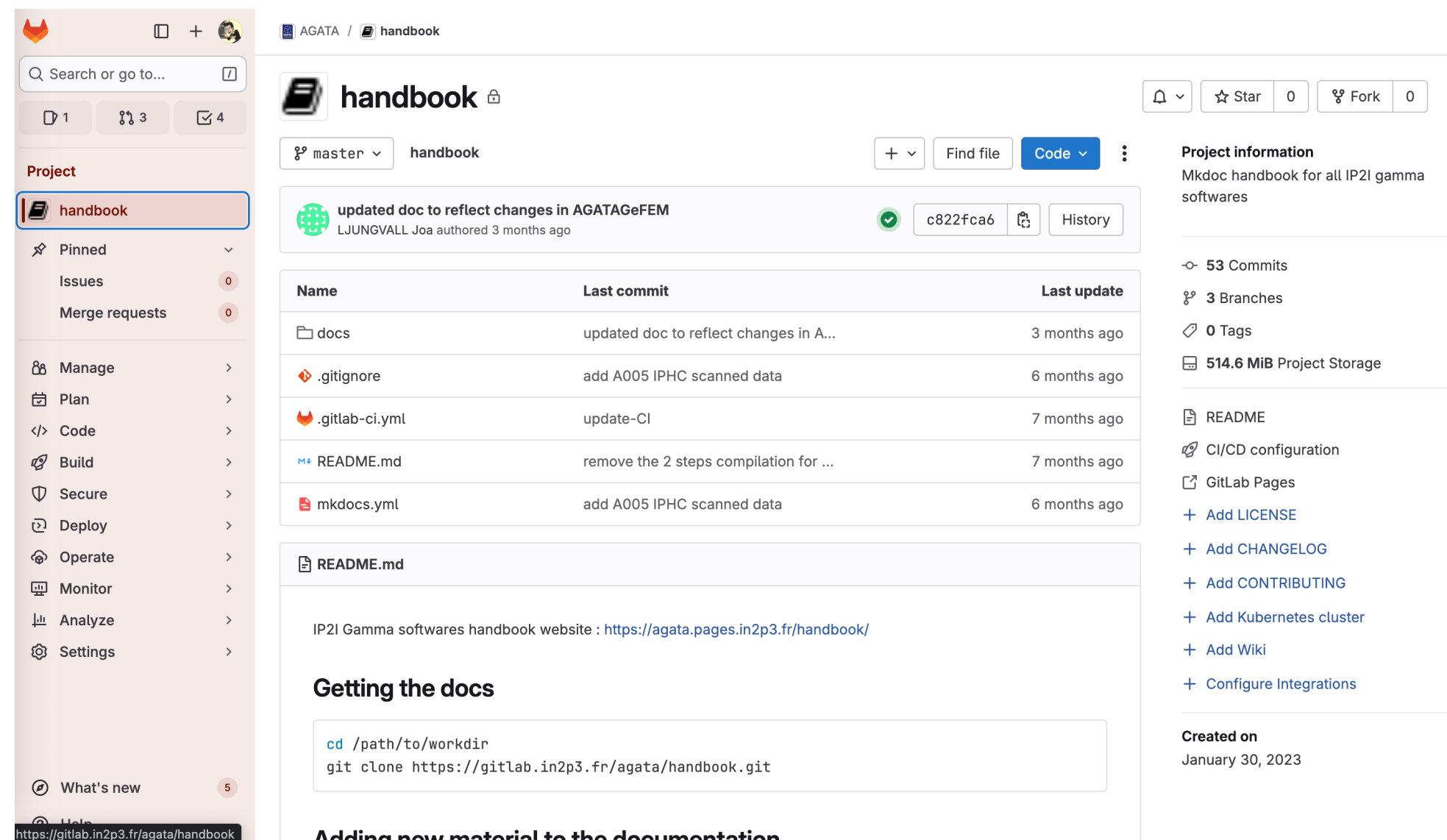
Name	Description	Default value
file_name	The full address of a data:crystal ADF file.	"./ADF2UDPServer_data.adf"
output_file_name	The full address of an output file. All sent data will be copied to this file (including the UDP packet headers). This might slow down the process if active.	"" (disactivated)
destination	IP address of the SQM server.	"localhost"

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- Sending commands to ADF2UDPServer
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- Commands
- Python example

# Documentation needs


- **Updating the documentation is really easy**
  - **markdown** format and automatically generated par **GitLab**
- **Contributors are welcome** to add material (packages, scanned data, documentation...)
- It would be great to have someone from the host lab to maintain the needs in documentation
  - (standard / expert modes)





Documentation

The AGATA forum no more available (and no more used since the LNL campaign)  
It will no more be maintained



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Last visit was: Tue Aug 20, 2024 11:23 am

FORUM	TOPICS	POSTS	LAST POST
 <div><b>WG: Data flow and processing</b> Moderator: WG_DataFlowProcesing_Moderators</div>	34	275	<b>Re: Trouble Accessing GRID to...</b> by <b>dudouet</b> Mon Jan 08, 2024 10:04 am
 <div><b>Simulations</b> Place dedicated to Geant4 simulations for AGATA Moderator: Simulations_Moderators</div>	5	17	<b>Re: /Agata/file/info/enableIn...</b> by Korichi Wed Jun 22, 2022 4:58 pm

**WHO IS ONLINE**

In total there is **1** user online :: 1 registered, 0 hidden and 0 guests (based on users active over the past 5 minutes)  
Most users ever online was **36** on Mon Apr 29, 2024 9:14 am

Registered users: **dudouet**  
Legend: *Administrators*, *Global moderators*

**BIRTHDAYS**

No birthdays today

**STATISTICS**

Total posts **292** • Total topics **38** • Total members **94** • Our newest member **davide.genna**

Board index

The team Members Delete all board cookies All times are UTC+02:00

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Merci !