

FLASH computing infrastructure

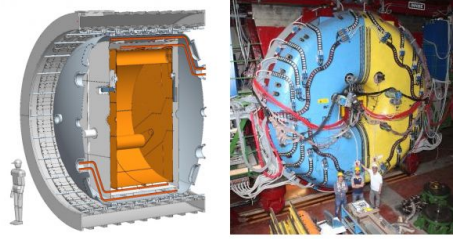
INFN-LNF : Anna Calanca with the INFN-Cloud & ICSC team support

FLASH (Finuda magnet for Axion Search)

Once KLASH (*K*Loe magnet for Axion Search).

Search for galactic axions (mass $\sim 0.2 \mu\text{eV}$) using a large volume resonant cavity at 4 K in a magnetic field of about 0.6 T (superconducting magnet of the KLOE) experiment.

Potential sensitivity on the axion-to-photon coupling ($6\text{e-}17$ GeV)

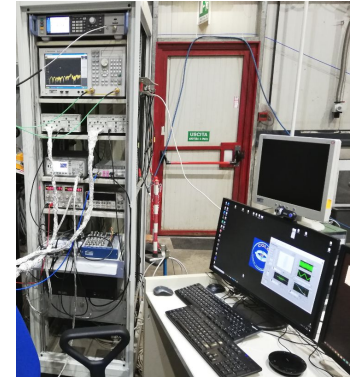


KLOE magnet for Light Axion Search

What is needed:

- data streaming
- data monitoring (offline & online)
- documentation
- data & metadata handling
- data visualization
- HPC usage
- online analysis tools

FINUDA magnet for Light Axion Search



INFN-LNF Data Acquisition

data throughput of about :

File size ~ 34 MByte

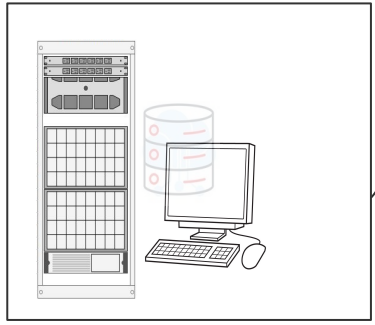
Storage rate ~ 56 GByte /hour

2 months/y of data taking

FLASH computing infrastructure

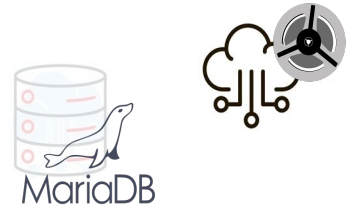
State of the art

DAQ & Storage (LNF)

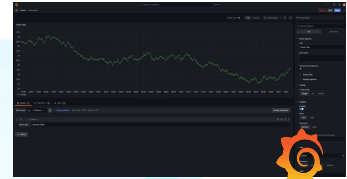


Authentication and authorization

Storage/Backup

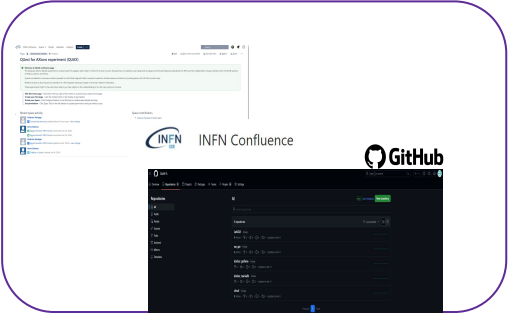


MariaDB



Grafana

Documentation (web)



Batch & nodes managing

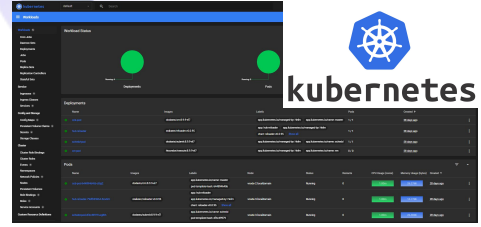
HTCondor



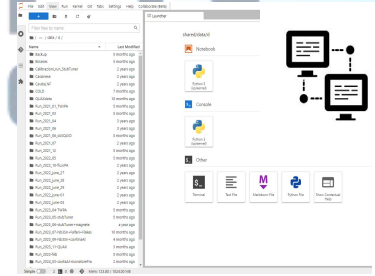
INFN



kubernetes



Metadata & slow control

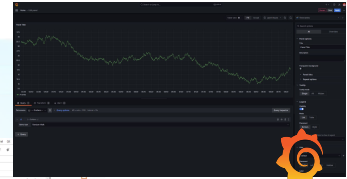
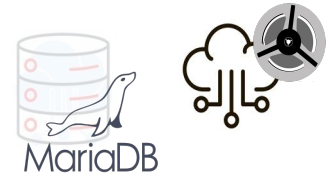
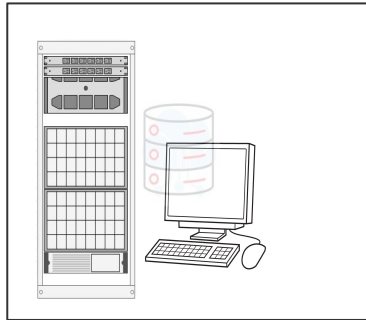


NFS and web interface

FLASH computing infrastructure

Solutions under investigation

DAQ & Storage (LNF)

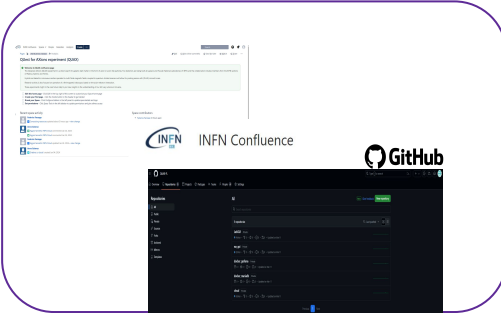


Grafana



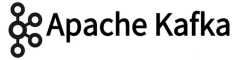
INFN

Documentation (web)

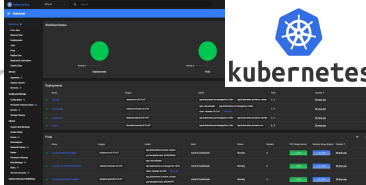


Online monitoring of data and metadata

Log management and data analytics (search and visualization of data)



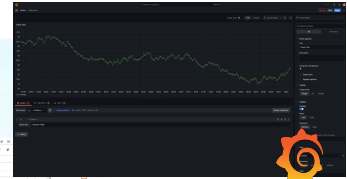
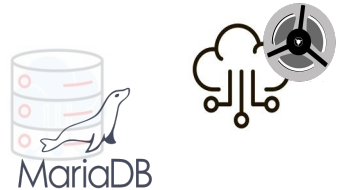
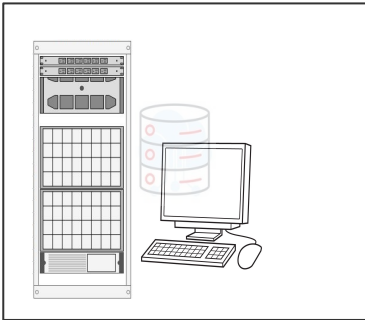
Event streaming platform for alert and warnings



FLASH computing infrastructure

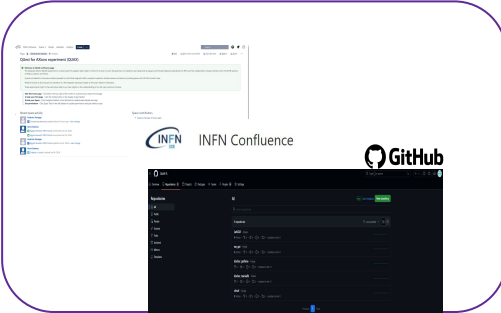
Solutions under investigation

DAQ & Storage (LNF)



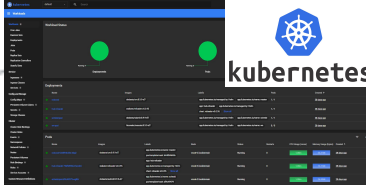
Grafana

Documentation (web)



RUCIO management of large quantities of data across different facilities

Sentinel framework
real-time reconstruction and analysis of data



FLASH computing infrastructure

Computing resources

Actual FLASH Cloud resources

quota:

- volumes: 130TB
- vCore: 50
- RAM: 100GB
- # instances: 12
- security group:100
- fIP:12

where	CPU	Block Storage	Object Storage	Tape
INFN Cloud	50	130 TB (segnato 260 TB per errore, da ridurre)	---	---
Tier 1	---	---	---	120 TB

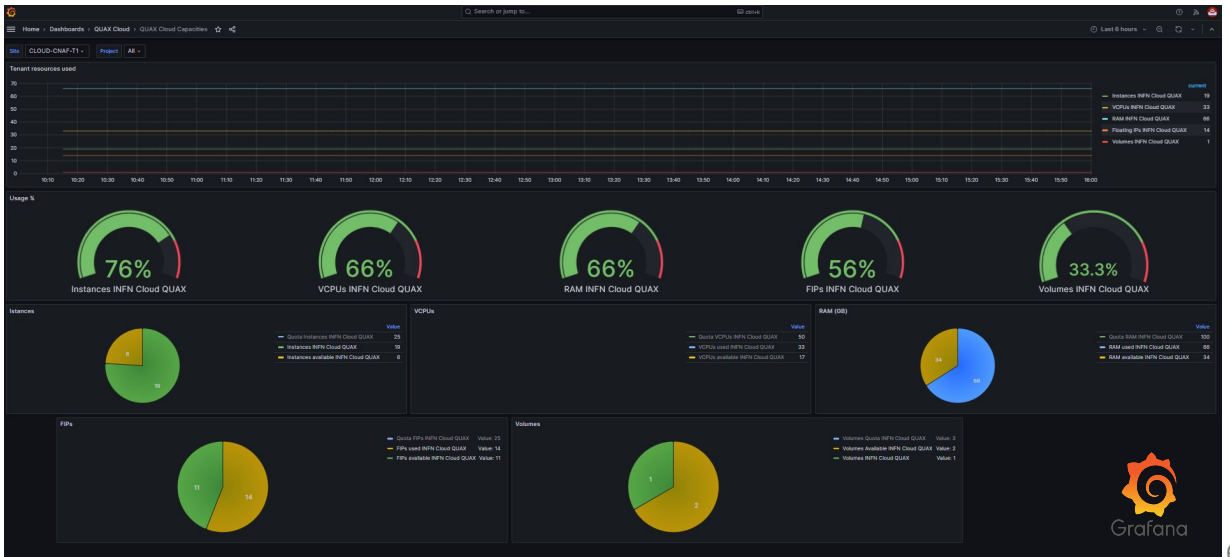
Tier-1 FLASH tape

resources:

- 120TB

CloudVeneto:

- VCPU: 20
- Block storage: 1 TB
- Object storage: 2 TB



FLASH computing infrastructure

Up & running



Identity and Access Management: <https://iam.cloud.infn.it>

The screenshot shows the user profile for Anna Calanca in the IAM system. The profile includes the following details:

- Name:** Anna Calanca
- Email:** Anna.Calanca@inf.infn.it
- Status:** Active
- Created:** a year ago
- Updated:** a week ago
- End time:** N/A
- Signed AUP:** a year ago

Buttons for **Edit Details** and **Change Password** are visible. The **Groups** list includes: admins, admins/catchall, admins/cygn0, admins/quax, end-users-catchall, users, users/catchall, users/cygn0, users/naas, users/quax, and users/s3. The **Group requests** section shows "No request found" and a **Join a group** button. The **Linked accounts** section lists a SAML account with the URL: <https://idp.infn.it/saml2/idp/metadata.php?urn:oid:1.3.6.1.4.1.5923.1.1.1.13&id=6de3762fe6dd645404433d249ac99f35c81f9407g>.

Welcome to **infn-cloud**

Sign in with

Not a member?

[Apply for an account](#)

IT | EN

balanca@e-mail

Password

[ACCEDI](#)

[REGISTRATI](#)

Cambio o Rigenerazione Password - Recupero Username

[CERTIFICATO X509](#)

[KERBEROS - GSSAPI](#)

[Entra con SPID](#)

[Entra con CIE](#)

FLASH computing infrastructure

Up & running

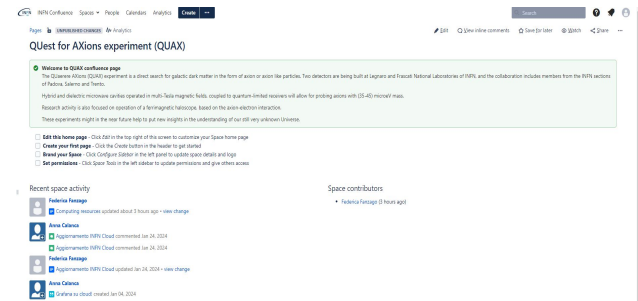
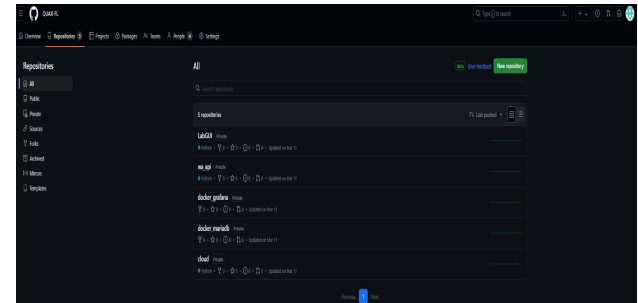


Share and organize algorithms: <https://github.com/QUAX-FL>



INFN Confluence

Organize documentation, meetings: <https://confluence.infn.it>



FLASH computing infrastructure

Up & running



Cloud and tape storage of raw data:

- Virtual machine hosted in INFN-Cloud with attached volume
- TAPE Endpoint -> <davs://xfer-archive.cr.cnaf.infn.it:8443/quax-tape>



Organize data in a SQL-like DataBase -> MariaDB



run	data	site	timestamp	softv	cloud	tape	path cloud storage	path tape storage	runtime	T_cav[mK]	T_MC[mK]	BIT	cavity freq
/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11.txt	LNF	12/07/2023,11:26:09	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib
/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11_19deg.txt	LNF	12/07/2023,11:38:41	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib
/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11_20p2deg.txt	LNF	12/07/2023,11:38:45	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib
/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11_20p8deg.txt	LNF	12/07/2023,11:27:25	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib
/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11_21p2deg.txt	LNF	12/07/2023,11:38:49	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib
/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11_21p7deg.txt	LNF	12/07/2023,11:38:53	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib
/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11_22p3deg.txt	LNF	12/07/2023,11:38:57	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib
/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11_22p7deg.txt	LNF	12/07/2023,11:39:01	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib
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/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11_25p4deg.txt	LNF	12/07/2023,11:26:17	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib
/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11_25p7deg.txt	LNF	12/07/2023,11:27:29	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib
/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11_25p9deg.txt	LNF	12/07/2023,11:39:29	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib
/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11_26p2deg.txt	LNF	12/07/2023,11:39:33	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib
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/mnt/d/Run_2023.11-QUAX/Calibrazione...	S11_27p1deg.txt	LNF	12/07/2023,11:26:45	v0	1	1	/mnt/quaxraw/Frascati	davs://xfer-archiv...	calib

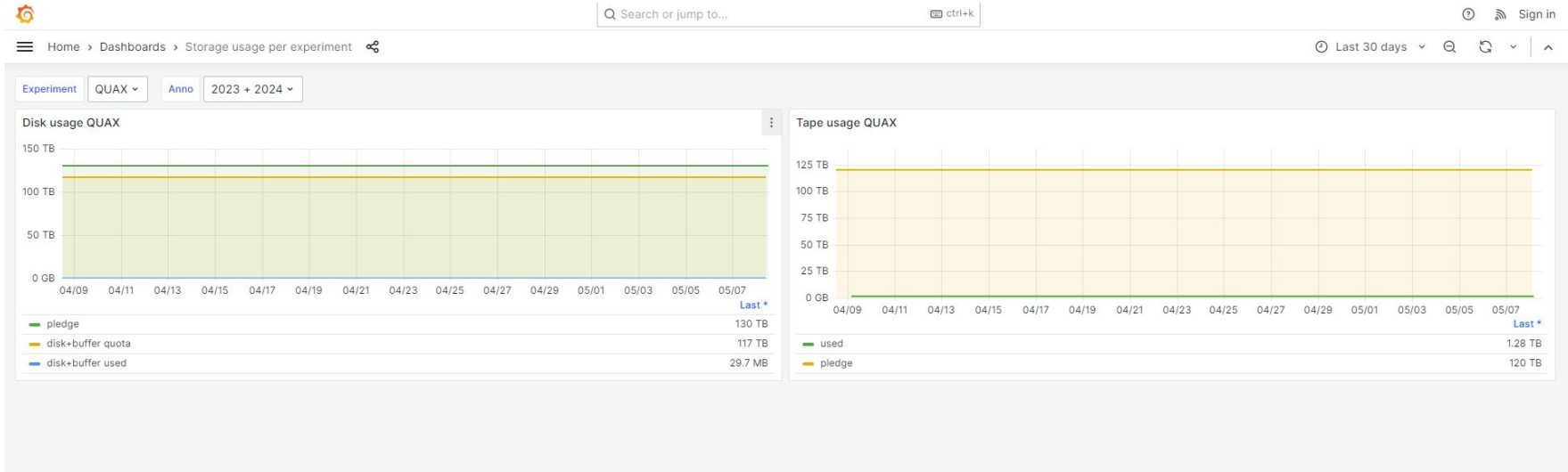
FLASH computing infrastructure

Up & running



Monitoring of Cloud resources via Grafana: storage

<https://t1metria.cr.cnaf.infn.it/d/ZARHZvEMz/storage-usage-per-experiment?orgId=18&var-vo=QUAX&var-exp=qua&var-Anno=2024>



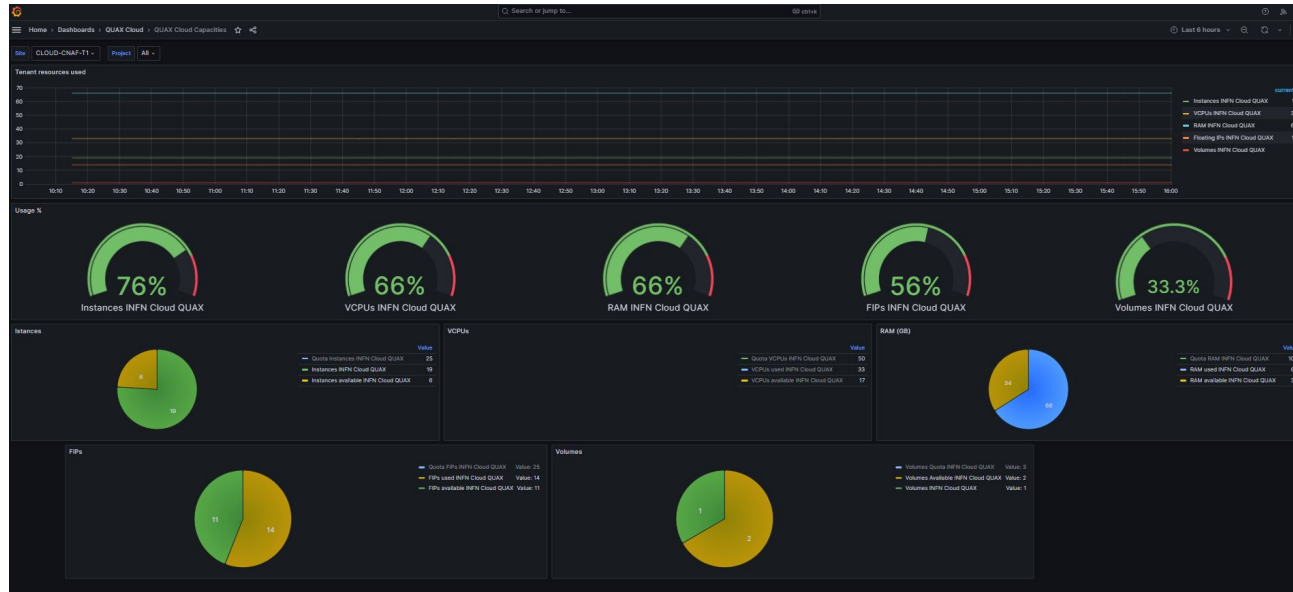
FLASH computing infrastructure

Up & running



Monitoring of Cloud resources via Grafana: Cloud capacities

<https://monitoring.cloud.infn.it:3000/d/u1sBcydVvkq/quax-cloud-capacities?orgId=1>



FLASH computing infrastructure

Up & running



Sharing data via Network File System (NFS) among different virtual machines for online data analysis.



Jupyter notebook online-service: <https://131.154.98.180.myip.cloud.infn.it:8888>



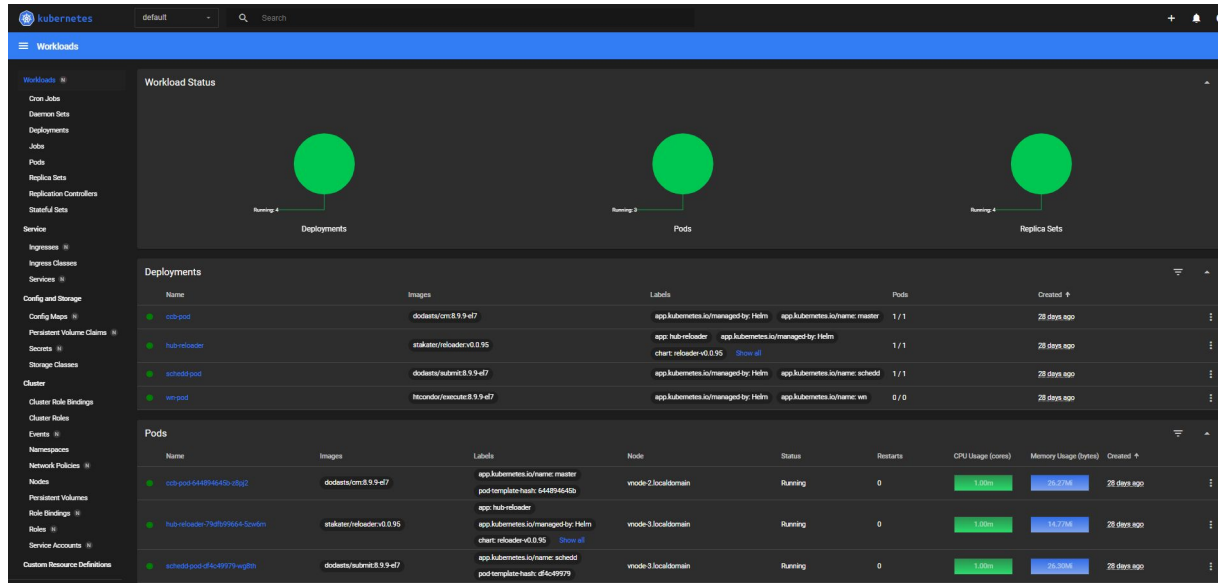
A screenshot of a Jupyter Notebook interface. The left sidebar shows a file browser with a search bar and a list of files and folders, including 'Backup', 'Binaries', 'Calibrations_run_StubTuner', 'Cassinese', 'CavitaLNF', 'COLD', 'QUAXdata', and various 'Run' files. The main area is titled 'Launcher' and shows a file browser for 'shared/data/d'. It contains a 'Notebook' section with a 'Python 3 (ipykernel)' icon, a 'Console' section with a 'Python 3 (ipykernel)' icon, and an 'Other' section with icons for 'Terminal', 'Text File', 'Markdown File', 'Python File', and 'Show Contextual Help'. The top of the interface shows a menu bar with 'File', 'Edit', 'View', 'Run', 'Kernel', 'Git', 'Tabs', 'Settings', 'Help', and 'Collaborate (Beta)'. The bottom status bar shows 'Simple', '2', '0', '0', and 'Mem: 123.80 / 1024.00 MB'.

FLASH computing infrastructure

Up & running



- HTCondor queues service for the reconstruction of raw data
- Kubernetes service for monitoring of Workload Status



Thank you