

HELIPORT Ecosystem and Use Cases @ HI-Jena

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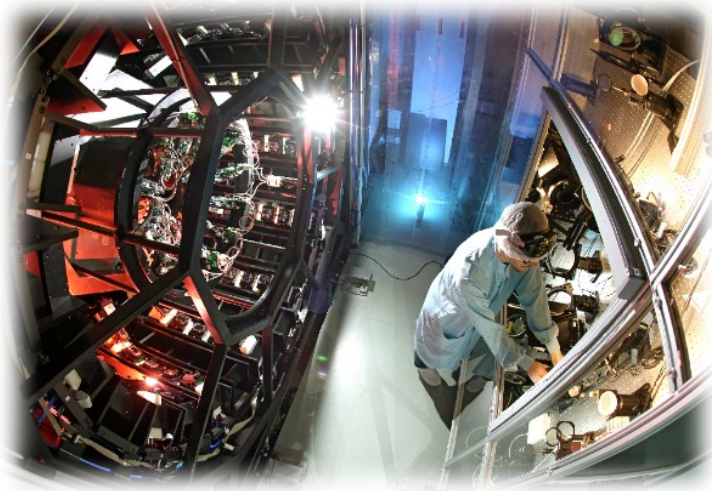
I. Polaris Laser @ Hi Jena

II. HELIPORT + SciCat + UI Plug-in

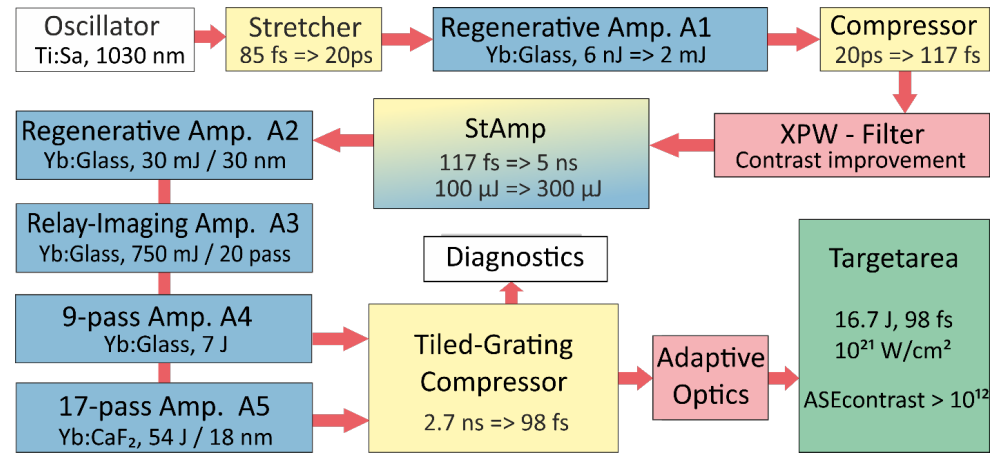
III. User Manual

POLARIS-Petawatt Optical Laser Amplifier for Radiation Intensive Experiments

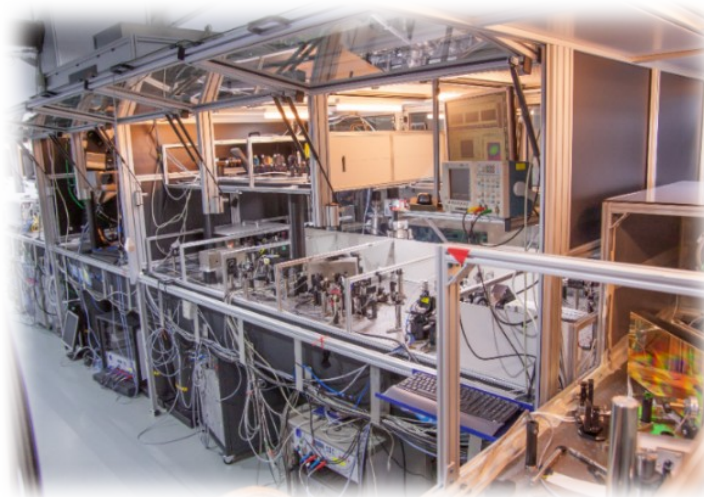
- Worldwide unique fully-diode pumped, PW-class laser facility
- Experimental program for high-energy particle acceleration
- Test-bed for development and implementation of novel laser technologies and improvements



System overview



- Pulse energy: $E_L > 54 \text{ J}$ (17 J on target)
- Pulse duration: $t_L \sim 100 \text{ fs}$
- Peak intensity: $I_L > 10^{21} \text{ W/cm}^2$
- Repetition rate: 1/50 Hz, toward 1 Hz using cryogenic cooling
- Temporal intensity contrast: ASE-level $< 2.2 \times 10^{-13}$
- Plasma-mirror option
- SHG-option for ultrahigh contrast



Current developments & fields of research:

- Improvement of beam profile with adaptive optics system in final amplifier
- Reduction of coherent noise to improve the rising edge temporal contrast
- Installation of a 10-fs NOPCPA target probing system

Coming soon:

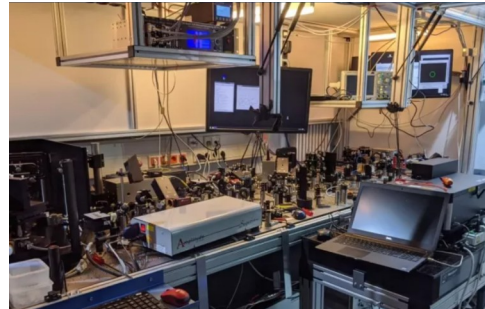
- Combine Two Laser Systems in Target Area: JETi200 & POLARIS

Software Challenges:

- LabView => Find a Control System (Tango or EPICS)
- Make Data FAIRer => HELIPORT (2022)
- Storage (Repository in PCs) => SciCat with MongoDB

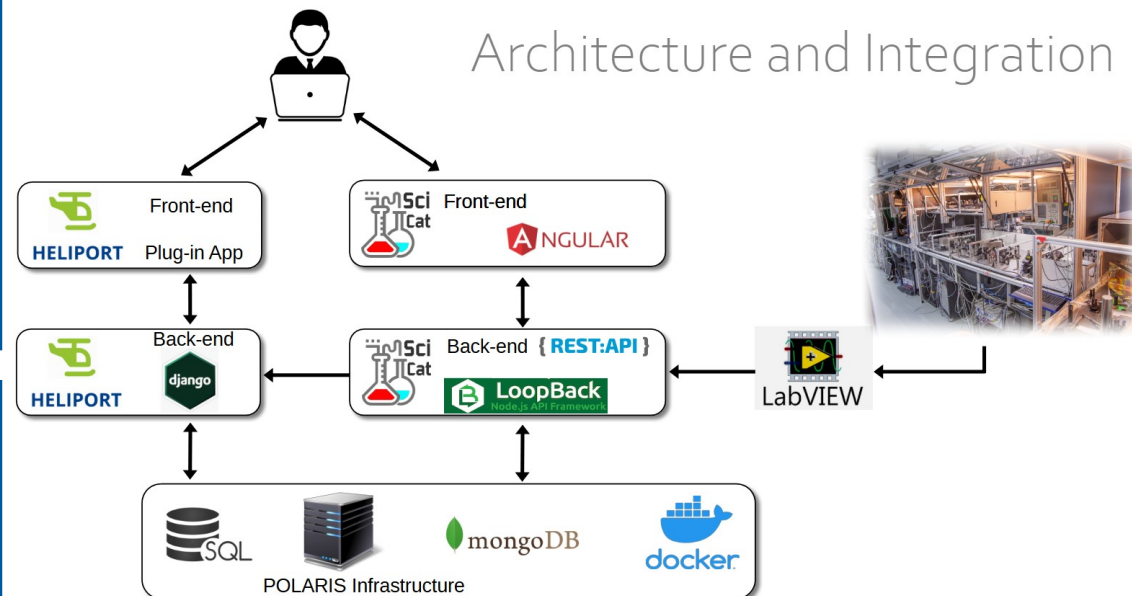
New Installations:

- HELIPORT v.0.5 was installed on Polaris server on 15.5.2023
- SciCat was installed on 09.01.2023



Why SciCat?



- MongoDB(non-relational DB): flexible document schemas
- Open source, BSD-3 clause license
- Python client library (pyscat): used by LabView and HELIPORT



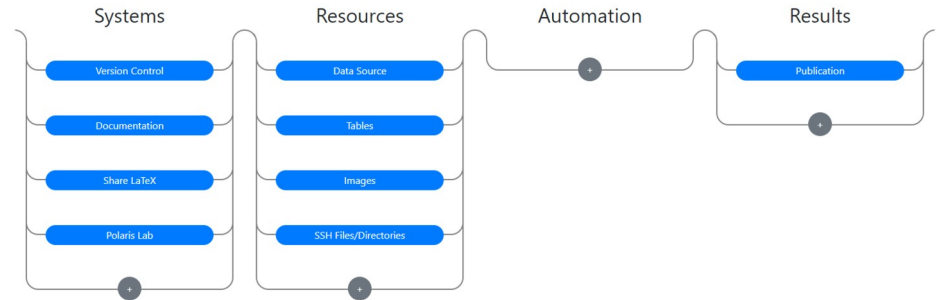
Connect to SSH Files/Directories

Connect Data in HELIPORT


- Create a log-in in your HELIPORT
- add a data source in “SSH Files/Directories”
- SSH Files/Directories
- Download the file
- Run codes by celery job (in the future)

HELIPORT   About Docs jachin

test Tags Project Timeline Object Graph Project



SSH Files and Directories

ID	Name	Login	Path	
2	 my_data	My_Server	/home/jachin/Desktop/ssh_test	Open Edit Delete

Add a Data Source

Name

Path

Login

Description

Add

Provided Logins

ID	Type	Name	
1	ssh connection	my polaris server ssh	Disconnect Edit Remove
2	ssh connection	adf	Connect Edit Remove

Add a Login

Login Type

Add

My_Project > SSH Files/Directories > my_data Tags Project Timeline Object Graph Project

Select All Files Directories Select Pattern

my_data

☐  SciCat_WebPage.PNG 67 KiB 2023-05-16 09:35:42 Add Tag

☐  test1.txt 17 Bytes 2023-05-15 12:48:20 Add Tag

Connect to Datasets in SciCat

- Meta-data Catalog System provides a Mano database, a UI with a powerful searching capability , REST APIs and more.
- LabView program will collect data/metadata and call Pyscicat (Python library) to write them into SciCat's database via REST APIs.
- Every shot will be provided with a persistent ID and unique URL.
- This URL can be manually stored within the HELIPORT Project

The HELIPORT interface displays a table of data sources with columns for ID, Protocol, Name, and Description. Each entry includes an 'Add Tag' button and action buttons for 'Open', 'Edit', and 'Remove'.

ID	Protocol	Name	Description	
2	http	one shot	one shot from SciCat	<button>Add Tag</button> <button>Open</button> <button>Edit</button> <button>Remove</button>
4	http	two shots		<button>Add Tag</button> <button>Open</button> <button>Edit</button> <button>Remove</button>
5	http	Three shots	Key Word: Test	<button>Add Tag</button> <button>Open</button> <button>Edit</button> <button>Remove</button>
6	http	Shots in Feb.		<button>Add Tag</button> <button>Open</button> <button>Edit</button> <button>Remove</button>

Below the table, there is a section 'Add a Data Source' with a 'Protocol' dropdown menu and an 'Add' button.

The top screenshot shows the SciCat 'Datasets' page with a search bar and a table of datasets. The table columns include Name, Type, Start Time, Proposal ID, Image, and Source Folder.

Name	Type	Start Time	Proposal ID	Image	Source Folder
Ingestor05	raw	2023-01-31 Tue 11:12	LV-test_5		../sklad
string	raw	2023-01-30 Mon 12:40			...string
string	raw	2023-01-30 Mon 12:40			...string
SRDS	raw	2023-01-26 Thu 12:48	string		...string
FRDS	raw	2023-01-26 Thu 12:48	string		...string
FRDS	raw	2023-01-26 Thu 12:48	string		...string
A1 Pointing at 2023-01-23	Hz	2023-01-25 Wed 13:17			...string

The bottom screenshot shows the detailed view of a dataset with a URL: `PID.SAMPLE.PREFIX%2F27743c19-3949-4c61-be6e-19351b505509`. It includes sections for General Information, Creator Information, File Information, and Scientific Metadata.

General Information:

- Name: Shot_1234567
- Description: Test of Polaris Data Scheme
- PID: PID.SAMPLE.PREFIX%2F27743c19-3949-4c61-be6e-19351b505509
- Type: raw
- Creation Time: 2023-02-23 14:21
- Keywords: Data Scheme, POLARIS, 122, Add Keyword

Creator Information:

- Owner: a.jewell@ipscat
- Principal Investigator: a.jewell@ipscat
- Contact Email: a.jewell@ipscat
- Owner Group: ingster
- Access Groups: ingster

File Information:

- Source Folder: /home/jack/working/Polaris
- Data Format: mixed

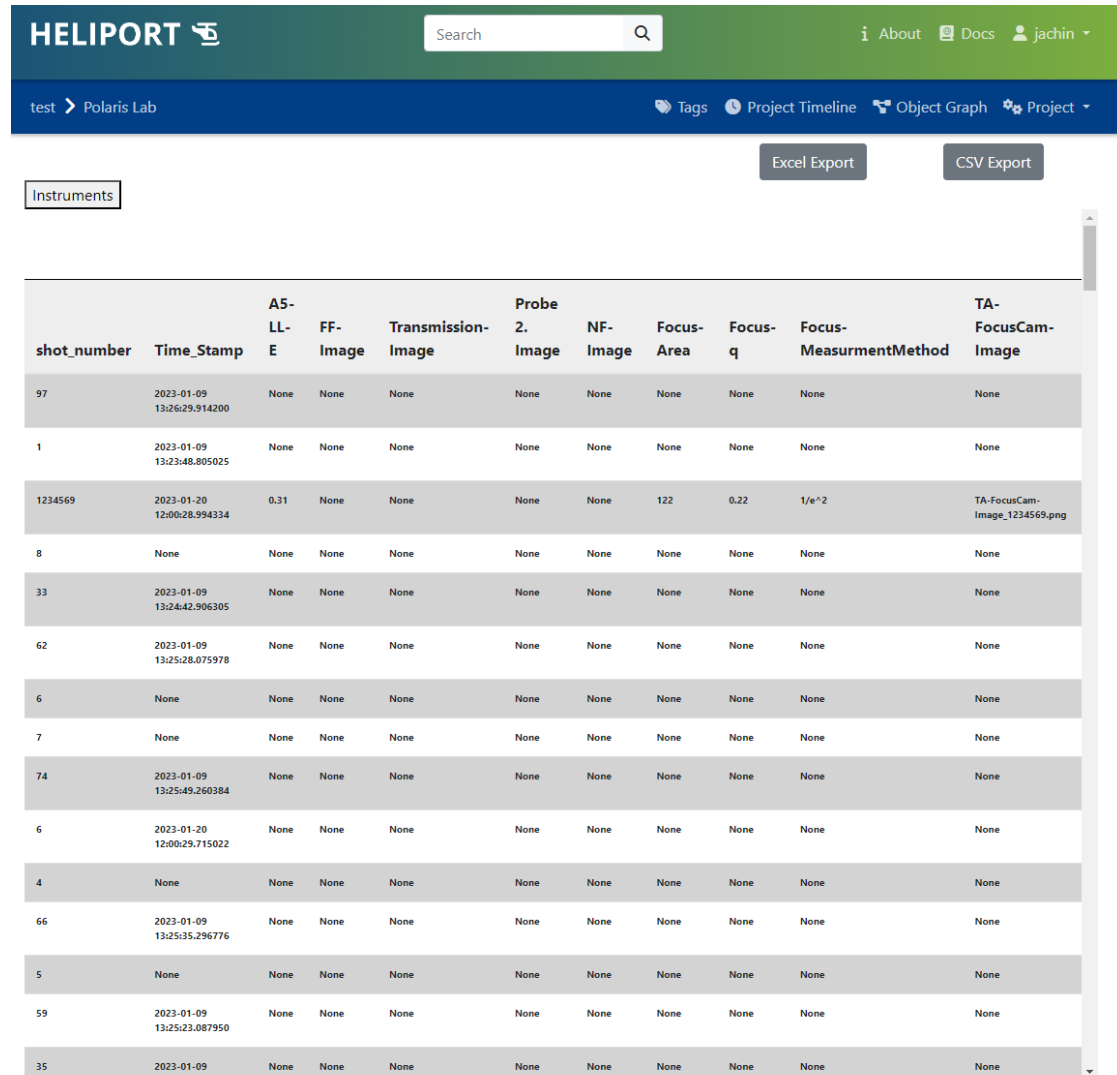
Related Documents:

- Proposal: POLARIS Shot Example
- Sample: Set of Shots to find Data Scheme for POLARIS Shots
- Creation Location: POLARIS

Scientific Metadata:

shot_number	1234567
Focus-Area	122 (µm*2)
Focus-q	0.22
Focus-MeasurementMethod	1W*2
1A-FocusCam-Image	1A-FocusCam-Image_1234572.png
MCP-E_max	0.7409 (J)
Ramion-Dose	4.06 (µs)
target-x_pos	93.0987 (mm)
target-y_pos	44.94882 (mm)
target-z_pos	81.61076 (mm)
A5-L1-E	0.31 (J)
PM-x_pos	-2.8e+0 (cm)
PM-y_pos	4.1 (cm)
PM-z_pos	3.5 (cm)
Time_Stamp	2023-01-20 12:00:28.994334

- We developed an plug-in UI for our POLARIS users.
- Access under “System”.
- Fetch data from SciCat and display it in a table.
- Functions: export in Excel and CSV file, hide/show columns.



The screenshot shows the HELIPORT web interface. At the top, there is a green header with the HELIPORT logo, a search bar, and navigation links (About, Docs, jachin). Below the header, a blue bar shows the current context (test > Polaris Lab) and navigation options (Tags, Project Timeline, Object Graph, Project). On the right, there are buttons for 'Excel Export' and 'CSV Export'. A tab labeled 'Instruments' is active. The main content area displays a table with 11 columns: shot_number, Time_Stamp, A5-LL-E, FF-Image, Transmission-Image, Probe 2. Image, NF-Image, Focus-Area, Focus-q, Focus-MeasurmentMethod, and TA-FocusCam-Image. The table contains 16 rows of data, with most cells containing 'None' or specific timestamps and values.

shot_number	Time_Stamp	A5-LL-E	FF-Image	Transmission-Image	Probe 2. Image	NF-Image	Focus-Area	Focus-q	Focus-MeasurmentMethod	TA-FocusCam-Image
97	2023-01-09 13:26:29.914200	None	None	None	None	None	None	None	None	None
1	2023-01-09 13:23:48.805025	None	None	None	None	None	None	None	None	None
1234569	2023-01-20 12:00:28.994334	0.31	None	None	None	None	122	0.22	1/e^2	TA-FocusCam-Image_1234569.png
8	None	None	None	None	None	None	None	None	None	None
33	2023-01-09 13:24:42.906305	None	None	None	None	None	None	None	None	None
62	2023-01-09 13:25:28.075978	None	None	None	None	None	None	None	None	None
6	None	None	None	None	None	None	None	None	None	None
7	None	None	None	None	None	None	None	None	None	None
74	2023-01-09 13:25:49.260384	None	None	None	None	None	None	None	None	None
6	2023-01-20 12:00:29.715022	None	None	None	None	None	None	None	None	None
4	None	None	None	None	None	None	None	None	None	None
66	2023-01-09 13:25:35.296776	None	None	None	None	None	None	None	None	None
5	None	None	None	None	None	None	None	None	None	None
59	2023-01-09 13:25:23.087950	None	None	None	None	None	None	None	None	None
35	2023-01-09 13:25:23.087950	None	None	None	None	None	None	None	None	None

- We are currently writing the User Manual or Instruction for Polaris users.
- Step by step guidance for new users.

Official HELIPORT Documentation: [Link](#)

From above link, you can visit the official HELIPORT documentation and find guides for HELIPORT users! As this documentation will be completed in the future, for the time being, I would make a simple user guide for HELIPORT that is installed in Polaris Lab.

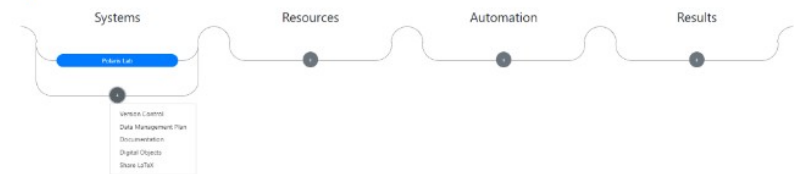
► How to get started?

▼ User Interface (Project Graph)



In the page of Project Graph, there are "Systems", "Resources", "Automation" and "Results".

▼ Systems



▼ Polaris Lab

1. In the systems, there is a plug-in app called "Polaris Lab". This is only relevant to the experiments performed in [polaris lab](#).



Benefits:

- Users can retrieve their experimental data even after many years
- Users can view their data in “table-like” displays
- With the help of HELIPORT and SciCat, the data are now one step further towards FAIR

Work in future:

- Complete user manual
- Optimize plug-in app
- Automatic analysis and display results
- Integration of HELIPORT to new CS
- Make datasets AI-ready

**THANK YOU
FOR YOUR
ATTENTION!**



Architecture and Integration

