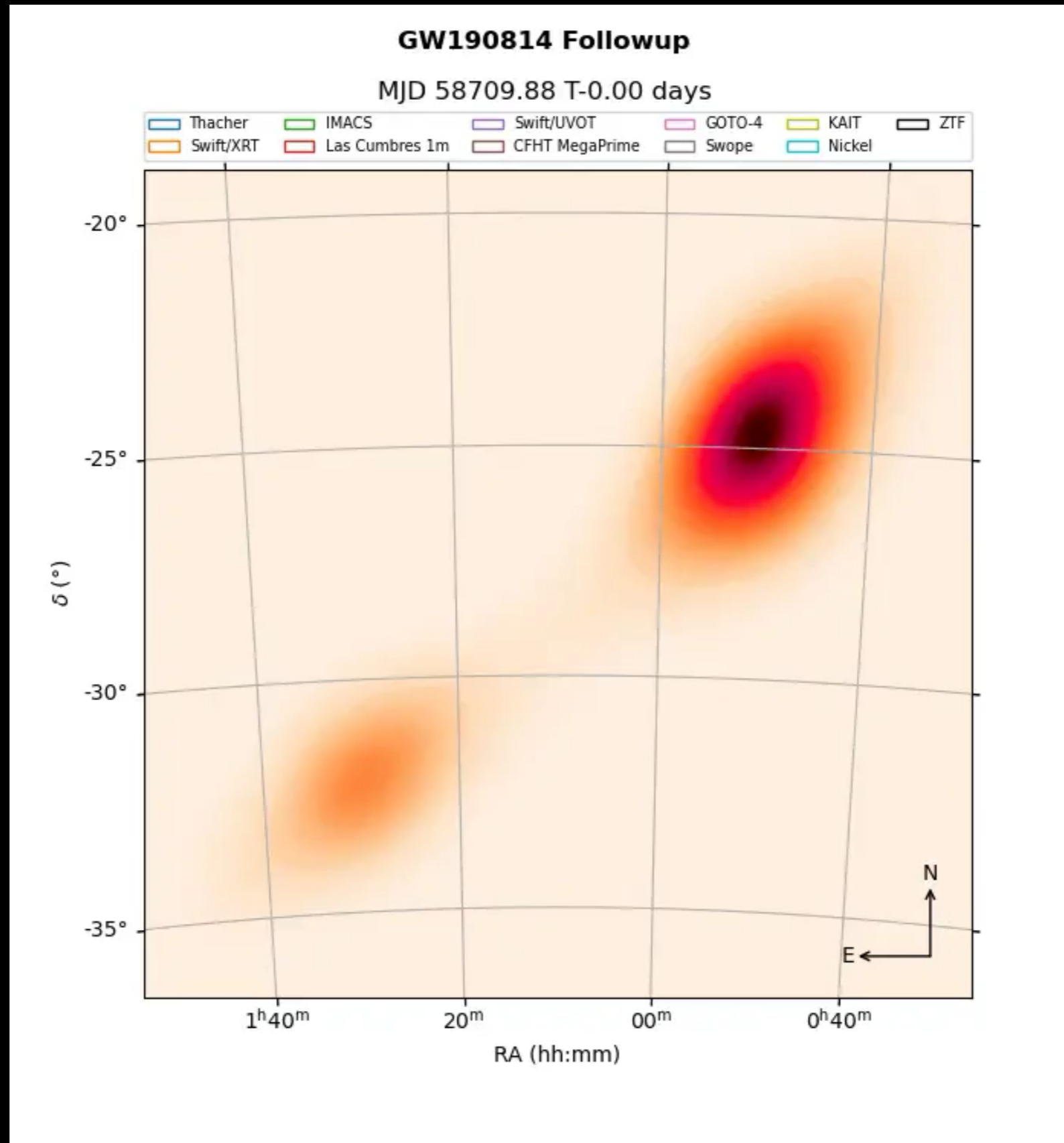


# The Multi-Messenger Astronomy Followup Ecosystem

**Curtis McCully**


**LCO**   
Las Cumbres Observatory

# We Need Coordination!



# First, we need to know if a multi-messenger event occurred.

An official website of the United States government [Here's how you know](#)

 **General Coordinates Network**

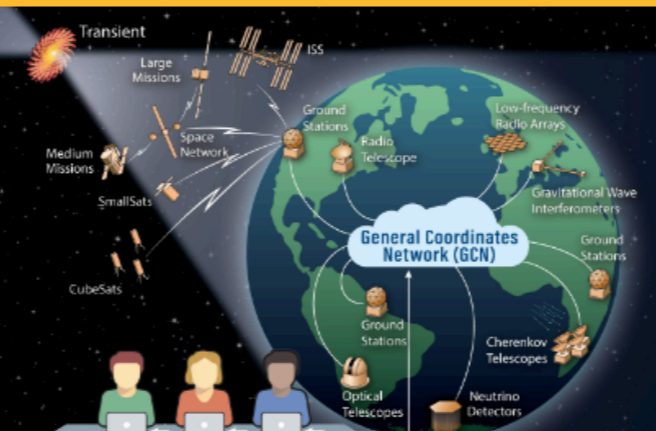
Missions Notices Circulars Documentation Sign in / Sign up

New Announcement Feature, Code of Conduct, Circular Revisions. See [news and announcements](#)

## GCN: NASA's Time-Domain and Multimessenger Alert System















GCN distributes alerts between space- and ground-based observatories, physics experiments, and thousands of astronomers around the world.

[Start streaming GCN Notices](#) [Post a GCN Circular](#)



The General Coordinates Network (GCN) is a public collaboration platform run by NASA for the astronomy research community to share alerts and rapid communications about high-energy, multimessenger, and transient phenomena. For more information, see [What is GCN?](#) or check out our [slide deck](#).

There are three ways to stream GCN Notices in real time:

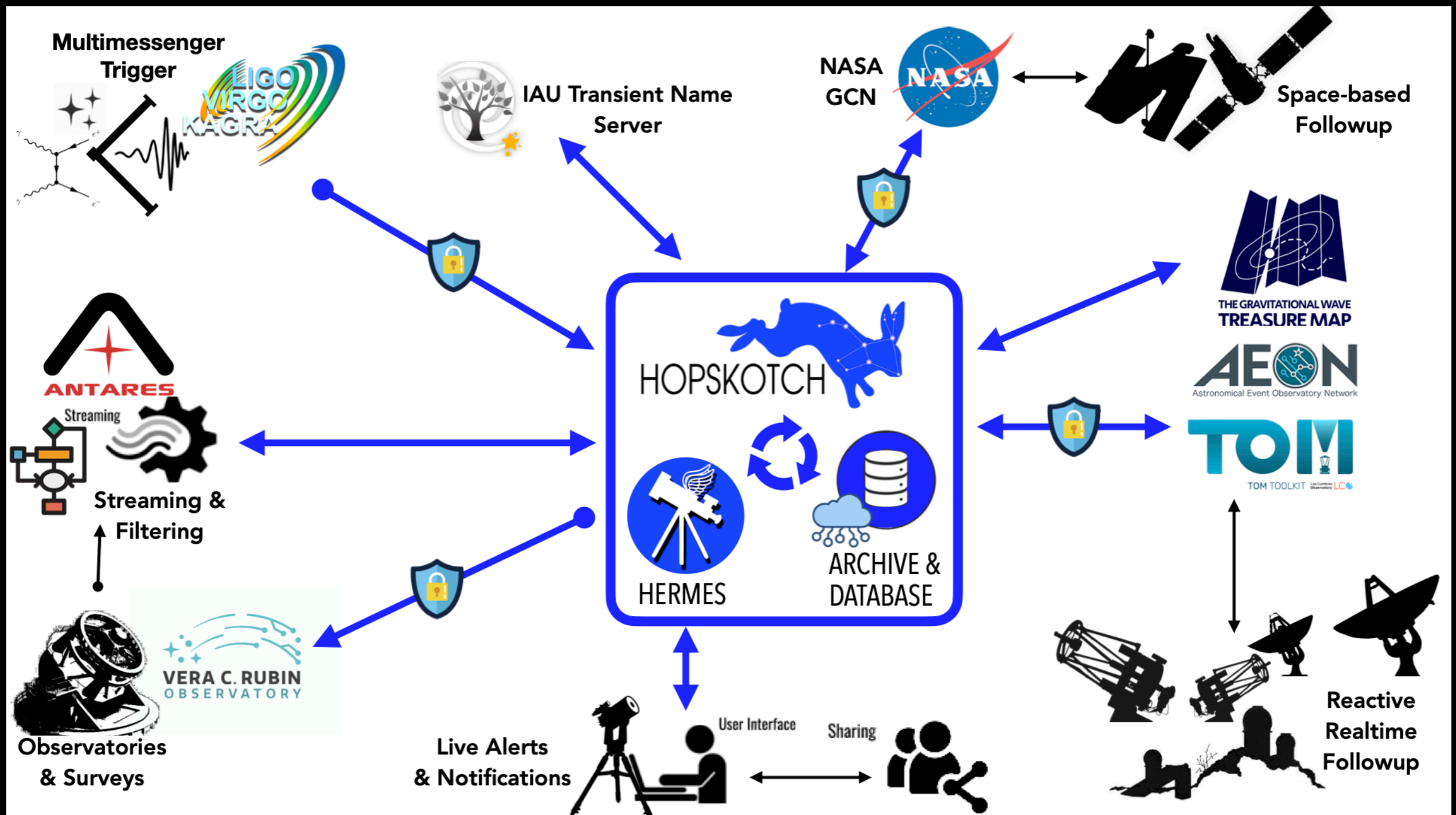
For legacy applications <b>GCN Classic</b>	Recommended <b>GCN Classic over Kafka</b>	Coming soon <b>GCN Kafka</b>
 VOEvent → VOEvent Transport Protocol →   Text → Email →   Binary → 160-Byte Binary Protocol → 	 VOEvent → Kafka →   Text → Kafka →   Binary → Kafka → 	 JSON → Kafka → 
Three formats, three protocols. <a href="#">Get Started (Old Web Site)</a>	Three formats, one protocol. <a href="#">Get Started</a>	One format, one protocol.

**First we need to know that a new transient has been detected.**



- Messaging system built by SCIMMA (Scalable Cyberinfrastructure for Multimessenger Astrophysics) funded by the NSF - see [scimma.org](http://scimma.org)
- Pub-sub model - only subscribe to the information you want.
- Will carry existing existing astronomical messages, e.g. GCN Circulars and Notices, Transient Name Server messages, Astronomer's Telegrams.
- Goal is to increase machine readable information.

# Our goal is for HOPSKOTCH to be the messaging backbone for the MMA ecosystem



# Then we need an interface to make follow-up decisions via human and/or AI

## Non-Localized Event Index

Detail Page	GraceDB	Treasure Map	Event Type
1. <a href="#">S190425z Details</a>	<a href="#">S190425z</a>	<a href="#">S190425z</a>	GW
2. <a href="#">S190426c Details</a>	<a href="#">S190426c</a>	<a href="#">S190426c</a>	GW
3. <a href="#">S190718y Details</a>	<a href="#">S190718y</a>	<a href="#">S190718y</a>	GW
4. <a href="#">S200112r Details</a>	<a href="#">S200112r</a>	<a href="#">S200112r</a>	GW
5. <a href="#">S200316bj Details</a>	<a href="#">S200316bj</a>	<a href="#">S200316bj</a>	GW
6. <a href="#">S191110af Details</a>	<a href="#">S191110af</a>	<a href="#">S191110af</a>	GW
7. <a href="#">S191216ap Details</a>	<a href="#">S191216ap</a>	<a href="#">S191216ap</a>	GW

# Astro-COLIBRI

Astro-COLIBRI interface showing a timeline of astronomical events from 2024-08-30 to 2024-09-14. The interface includes a top navigation bar with a logo, share, download, and chat icons, and a status bar indicating the user is logged out and the version is v2.17.1.

The main content area features a filter bar for observatories (Swift, SVOM, Fermi, HAWC, IceCube, AMON, Integral, GECAM, FlaapLUC, LVC, Catalogs, Other) and event types (FRB, Unclassified OT, Classified OT, SN, GRB, burst, neutrino, nuem, GW, 4FGL, TeVCAT, SGR/AXP, IceCat). A timeline shows event markers for each day, with a detailed view for GRB 240914B on 2024-09-14.

**GRB 240914B**  
Gamma-ray burst  
RA/Dec: 293.61°/29.34° ( $\pm 1.03^\circ$ )  
2024-09-14 07:09:47

**GRB 240914A**  
Gamma-ray burst  
RA/Dec: 54.28°/-35.03° ( $\pm 0.17^\circ$ )  
2024-09-14 01:40:03

**GRB 240913B**  
Gamma-ray burst  
RA/Dec: 89.31°/-14.28° ( $\pm 12.03^\circ$ )  
2024-09-13 20:03:39

**PKS0405-385**  
GeV flare  
RA/Dec: 61.76°/-38.44° ( $\pm 0.02^\circ$ )  
2024-09-13 19:38:19

**AT 2024vjp**

**Custom cone search**  
source: GRB 240914B  
RA / Dec: 293.61° 29.34°  
error:  $\pm 1.03^\circ$

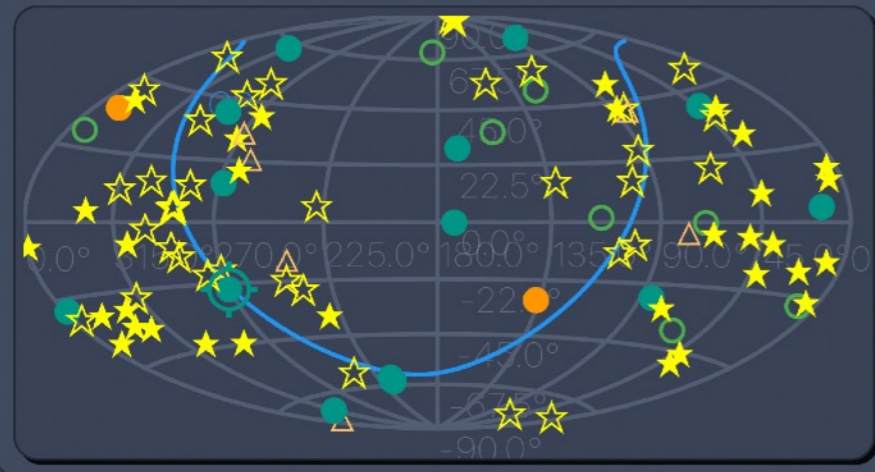
**Detailed info about selected source:**  
name: GRB 240914B  
detection time: 2024-09-14 07:09:47  
localisation:  
RA [deg] : 293.61 Dec [deg] : 29.34  
RA : 19h34m26.4s Dec : 29d20m24s

On September 14, 2024, the Fermi Gamma-ray Burst Monitor (GBM) detected a gamma-ray burst (GRB), designated as GRB 240914B, in the constellation of Cygnus. The event was recorded at 07:09:47.31 UTC, with the source located at coordinates RA 293.61° and Dec 29.34°, with an uncertainty of  $\pm 1.03^\circ$ . This GRB was notable with a high significance of 69.6 and had a sun distance of 116.65 degrees, making it a prominent event in the sky.

Gamma-ray bursts are among the most energetic events in the universe, often associated with massive stellar explosions or the merging of neutron stars. The Fermi observatory's detection of GRB 240914B contributes valuable data to multi-messenger astronomy, allowing for the study of such cosmic phenomena through various signals, including gamma rays. This event underscores the importance of real-time alerts in coordinating follow-up observations across different observatories, enhancing our understanding of these powerful cosmic events.

**External information:**  
ESASky: Displays event in an interactive sky atlas  
TNS: Transient Name Server  
Fink: Broker providing real-time transient  
ASAS-SN: Photometric lightcurves from ASAS-SN  
AAVSO: Lightcurve collected by amateur  
Spe dist (SE)


Thank you to our hosts!





 **GRB 240905A**  
RA/Dec: 270.47° / -24.71°  
error: 6.12°  
2024-09-05 01:16:17 [cone search](#)

 **AT 2024vfl**  
RA/Dec: 5.08° / -73.87°  
2024-09-11 09:06:41 [cone search](#)

 **GRB 240910B**  
RA/Dec: 171.34° / 29.24°  
error: 7.48°  
2024-09-10 11:42:30 [cone search](#)

 **S240910ci**  
RA/Dec: 241.35° / -14.71°  
2024-09-10 10:35:35 [cone search](#)

 **GRB 240910A**  
RA/Dec: 15.05° / 4.50°  
error: 4.50°  
2024-09-10 04:00:44 [cone search](#)

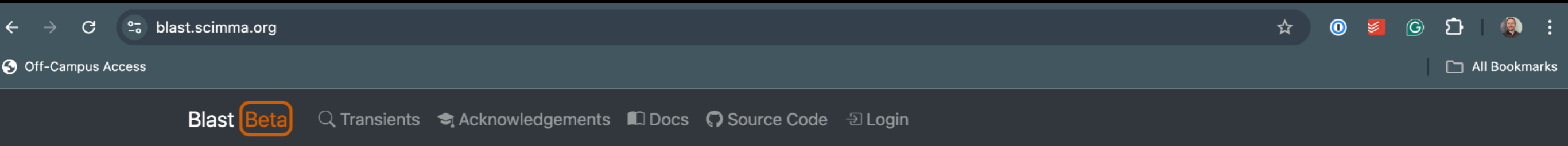
 **PKS0035-252**  
RA/Dec: 9.56° / -24.99°  
error: 0.02°  
2024-09-09 19:15:58 [cone search](#)

It behooves us to take advantage of modern technology.





# We may want to prioritize our targets using external services.



*A web service for the automatic, real-time characterization of transient host galaxies*

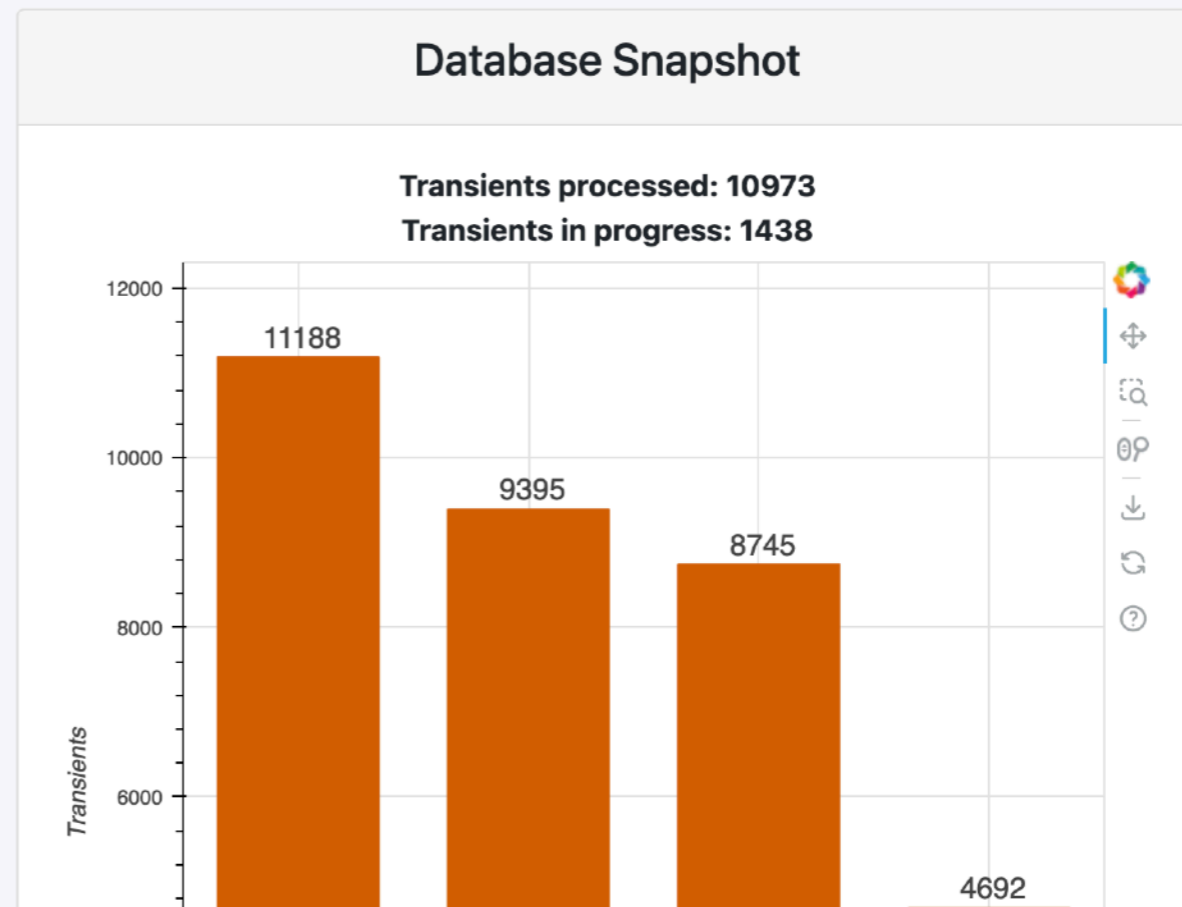
Search the Blast database 🔍

Read the docs 📖

The host galaxies of astrophysical transients play a key role in our understanding of their progenitor systems and the use of Type Ia supernovae as standardizable candles for cosmology. However, fully characterizing host galaxy environments requires a high-statistics, unbiased, multi-wavelength dataset, preferably with 1-2 kpc resolution. Current analyses are limited by sample sizes of anywhere from ~10-200 SNe, predominantly optical host observations, and observational biases such as selecting from surveys that search for SNe within a pre-selected a set of galaxies.

Blast is a public web application built to provide information in real-time for every new transient reported to the [International Astronomical Union \(IAU\)](#):

- determine the transient's host galaxy,
- identify the available archival data,
- measure the resulting host galaxy star formation rates, masses, and stellar ages.

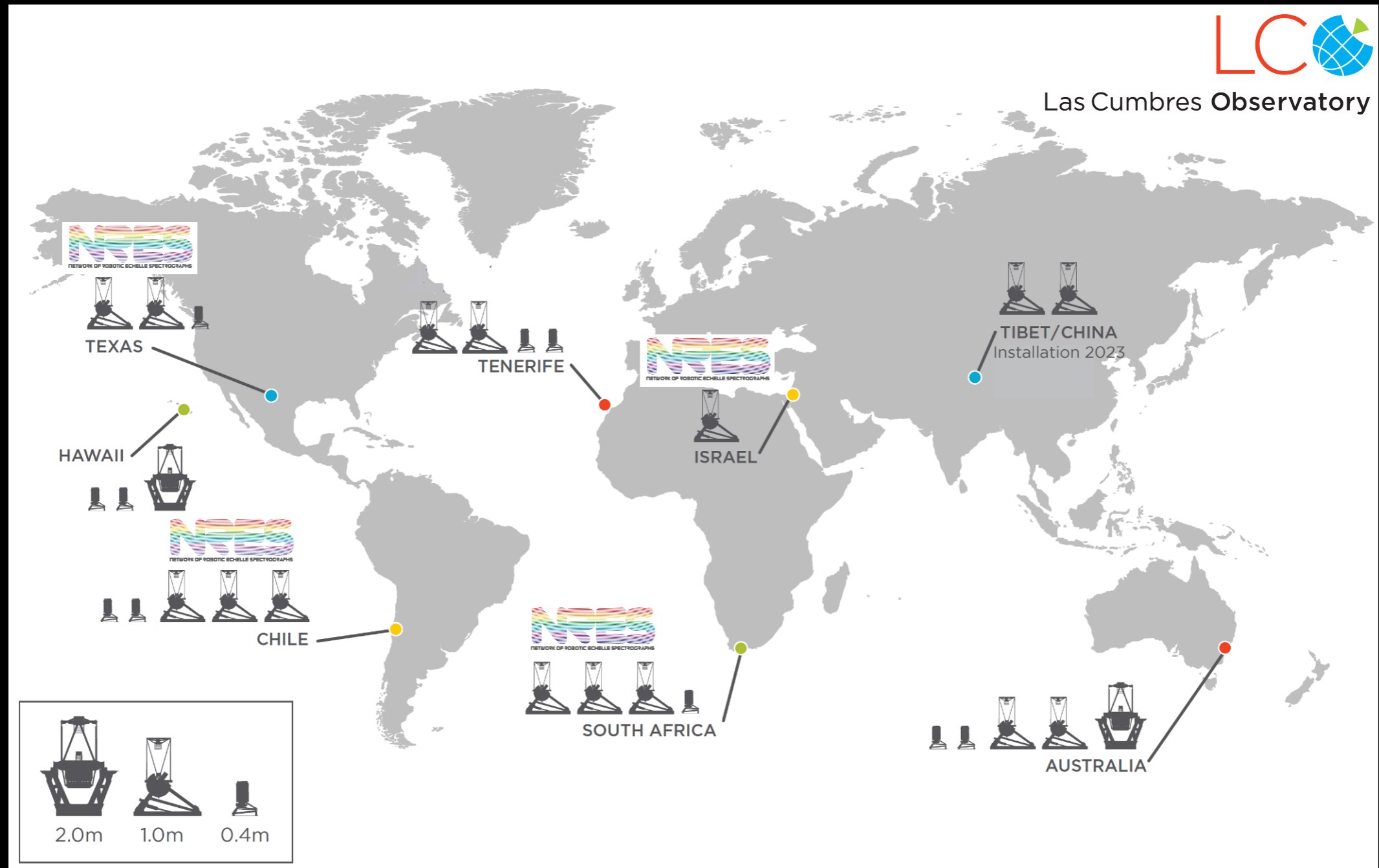


**Once we have decided to followup an event, we need a rapid interface to trigger observations.**

**TOM Toolkit, SkyPortal**

# Las Cumbres Observatory

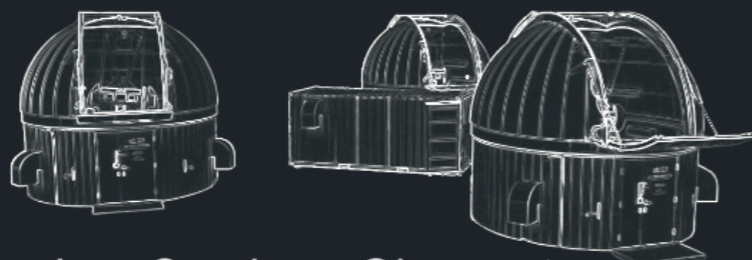
We operate a network of 25 robotic telescopes around the globe.



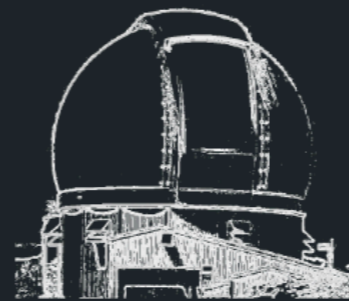
# We need APIs trigger follow-up facilities

## Collaboration of observatories for time-domain astrophysics

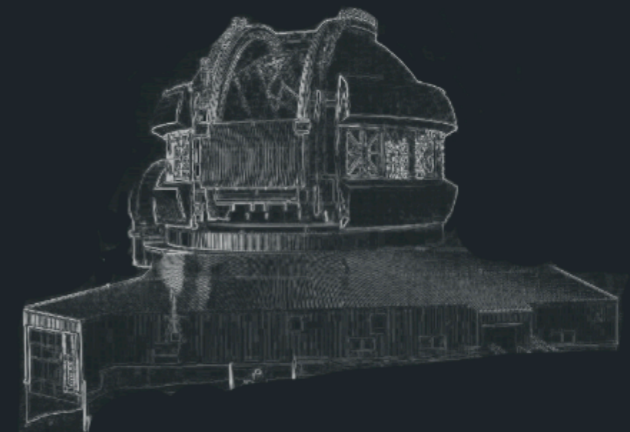
- Observations can be programmatically requested
- Queue-scheduled at least some of the time
- Manual and robotic operation



Las Cumbres Observatory  
Network - 2m, 1m, 0.4m



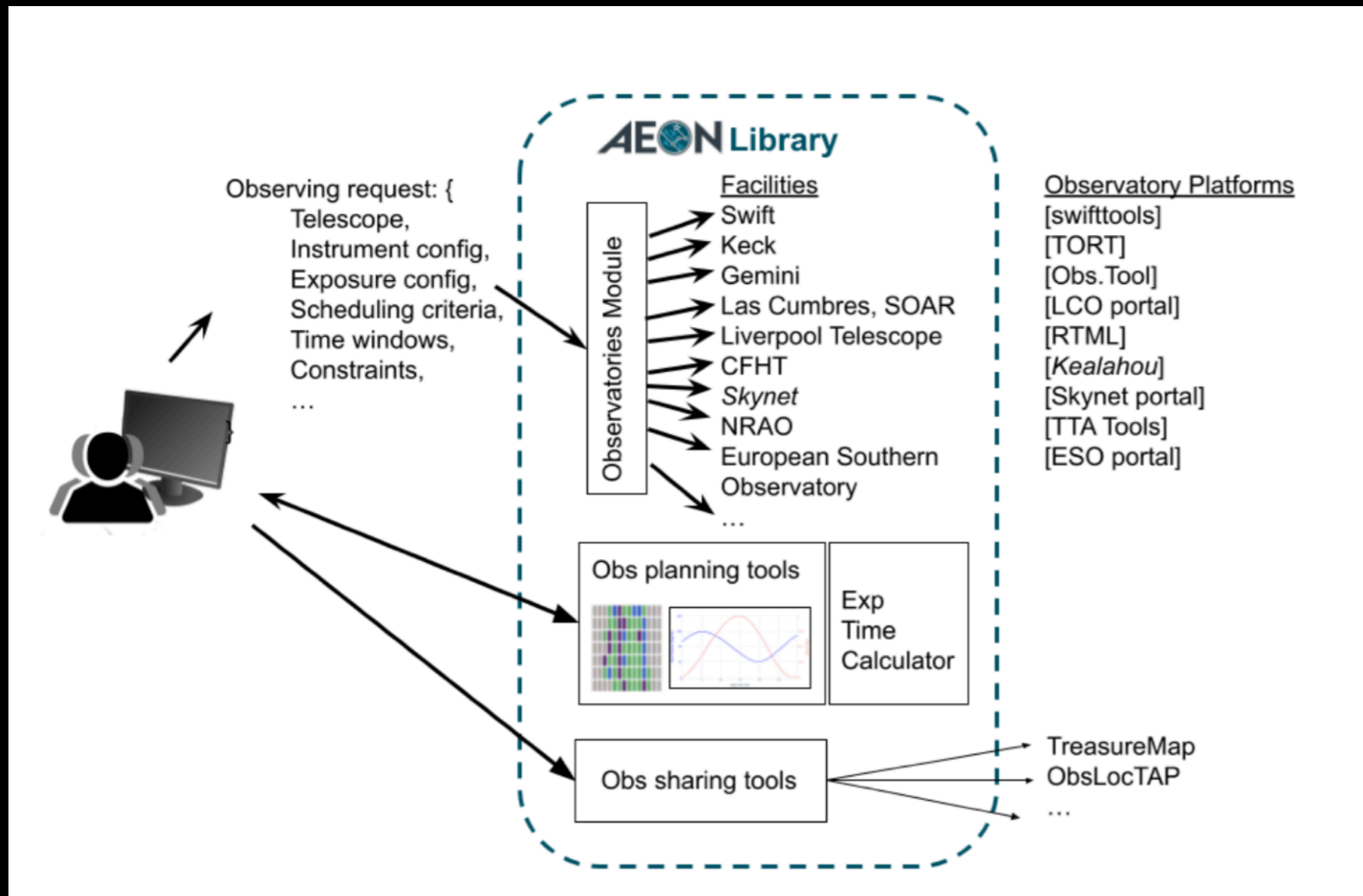
SOAR - 4m



Gemini N & S - 8m

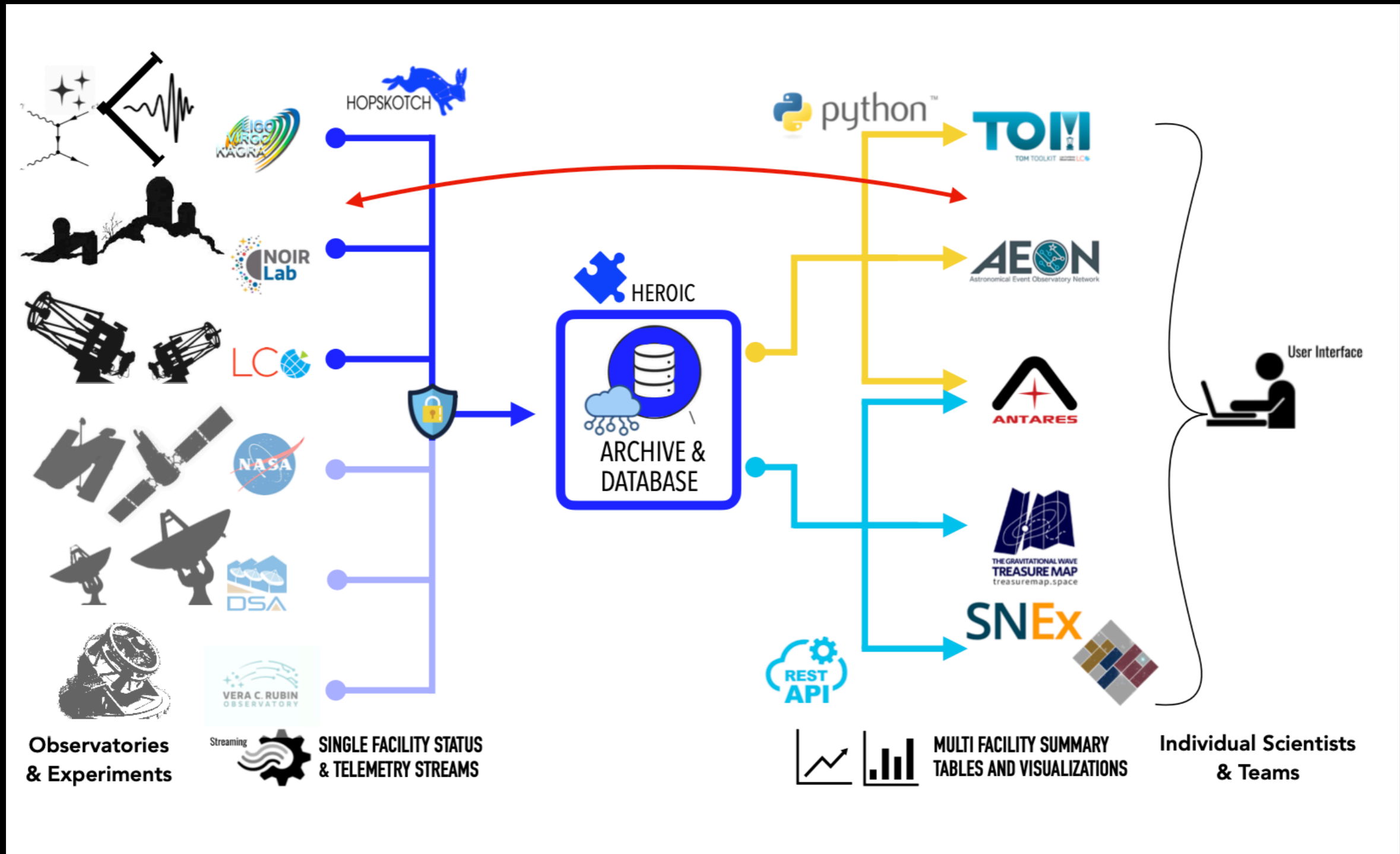
# AEON+

We have recently been funded to extend AEON to more facilities including CFHT, NOIRLab telescopes, and radio observatories.

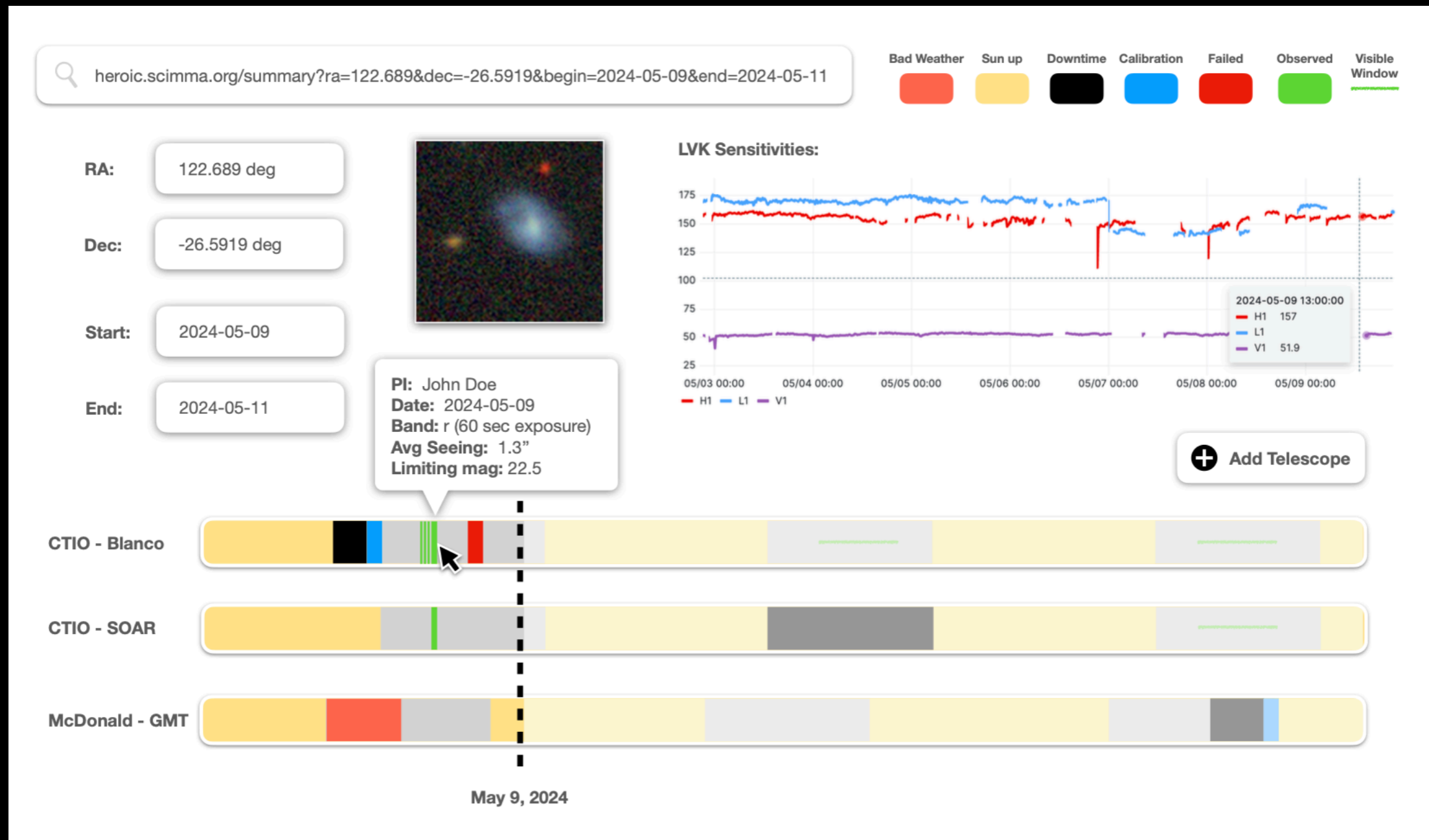


# HEROIC

## Hop Enabled Realtime Observatory Information and Coordination



# HEROIC will provide realtime status for a variety of telescopes including AEON and NOIRLab telescopes



# New observations need to be reported back to the community so they can be used to make future decisions.

## Treasure Map

[Treasure Map](#)[Home](#)[GW Events](#)[Query Pages](#)[Submit Pages](#)[Observatory Statuses](#)[Documentation](#)[Login](#)[Register](#)

### Welcome to the Gravitational Wave Treasure Map

The Treasure Map is designed to help coordinate electromagnetic followup of gravitational-wave (GW) events. It allows observers to easily report their planned and executed observations in search of counterparts to GW events, and to query the reports of other observers, in a programmatic way. The goal is to enable coordination between observatories in order to minimize unnecessary overlap in these searches and find the counterpart as quickly and as efficiently as possible.

Please [register](#) for an account, so that you can programatically query the Treasure Map.

For more details on how to use the Treasure Map see our [User Guide](#).

The Treasure Map is being designed and developed by:

Samuel Wyatt, University of Arizona

Aaron Tohuvavohu, University of Toronto

Iair Arcavi, Tel Aviv University

Dave Sand, University of Arizona

D. Andrew Howell, Las Cumbres Observatory

Michael Lundquist, University of Arizona

Curtis McCully, Las Cumbres Observatory

Austin Riba, Las Cumbres Observatory

Please direct any general inquiries to [Iair Arcavi](#).

If you use the Treasure Map in your research, please cite the [Treasure Map paper](#) in addition to the circulars and/or papers of the teams whose pointing information you use.

#### Instruments Reporting

Name	Pointings reported
<a href="#">Swift X-ray Telescope</a>	7803
<a href="#">Swift Ultraviolet/Optical Telescope</a>	6625
<a href="#">Gravitational-wave Optical Transient Observer (GOTO-4 prototype)</a>	2714
<a href="#">ZTF</a>	2586
<a href="#">Swope</a>	1011
<a href="#">MLS10KCCD-CSS</a>	980
<a href="#">Sinistro</a>	728
<a href="#">Thacher ACP Camera</a>	337
<a href="#">Nickel Direct Camera</a>	315
<a href="#">J-GEM/Subaru/Hyper Suprime-Cam</a>	240
<a href="#">Katzman Automatic Imaging Telescope</a>	213
<a href="#">MMTCam</a>	119
<a href="#">IMACS_f2_square</a>	99
<a href="#">J-GEM/Kanata-HONIR</a>	79
<a href="#">Canada France Hawaii Telescope MegaPrime</a>	65
<a href="#">Wise observatory C28 Jay Baum Rich telescope</a>	32
<a href="#">Swift Burst Alert Telescope</a>	31
<a href="#">Wise observatory C18 telescope</a>	24



# New transients the need to be reported back to the community for further vetting.

Brokers: ANTARES, FINK, ALeRCE, LASAIR, et al., (TNS)

The screenshot displays the ANTARES web interface. At the top left is the ANTARES logo. To the right is a search bar labeled "Lookup Object by ID" and logos for NSF and NOIR Lab. Below the header is a navigation menu with "Explore" selected, and other options like "Favorites", "Filters", "Tags", "Watch Lists", "Catalogs", "Pipeline", and "Properties". On the right side of the header are links for "FAQ", "Team", "Support", "Register", and "Login".

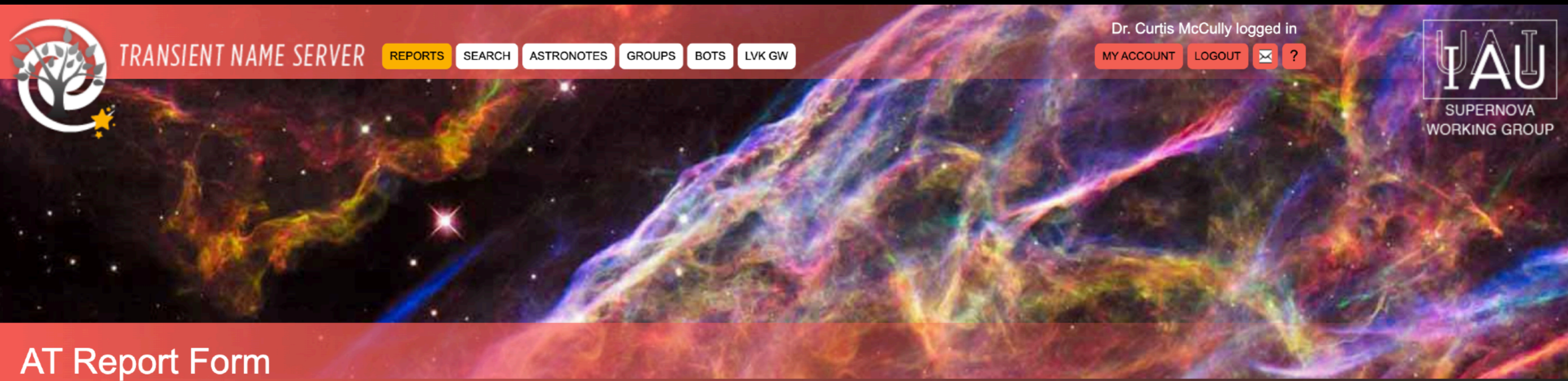
On the left side, there are several filter panels:

- Latest Alert Within:** A dropdown menu set to "All time".
- First Alert Within:** A dropdown menu set to "All time".
- Number of Measurements:** A slider ranging from 1 to 3238.
- Cone Search:** A form with "Center:" (placeholder: "Enter a coordinate string") and "Radius:" (value: 1, unit: arcsec).
- Catalogs:** A list of catalogs including gaia\_dr2 (25.3M), 2mass\_psc (24.1M), allwise (23.6M), bright\_guide\_star\_cat (23.6M), sdss\_stars (5.8M), gaia\_edr3\_distances\_bailer\_jones (2.0M), gaia\_dr3\_variability (1.5M), PS1StarGalaxyCatalog (1.4M), gaia\_dr3\_gaia\_source (1.4M), and vsx (867.3k).
- Tags:** A list of tags including refit\_newsources\_snrcut (23.2M), lc\_feature\_extractor (5.2M), sso\_candidates (1.1M), young\_extragalactic\_candidate (1.0M), sso\_confirmed (974.4k), siena\_mag\_coord\_cut (910.9k), dimmers (588.8k), extragalactic (485.0k), high\_flux\_ratio\_wrt\_nn (466.7k), and high\_snr (342.9k).
- Gravitational wave event ID:** An empty input field.

The main content area shows a table of transient objects. The table has the following columns: ID, Newest Thumbnails, ZTF ID, RA, Dec, Latest Mag, Brightest Mag, # Alerts, Latest Alert, First Alert, and Actions. The table is sorted by "Latest Alert" in descending order. The first 15 rows of the table are as follows:

ID	Newest Thumbnails	ZTF ID	RA	Dec	Latest Mag	Brightest Mag	# Alerts	Latest Alert	First Alert	Actions
ANT2020xrng		ZTF18abjkrmu	273.06	20.54	16.42	15.67	564	2024-05-10 11:56:34	2018-07-24 06:34:29	...
ANT2020anvde		ZTF18abmlxmj	271.97	19.08	17.35	16.27	382	2024-05-10 11:56:34	2018-08-18 03:56:23	...
ANT2020aghow		ZTF18abjtjcg	275.17	21.48	16.19	15.99	374	2024-05-10 11:56:34	2018-07-27 04:59:48	...
ANT2020avrc2		ZTF18abmoqqm	271.96	18.76	17.32	17.03	161	2024-05-10 11:56:34	2018-08-14 03:41:52	...
ANT2020wssa		ZTF18abmlxrq	272.72	17.60	17.46	16.63	682	2024-05-10 11:56:34	2018-08-18 03:56:23	...
ANT2020xbua		ZTF18abfsdsm	275.96	22.23	18.09	17.33	682	2024-05-10 11:56:34	2018-07-09 09:05:30	...
ANT2020a5gzc		ZTF18abimnwx	272.17	22.46	19.32	18.86	365	2024-05-10 11:56:34	2018-07-09 07:59:01	...
ANT2020zuoa		ZTF18abmoyfm	274.54	20.01	18.38	18.20	279	2024-05-10 11:56:34	2018-08-24 05:01:27	...
ANT2020bdyiy		ZTF18admbwrq	271.47	19.22	17.90	17.45	185	2024-05-10 11:56:34	2018-08-10 07:42:18	...
ANT2020am4oc		ZTF18adknsmt	272.00	15.31	18.17	17.73	382	2024-05-10 11:56:34	2018-06-24 07:06:32	...
ANT2020agm7m		ZTF18abkjhgg	275.93	18.66	18.68	17.75	411	2024-05-10 11:56:34	2018-07-31 06:34:49	...
ANT20203zmq		ZTF18abjkpqa	273.62	17.58	17.27	16.83	588	2024-05-10 11:56:34	2018-07-24 06:34:29	...
ANT2020avre4		ZTF19aaqfdnp	277.68	18.59	18.64	18.59	144	2024-05-10 11:56:34	2019-04-13 11:20:25	...
ANT2020ukuq		ZTF19aanykmc	276.22	22.58	19.57	19.13	640	2024-05-10 11:56:34	2019-03-31 11:11:37	...
ANT2020af5ze		ZTF18abbcwvd	277.88	22.06	17.53	16.84	590	2024-05-10 11:56:34	2018-06-12 09:07:55	...
ANT2020anipe		ZTF18abmdqqq	272.80	21.26	16.08	15.98	608	2024-05-10 11:56:34	2018-08-10 07:42:18	...

# Once new counterpart candidates are discovered, they need to be reported to get an official IAU designation.



## AT Report Form

[AT Report Form](#) [Classification Report Form](#) [FRB Report Form](#)

RA*	Error	Err units	DEC*	Error	Err units
<input type="text"/>	<input type="text"/>	arcsec ▾	<input type="text"/>	<input type="text"/>	arcsec ▾

Reporting Group*	Discovery Data Source*
- Select - ▾	- Select - ▾

Reporter/s (Authors list)\*

Curtis McCully

<https://www.wis-tns.org/reports/frb>

# Let's start by getting an interesting target from an alert stream

TOM Toolkit | Targets

127.0.0.1:8000/targets/

TOM Toolkit Home Targets Alerts Observations Data Users rstreet Logout

2 Targets [Create Targets](#) [Update Broker Data](#) [Export Filtered Targets](#)

Target Distribution (sidereal)

Target Type:

Name:

Key:

Value:

Cone Search:   
RA, Dec, Search Radius (degrees)

Target Grouping:

Cone Search (Target):   
Target Name, Search Radius (degrees)

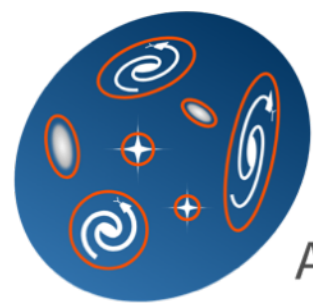
« 1 »

Add/Remove from grouping [Add](#) [Move](#) [Remove](#)

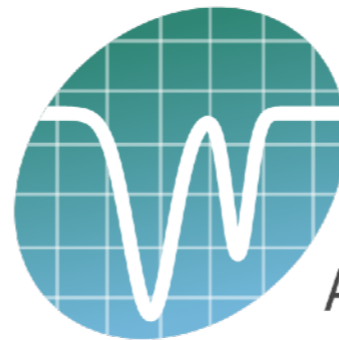
<input type="checkbox"/>	Name	Type	Observations	Saved Data
<input type="checkbox"/>	<a href="#">NGC6819</a>	Sidereal	0	0

Once we have data, it needs to be processed quickly

BANZAI, Pypeit, astropy photutils and specutils, DRAGONS



**photutils**  
An **Astropy** Package for Photometry



**specutils**  
An **Astropy** package for spectroscopy



**DRAGONS**

**Pypeit**

# BANZAI

---

BANZAI is the pipeline framework designed specifically for Las Cumbres Observatory



BANZAI runs fully automatically, delivering data to users within minutes of shutter close.

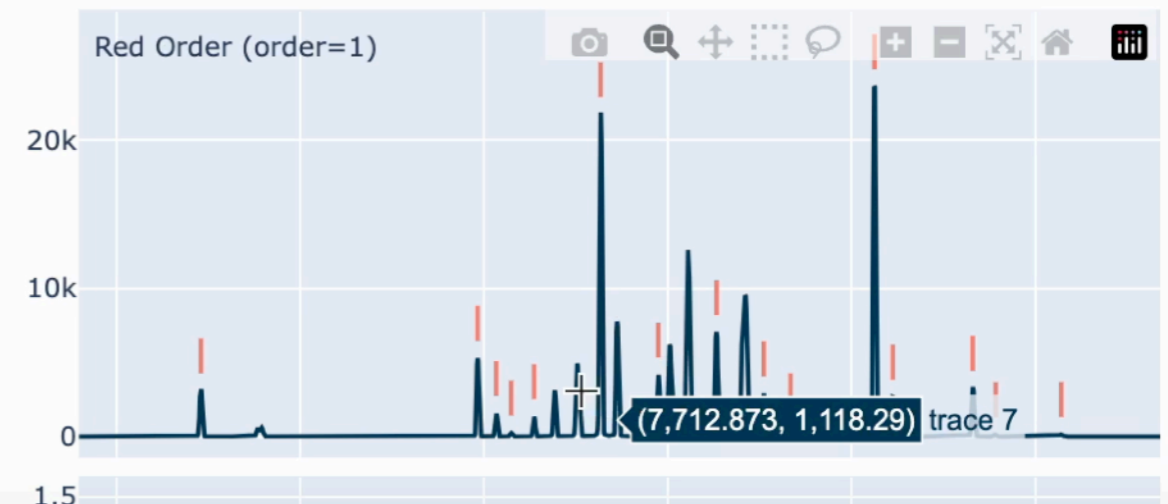
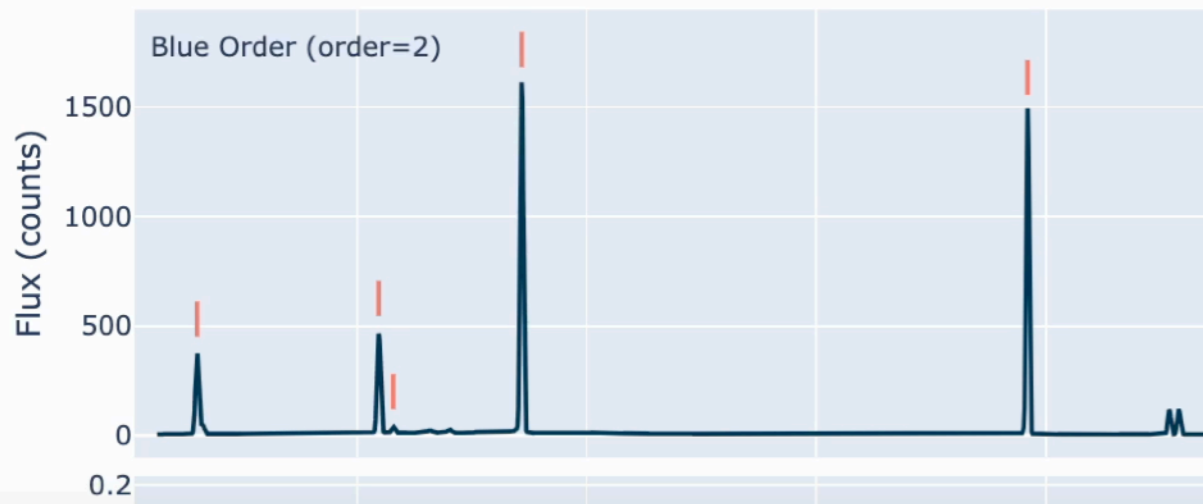
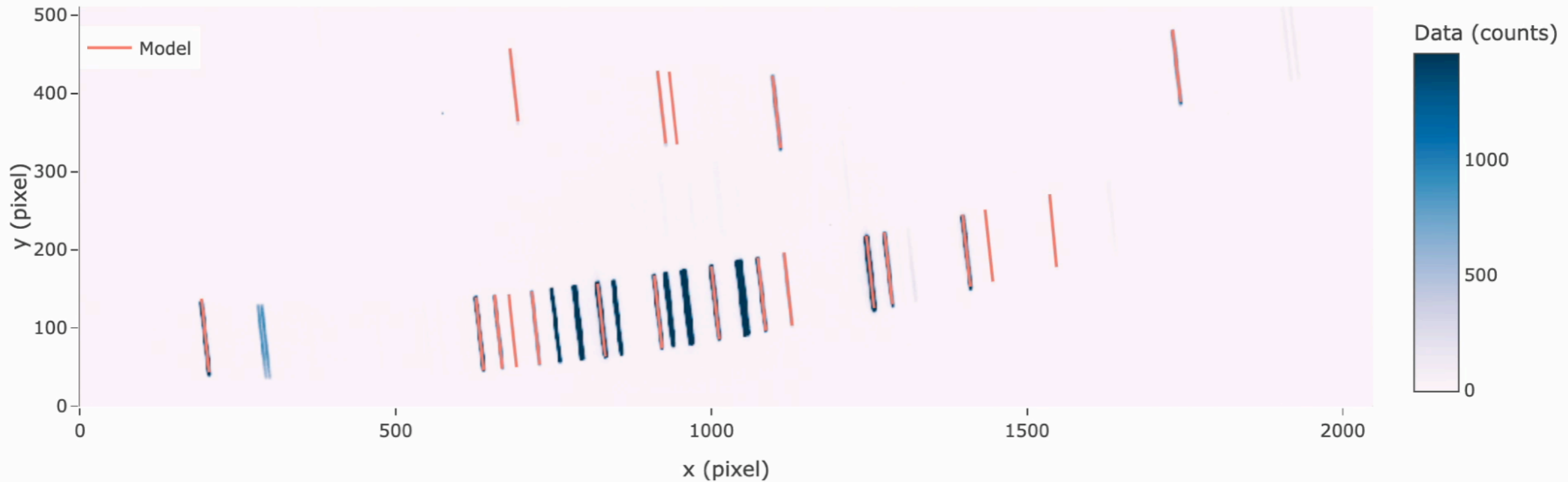
McCully+ 2018, SPIE, 107070K

# BANZAI-FLOYDS Reprocessing

ogg x 06/10/2024 → 06/17/2024

ogg2m001-en06-20240614-0017-e91-1d.fits.fz

Arc Frame Used in Reduction: ogg2m001-en06-20240614-0013-a91



# New observations need to be reported back to the community so they can use that to make future decisions.

## GCN

An official website of the United States government [Here's how you know](#)

**NASA General Coordinates Network**

Missions Notices **Circulars** Documentation Sign in / Sign up

New Announcement Feature, Code of Conduct, Circular Revisions. See [news and announcements](#)

### GCN: NASA's Time-Domain and Multimessenger Alert System

GCN distributes alerts between space- and ground-based observatories, physics experiments, and thousands of astronomers around the world.

[Start streaming GCN Notices](#) [Post a GCN Circular](#)

The General Coordinates Network (GCN) is a public collaboration platform run by NASA for the astronomy research community to share alerts and rapid communications about high-energy, multimessenger, and transient phenomena. For more information, see [What is GCN?](#) or check out our [slide deck](#).

There are three ways to stream GCN Notices in real time:

For legacy applications	Recommended	Coming soon
<b>GCN Classic</b>	<b>GCN Classic over Kafka</b>	<b>GCN Kafka</b>
<p>Three formats, three protocols.</p>	<p>Three formats, one protocol.</p>	<p>One format, one protocol.</p>
<a href="#">Get Started (Old Web Site)</a>	<a href="#">Get Started</a>	

An official website of the United States government [Here's how you know](#)

**NASA General Coordinates Network**

Missions Notices **Circulars** Documentation [cmccully@lco.global](mailto:cmccully@lco.global)

New Announcement Feature, Code of Conduct, Circular Revisions. See [news and announcements](#)

### New GCN Circular

From Curtis McCully at Las Cumbres Observatory <cmccully@lco.global> [Edit](#)

Subject

The subject line must contain (and should start with) the name of the transient, which must start with one of the [known keywords](#).

[Edit](#) [Preview](#)

Worf Son of Mogh (Starfleet), Geordi LaForge (Starfleet), Beverly Crusher (Starfleet), Deanna Troi (Starfleet), Data Soong (Starfleet), Isaac Newton (Cambridge), Stephen Hawking (Cambridge), and Albert Einstein (Institute for Advanced Study) report on behalf of a larger collaboration:

...

Body text. If this is your first Circular, please review the [style guide](#). References to Circulars, DOIs, arXiv preprints, and transients are automatically shown as links; see [syntax](#).

[Back](#) [Send](#)

# New observations need to be reported back to the community so they can use that to make future decisions.

## HERMES



◆	TIMESTAMP	◆	TITLE	◆	SUBMITTER
	1	2022/07/26	Boom! Boom! Boom! So many Booms!		Hermes User.guest
	2	2022/07/26	Title		Hermes User.guest
	3	2022/07/26	Demo test for Boom!		Hermes User.guest
	4	2022/07/26	A test submission -- Boom!		Hermes User.guest
	5	2022/07/25	matt_test		Hermes User.guest
	6	2022/07/25	matt_test		Hermes User.guest
	7	2022/07/25	matt_test		Hermes User.guest
	8	2022/07/25	Title		Hermes User.guest
	9	2022/07/25	Foo		Hermes User.guest
	10	2022/07/25	matt_test		Hermes User.guest

### Fermi trigger No 680421061: Global MASTER-Net observations report

Vladimir Lipunov at Moscow State U/Krylov Obs <lipunov@xray.sai.msu.ru>

V. Lipunov, V.Kornilov, E.Gorbovskoy, K.Zhirkov, N.Tyurina, P.Balanutsa, A.Kuznetsov, D. Vlasenko, G.Antipov, D.Zimnukhov, V.Senik, E.Minkina, A.Chasovnikov, V.Topolev, D.Kuvshinov, D.Cheryasov, Ya.Kechin (Lomonosov Moscow State University, SAI, Physics Department),

R. Podesta, C.Lopez, F. Podesta, C.Francile (Observatorio Astronomico Felix Aguilar Oafa),

R. Rebolo, M. Serra (The Instituto de Astrofisica de Canarias),

D. Buckley (South African Astronomical Observatory),

O.A. Gres, N.M. Budnev (Irkutsk State University, API),

L.Carrasco, J.R.Valdes, V.Chavushyan, V.M.Patino Alvarez, J.Martinez, A.R.Corella, L.H.Rodriguez (INAOE, Guillermo Haro Astrophysics Observatory),

A. Tlatov, D. Dormidontov (Kislovodsk Solar Station of the Pulkovo Observatory),

A. Gabovich, V.Yurkov (Blagoveschensk Educational State University)

MASTER-Oafa robotic telescope (Global MASTER-Net: <http://observ.pereplet.ru>, Lipunov et al., 2010, Advances in Astronomy, vol. 2010, 30L) located in Argentina (Oafa observatory of San Juan National University) started inspect of the Fermi



# HERMES/TOMS can be used to share data automatically between groups.

Known as:  
AT 2022wpy  
SN 2022wpy  
ATLAS22bhuv  
Add a new name

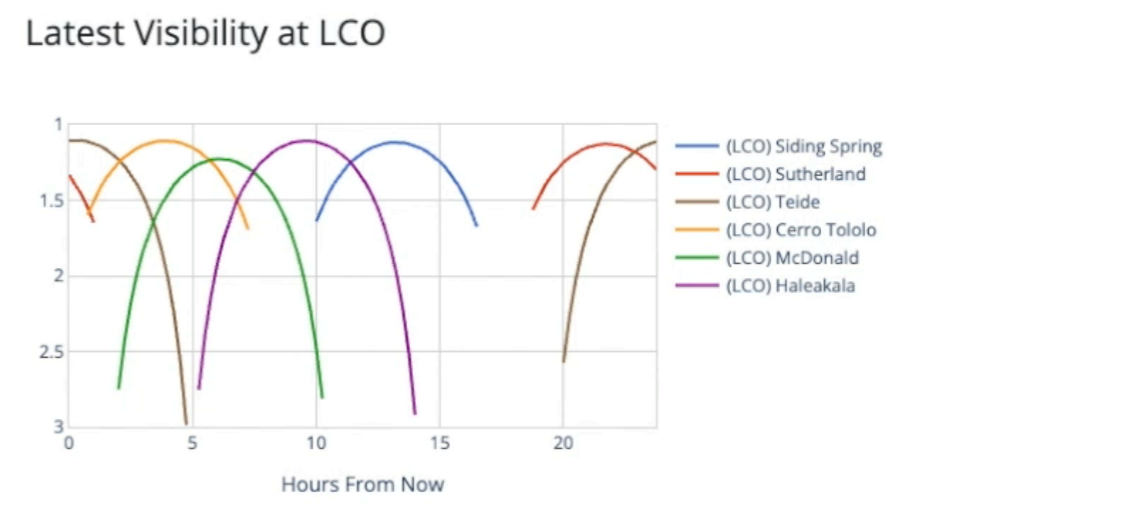
Science Interests:  
Classification  
Ia  
Nearby SNe  
Young SNe

Select Science Tags

### Latest Comments

Craig Pellegrino on 2022-10-03  
In NGC 1659 (64.3 Mpc,  $d_m=34.04$ ), discovered at 19.0 with a 1 day nondetection at 19.6

Add a comment



Interested Persons:

J. Craig Wheeler  
Or Graur

I'm Interested

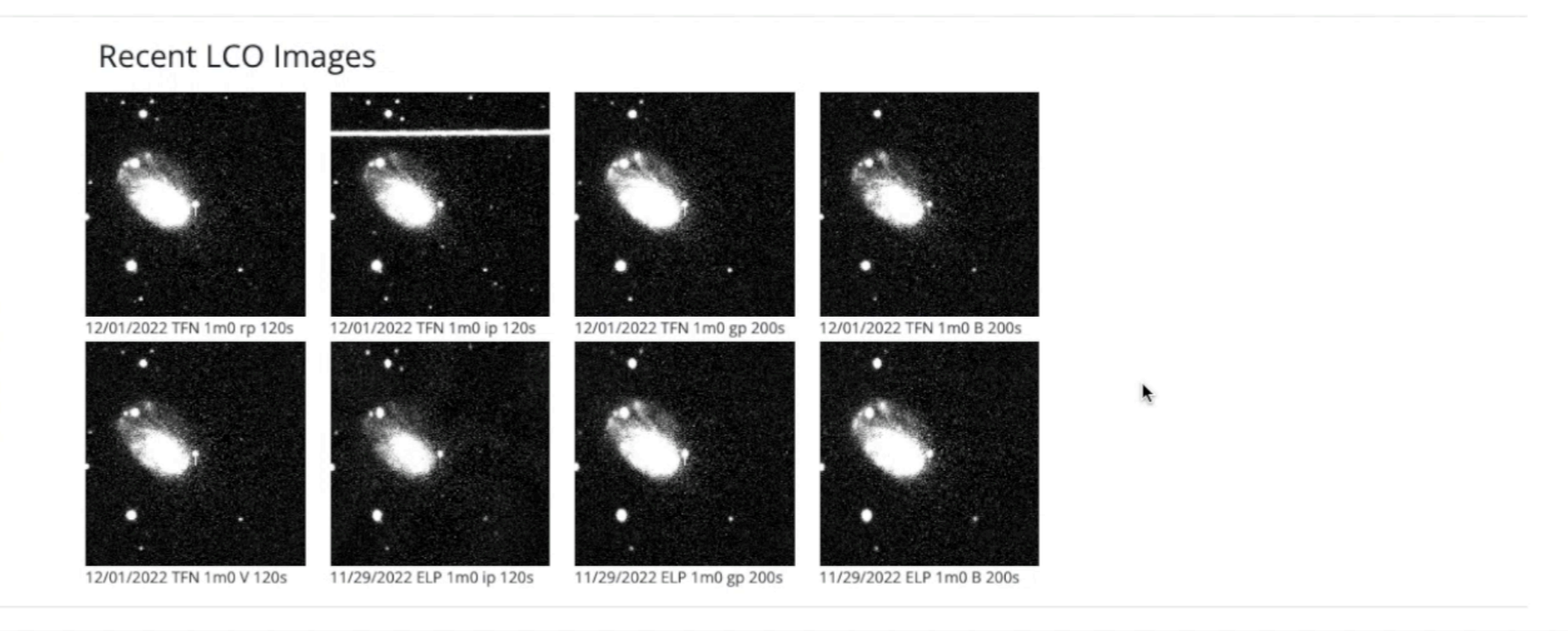
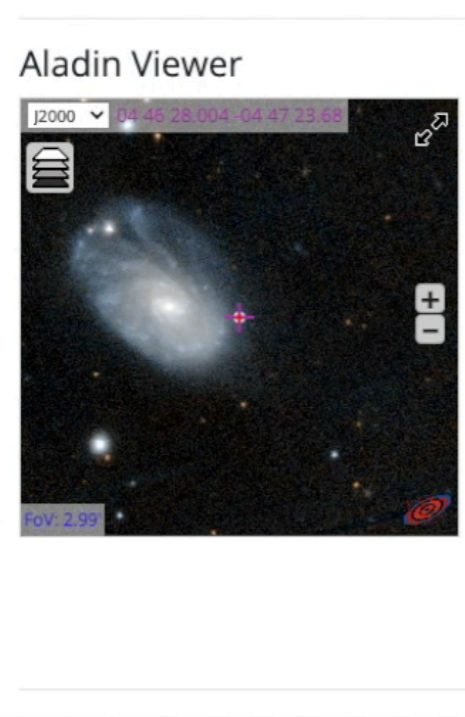
Add to Interesting Targets

Data Used In:

First name of first author

Last name of first author

Brief description of contents of this paper, i.e. "All photometry and ..."



# Human coordination is even more important than technology.

**LIGO VIRGO KAGRA** **NSF**

## Recap

- O4a: May 2023 - Jan 2024
  - KAGRA Observing first 4 weeks
  - LIGO Hanford-Livingston 2 detector time: 53%
  - At least one detector: 70%
- O4b: April 2024 - current
  - Virgo Observing, KAGRA planning to re-join later in run
  - Pause for some interferometers July - August to address in-vacuum components
  - At least one detector: 88% (non-Observing times overlapped to maximize multi-interferometer detections, which limits the "at least one" time to about 90%)
  - 3 detector time: 31% (was 45% until mid-July pause)

GstLAL Inspiral Detector Range History (Mpc)

Time	H1 (Mpc)	L1 (Mpc)	V1 (Mpc)
2023-07	140	150	-
2023-09	140	150	-
2023-11	140	150	-
2024-01	140	150	-
2024-03	140	150	50
2024-05	140	150	50
2024-07	140	150	50

LIGO-G2401726 LVK Update, OpenMMA, 29 Aug 2024 3 2024-08-29 11:07:55

We have recently restarted the OpenMMA telecons.

# Signup!

scimma.org

Off-Campus Access

HOPSKOTCH HERMES Community Resources Events People Conduct Policies Help

At work

Sign up for MMA messages

OpenMMA is a community forum for discussion of multi-messenger astrophysics(MMA). Topics include latest scientific results, the status of the ongoing and upcoming observatories and experiments (including the LIGO-VIRGO-Kagra (LVK) Gravitational Wave network, IceCube, SNEWS, AMON, ground-based observatories, spacecraft etc), the infrastructure to connect these facilities, and any other issues pertinent to the detection and characterization of MMA sources. OpenMMA replaces and broadens the scope of the OpenLVEM forum.

Visit the openMMA wiki

Subscribe to the openMMA mailing list

SCiMMA Auth

Current user: Curtis McCully (cmccully@lco.global) Log out

## SCiMMA Services

### Hopskotch

**Hopskotch** is SCiMMA's scalable, high-throughput low-latency platform for handling real-time data streams for MMA applications, based on [Apache Kafka](#). It provides data transport and storage, and is primarily accessed programmatically. Through its web interface you can manage access credentials, user groups, and topics.

[Click here to manage your Hopskotch settings](#)

SCiMMA recommends using our [hop-client](#) python package to send and receive data via Hopskotch, but any client tool or library for working with Kafka can be used. Hopskotch also provides a [REST API](#) which enables programmatic access to all of the same capabilities as the web interface.

### HERMES

**HERMES** is a high-level web interface for MMA alerts, built on Hopskotch. It allows both viewing and sending messages, including to GCN and TNS.

[Click here to use HERMES](#)

### OpenMMA

**OpenMMA** is a community forum to facilitate the exchange of information related to multi-messenger astrophysics (MMA).

[Click here for the OpenMMA Wiki](#)

You are subscribed to the [OpenMMA mailing list](#).

[Unsubscribe](#)

# If you want to present at an OpenMMA telecon, fill out this web form

docs.google.com/forms/d/e/1FAIpQLSeMDwWus8nG\_Op-HpuAuqoTNkqxTnDEWh8twrNLzHq\_ZHKNag/viewform

Off-Campus Access

Google Lens

All Bookmarks

## Request to present at OpenMMA call

Please submit this form to request a slot to present at an upcoming OpenMMA Telecon (<https://github.com/scimma/openMMA/wiki>)

curtismcully@gmail.com [Switch account](#)

Not shared

\* Indicates required question

Email \*

Your answer

First and Last Name \*

Your answer

Affiliation \*

Your answer

# Conclusions



How do we lower the barrier to entry on these tools?

How do we increase adoption?

How do we integrate these tools seamlessly?