

SCIMMA

Scalable Cyberinfrastructure for
Multimessenger Astrophysics




Andy Howell

Las Cumbres Observatory



University of California, Santa Barbara

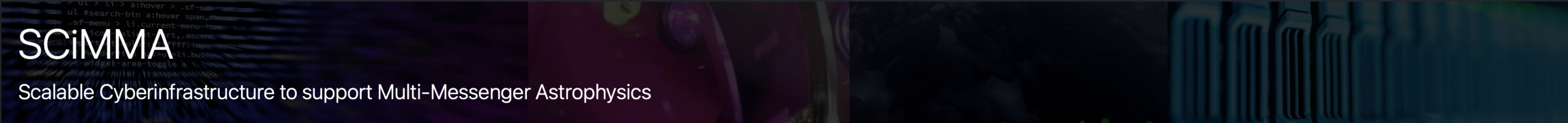
+ SCIMMA, especially Jon Nation (LCO) & Curtis McCully (LCO)





About ▾ Services ▾ Community ▾ Contacts ▾

 [Health](#) [Metrics](#)[Sign up/Login](#)



SCiMMA

Scalable Cyberinfrastructure to support Multi-Messenger Astrophysics

About SCiMMA

The goal of the *Scalable Cyberinfrastructure to support Multi-Messenger Astrophysics (SCiMMA)* project is to identify needed technical infrastructure through community engagement efforts, and then support these requirements by developing the required cyberinfrastructure and software systems. SCiMMA development projects draw on collaborations among astronomers, computer scientists, and data scientists.

Multi-Messenger Astrophysics (MMA) signals are often transient, originating from distinct celestial events, making a rapid response to an MMA event a key capability, The response may include a fast analysis by a distributed science group; assembly of historical observations; determining the instruments available for new, prompt follow-up observations; instantating the observations; and resolving conflicting requirements for similar observations from multiple science groups.

SCiMMA is working to provide interoperating cyberinfrastructure to rapidly coordinate, combine, and analyze the large-scale distributed data from all these sources. The infrastructure must accomodate public communications (of interest to the community) and protected internal communications (to support work internal to a collaboration).

The collection of SCiMMA services increasingly statisfy the community's needs for Cyberinfrastructure. The OpenMMA forum provides an addition venue to assess progress and needs.

New to SCiMMA? – a quick look at SCiMMA services

Read More

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

Read More

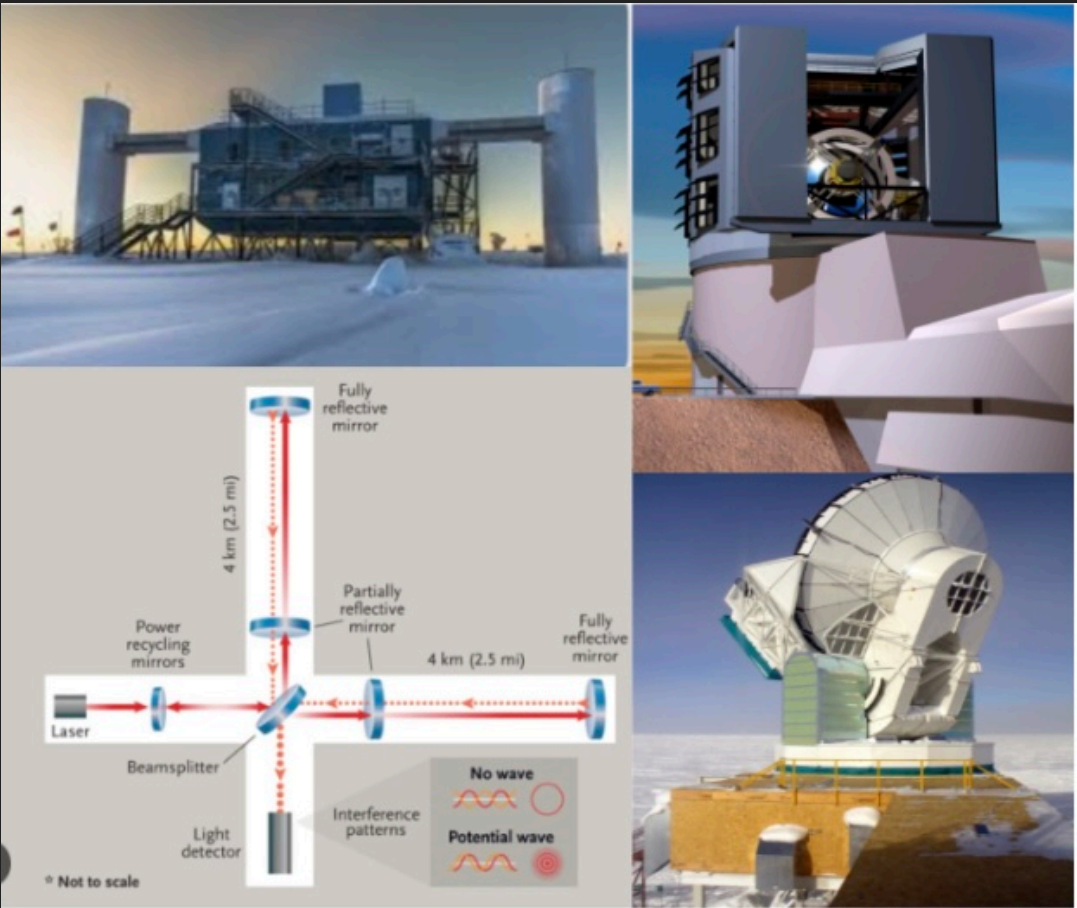
LVK run04 is live, how to access LVK alerts, and build a follow-up system.

Read More

HEROIC is a new project to faciltate Target of Opportunity Observations.

Read More

SCIMMA PRODUCTS



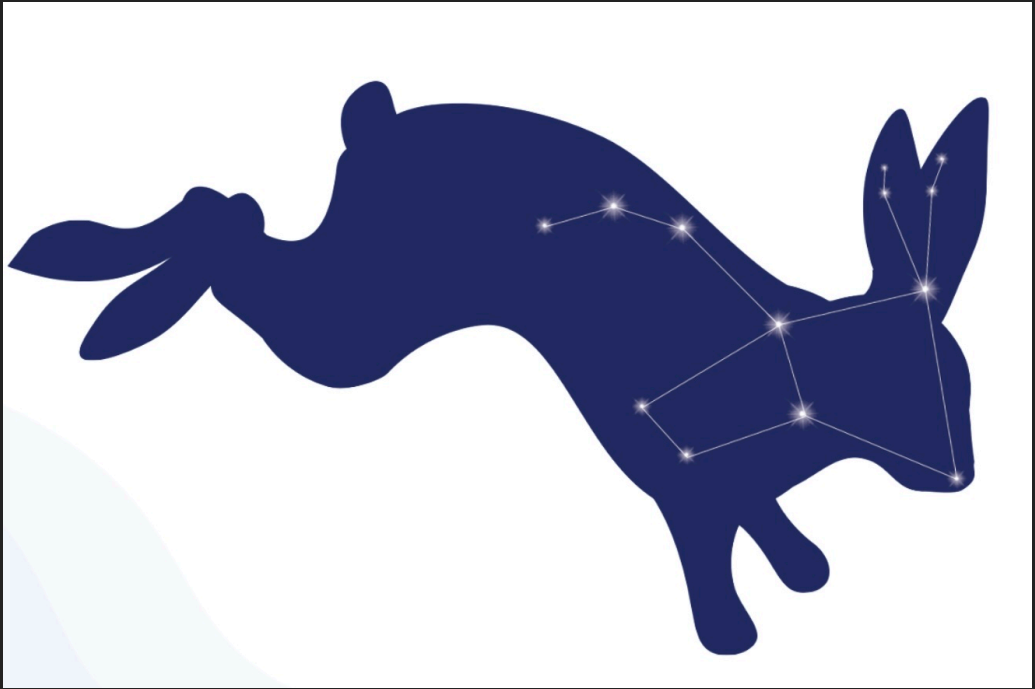
Open MMA
Community information

JSON	
Avro	
alert_type	{EARLYWARNING, PRELIMINARY, INITIAL, UPDATE, RETRACTION}
time_created	Time notice was created (UTC, ISO-8601) 2018-11-01T22:34:20Z
superevent_id	GraceDB ID: [{T, M}]SYMMDDabc . Example: MS181101abc
event	
time	Time of event (UTC, ISO-8601), e.g. 2018-11-01T22:22:46.654Z
far	Estimated FAR in Hz

IGWN alerts
Gravitational wave alerts



Blast
Host galaxy information



Hopskotch/HERMES
Messaging



HEROIC
Telescope & instrument availability



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

Search the Blast database 🔍

Read the docs 📖

Transient Processing Statistics

Blast: a Web Application for Characterizing the Host Galaxies of Astrophysical Transients

D. O. JONES ^{1,*} P. MCGILL ^{2,3,*} T. A. MANNING ⁴ A. GAGLIANO ^{5,6,7} B. WANG (王冰洁) ^{8,9,10}
D. A. COULTER ¹¹ R. J. FOLEY ² G. NARAYAN ^{12,13} V. A. VILLAR ^{6,5} L. BRAFF,² A. W. ENGEL ¹⁴
D. FARIAS ¹⁵ Z. LAI ¹⁶ K. LOERTSCHER,² J. KUTCKA ² S. THORP ¹⁷ AND J. VAZQUEZ ¹²

2025absa

Download data

Information

Transient

Name: AT2025absa

Right ascension: 9h29m15.21s

Declination: -20d22m34.73s

Discovery Date: Oct. 26, 2025, 5:42 p.m.

Classification: None

Redshift: None

MW E(B-V): 0.046

Host

Name: ESO565-011

Right ascension: 9h29m16.42s

Declination: -20d22m45.45s

Redshift: 0.014484

Photometric Redshift:

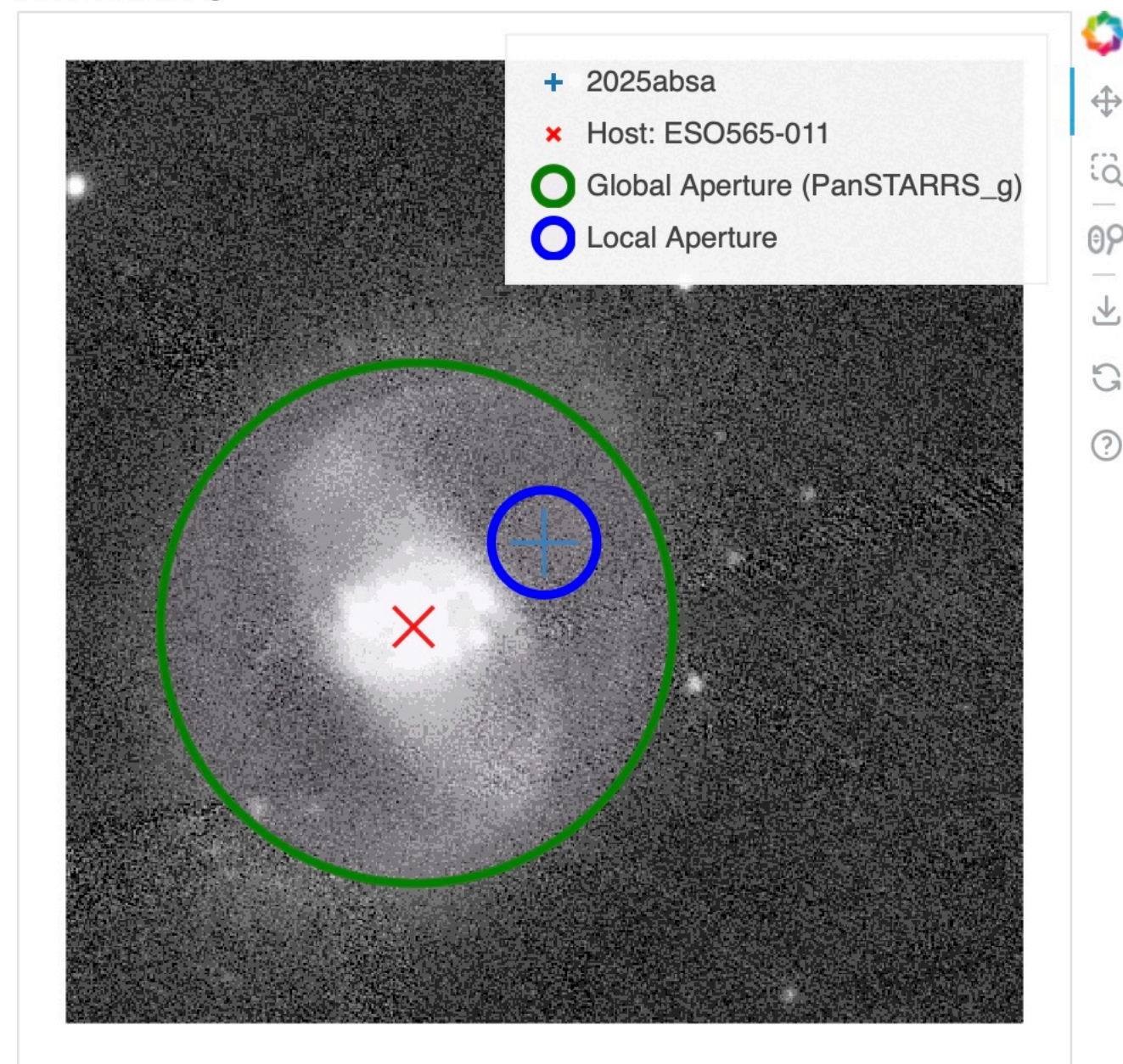
Processing Status

Cutout download

01000000

Imaging data

PanSTARRS_g



Choose cutout

Get Cutout

Aperture Photometry

Global

Local

Aperture details

RA, DEC (J2000) = 9h29m16.39s, -20d22m44.99s

semi major axis, semi minor axis (arcsec) = 33.64, 32.86

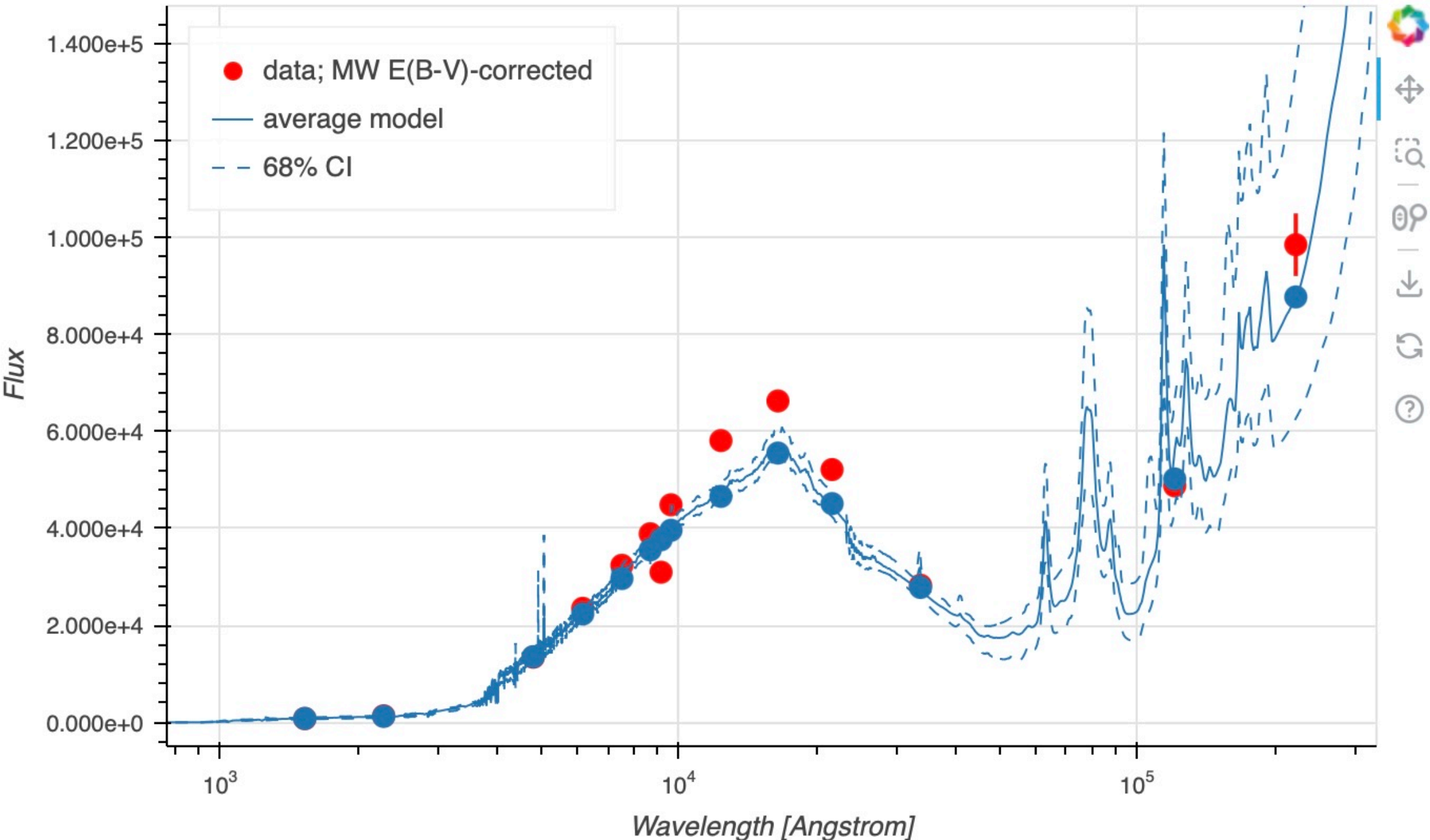
angle (degrees, anti-clockwise from east) = -12.23

Filter	Flux (μ Jy)	Flux error (μ Jy)	Mag	Mag error	Mag sys
GALEX_FUV	549.65	18.15	17.050	0.036	AB
GALEX_NUV	905.88	15.32	16.507	0.018	AB
PanSTARRS_g	11495.13	13.13	13.749	0.001	AB
PanSTARRS_r	21060.75	18.79	13.091	0.001	AB
PanSTARRS_i	29860.67	22.75	12.712	0.001	AB
PanSTARRS_z	36491.76	32.05	12.495	0.001	AB
DES_z	29218.61	80.14	12.736	0.003	AB
PanSTARRS_y	42539.06	65.52	12.328	0.002	AB
2MASS_J	56137.9	855.6	11.132	0.017	Vega
2MASS_H	64853.72	1061.07	10.503	0.018	Vega
2MASS_K	51369.05	1732.01	10.285	0.037	Vega
WISE_W1	28028.55	550.89	10.082	0.021	Vega
WISE_W3	48681.76	1300.33	7.008	0.029	Vega
WISE_W4	98412.99	6369.32	4.797	0.070	Vega

Spectral Energy Distribution

Global Local

Download Best-Fit Model



Host SED inference

Global Local

Global parameter details

Documentation

Download Chains

Download Percentiles

Parameter	Lower (16%)	Median (50%)	Upper (84%)
$\log_{10}(M_*/M_\odot)$	10.497	10.594	10.701
$\log_{10}(\text{SFR})$	-0.251	0.186	0.513
$\log_{10}(\text{sSFR})$	-10.832	-10.384	-10.026
stellar age	6.962	7.993	11.079

Metallicity parameters

Parameter	Lower (16%)	Median (50%)
$\log_{10}(Z_*/Z_\odot)$	-1.437	
$\log_{10}(Z_{\text{gas}}/Z_\odot)$	-1.870	

AGN parameters

Parameter	Lower (16%)	Median (50%)	Upper (84%)
$\log_{10}(f_{\text{AGN}})$	-2.777	-1.720	-1.327
$\log_{10}(\tau_{\text{AGN}})$	1.028	1.272	1.594

Dust parameters

Parameter	Lower (16%)	Median (50%)
τ_2	0.479	0.479
δ	-0.012	-0.012
τ_1/τ_2	0.441	0.441
Q_{PAH}	0.211	0.211
U_{min}	2.177	2.177
$\log_{10}(\gamma_e)$	-3.760	-3.760

Binned star formation history

Lookback time	Lower (16%)	Median (50%)	Upper (84%)
0.00-0.03 Gyr	-1.626	-0.241	0.263
0.03-0.10 Gyr	-0.428	0.235	0.637
0.10-0.33 Gyr	-0.639	0.157	0.557
0.33-1.10 Gyr	-1.426	-0.039	0.384
1.10-3.63 Gyr	-1.347	0.167	0.645
3.63-12.03 Gyr	0.117	0.677	0.851
12.03-13.36 Gyr	0.148	0.889	1.663

RESOURCE AVAILABILITY

- ▶ Example: you want to make an observation of a transient immediately. Which facilities can you use?
- ▶ What is my target's observability at each facility.
- ▶ This information has not been centralized - it is distributed across hundreds of web sites with no common protocol.

Mauna Kea at Mon Jan 11 16:01:06 2021

Gratings currently available in GMOS-N today...

mirror
B600+_G5307
R831+_G5302
R400+_G5305

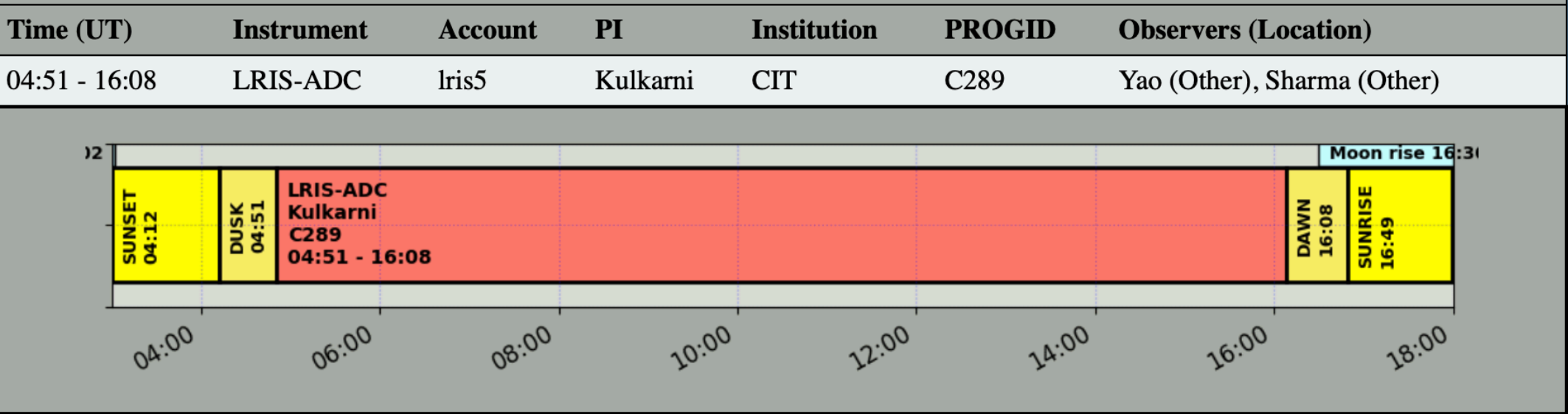
Slits currently available in GMOS-N today...

IFU-2
0.5arcsec
0.75arcsec
1.0arcsec
1.5arcsec
2.0arcsec
5.0arcsec
NS0.75arcsec
NS1.0arcsec
0.25arcsec

MONDAY JANUARY 11, 2021 HST

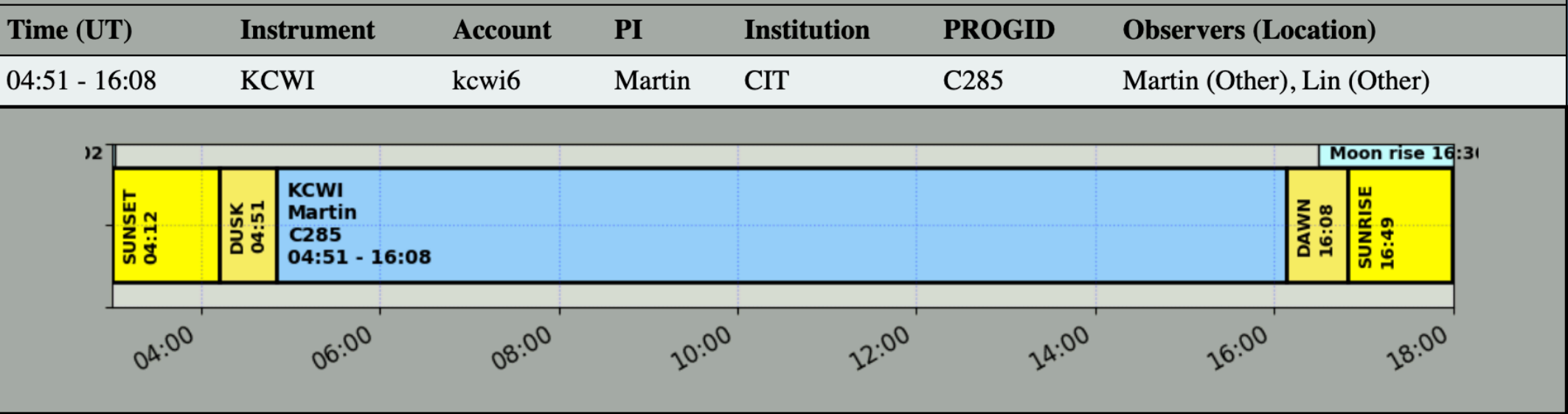
KECK 1

Observing Assistant: John Support Astronomer: JoshW Night Attendant: Nick
Oncall Support: Kyle (swoc)



KECK 2

Observing Assistant: Heather Support Astronomer: Sherry Night Attendant: Nick
Oncall Support: Kyle (swoc)



HEROIC

Home

Target Visibility

Telescopes

Instruments

Planning

Filters

Visibility: ☒

Airmass: ☒

<

Date Range:

2025-09-22 23:36:48 - 2025-09-23 23:36:48

▼

Target:

SN 1987A: 83.86675 ra, -69.26974166666668 dec

^

SIDEREAL

NON-SIDEREAL

MPC MINOR PLANET
MPC COMET
JPL MAJOR PLANET

Prefill Target

SN 1987A

SEARCH

Found target:SN 1987A

Right Ascension (decimal degrees)

83.866750000

Declination (decimal degrees)

-69.269741667

Proper Motion RA (mas/yr)

Proper Motion Dec (mas/yr)

Epoch

2000.00

Parallax (mas)

Filtered Telescope Data:

search

Showing: 11 / 28

Name	Site	Aperture (m)	Status	Latitude	Longitude
4.0 Meter Blanco - Dome A	lco.bco	4	SCHEDULABLE	-30.16541667	-70.81463889
0.4 Meter LCO - Clamshell A	lco.coj	0.4	SCHEDULABLE	-31.272932	149.070648
0.4 Meter LCO - Clamshell A	lco.coj	0.4	SCHEDULABLE	-31.272932	149.070648
2.0 Meter LCO - Clamshell A	lco.coj	2	SCHEDULABLE	-31.272932	149.070648
1.0 Meter LCO - Doma A	lco.coj	1	SCHEDULABLE	-31.272932	149.070648
1.0 Meter LCO - Dome B	lco.coj	1	SCHEDULABLE	-31.272932	149.070648
1.0 Meter LCO - Dome A	lco.cpt	1	SCHEDULABLE	-32.3805542	20.8101815
1.0 Meter LCO - Dome B	lco.cpt	1	SCHEDULABLE	-32.3805542	20.8100352
1.0 Meter LCO - Dome C	lco.cpt	1	SCHEDULABLE	-32.3806616944	20.8101083333
0.4 Meter LCO - Aqawan A	lco.cpt	0.4	SCHEDULABLE	-32.38063333	20.80988833
4.0 Meter SOAR - Dome A	lco.sor	4	SCHEDULABLE	-30.237892	-70.733642

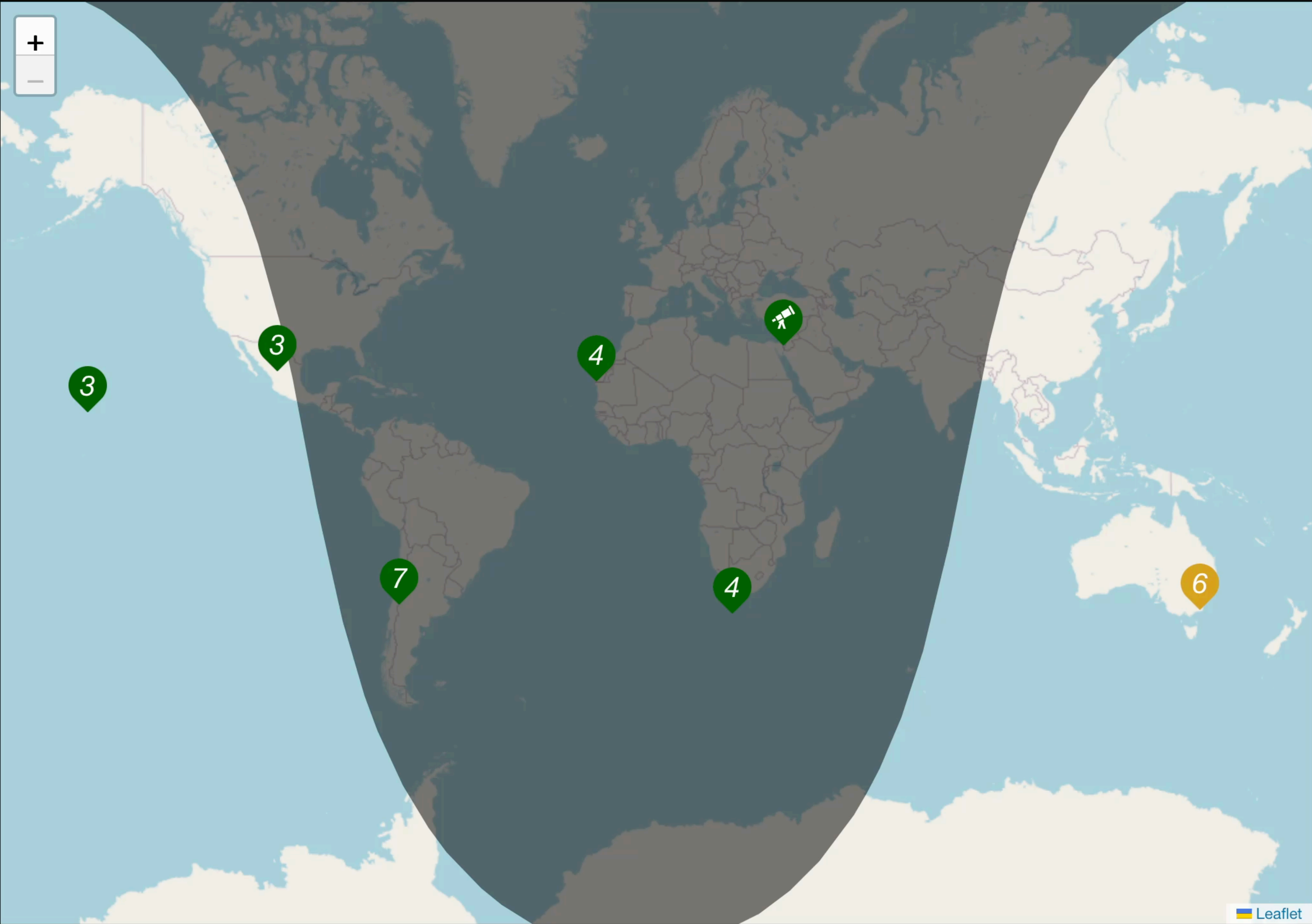
Filters Visibility: ☐ Airmass: ☐ <

Date Range: >

Target: No target specified >

Constraints: 2.0 airmass; 1.0 lunar phase >

Telescopes: All Telescopes >



PREEXISTING MESSAGING SYSTEMS

GCN Circulars Used for GRBs & GW events. Free text, not machine readable.

GCN Notices Machine readable, but only used by some NASA missions, no real free text.

```
////////////////////////////////////
TITLE:   GCN CIRCULAR
NUMBER:  21505
SUBJECT: LIGO/Virgo G298048: Fermi GBM trigger 524666471/170817529: LIGO/Virgo Id
DATE:    17/08/17 13:21:42 GMT
FROM:    Reed Clasey Essick at MIT  <ressick@mit.edu>

The LIGO Scientific Collaboration and the Virgo Collaboration report:

The online CBC pipeline (gstlal) has made a preliminary
identification of a GW candidate associated with the time
  of Fermi GBM trigger 524666471/170817529 at gps time 1187008884.47
  (Thu Aug 17 12:41:06 GMT 2017) with RA=186.62deg Dec=-48.84deg and an error radiu

The candidate is consistent with a neutron star binary coalescence with
False Alarm Rate of ~1/10,000 years.

An offline analysis is ongoing. Any significant updates will be provided
by a new Circular.

[GCN OPS NOTE(17aug17): Per author's request, the LIGO/VIRGO ID
was added to the beginning of the Subject-line.]
```

TRANSIENT NAME SERVER

SEARCHASTRONOTESBOTSLIGO GW

LOGIN✉?

IAU
SUPERNOVA
WORKING GROUP

SN 2017cbv

RA/DEC (2000)
14:32:34.420 -44:08:02.74
218.143417 -44.134094

Type
SN Ia

Redshift
0.003999

Discovery Report

Classification Report

Reporting Group
DLT40

Discovering Data Source
DLT40

Discovery Date
2017-03-10 04:06:14.000

TNS AT
Y

Public
Y

Host Name
NGC5643

Discovery Mag
16.0451

Filter
Clear-

Reporter/s
S. Valenti, D.J.Sand, L. Tartaglia

NED

SIMBAD

DECaLS

PanSTARRS-1

SkyMapper

VizieR

WISE

DSS

ADS

2000

3 is above the SDSS footprint.

FoV: 2.38

Transient Name Server (TNS) Report a new discovery to get an official IAU name and classification. Can send classification spectra. Works well for specific, functions, but not used for sharing arbitrary information.

Outside
GCN
IAUCs
Alert on Twitter

Patreon

The Astronomer's Telegram
Post | Search | Folders
Credential | Feeds | Email
22 Apr 2022; 20:20 UT

This space for free for your conference.
MIAPP workshop on
Interdisciplinary Science
6 February - 10 March 2023
Garching, Germany

Thanks to Patrons, The Astronomer's Telegram is free to read, free to publish and always will be. Thank you.

Email Circulation:
5897
Get Telegram #
Apply Subject Selections

Combine With:
(Show All) AND
Radio
Millimeter
Sub-Millimeter
Far-Infra-Red
Infra-Red
Optical
Ultra-Violet
X-ray
Gamma Ray
>GeV
TeV
VHE
UHE
Neutrinos
A Comment
AGN
Asteroid
Asteroid (Binary)
Binary

Telegram Index

Telegrams Posted Within the Last 30 Days (All)
52 Selected of 15344 Telegrams

15344 Blazar S4 0954+65 : new absolute brightness maximum
15343 AstroSat view of a quasi-regular large amplitude variability during the current outburst in IGR J17091-3624
15342 Detection of a bright FRB with the Tianlai Cylinder Pathfinder Array
15341 The Quasar 3C 345 reaches a high state of brightness also in the optical range
15340 Gaia22bou: First recorded outburst of symbiotic star WRAY 15-1167
15339 Detection of brightening and optical flickering of RS Ophiuchi
15338 Spectroscopic Classification of AT2022fca with the Lick Shere

ATELstream

Recently
15341 The Quasar 3C 345 reaches a high state of brightness also in the optical range
15338 Swift XRT follow-up observations of the flat spectrum radio quasar 3C 345
Most Viewed
15342 Detection of a bright FRB with the Tianlai Cylinder Pathfinder Array
15341 The Quasar 3C 345 reaches a high state of brightness also in the optical range
15343 AstroSat view of a quasi-regular large amplitude variability during the current outburst in IGR J17091-3624
Fast Radio Burst
15342 Detection of a bright FRB with the Tianlai Cylinder Pathfinder Array
Supernovae
15320 Spectroscopic classification of SN 2022gip by NUTS2 (NOT Un-biased Transient Survey-2)
15309 Spectroscopic classification of transients with the Lick Shane telescope
15305 Discovery of 8 ASAS-SN Supernova Candidates

Astronomer's Telegrams (ATels) Not machine readable. Largely abandoned by transient community.

ANTARES

Lookup Object by ID

Explore Favorites Filters Tags Watch Lists Catalogs Pipeline Properties

FAQ Support Register Login

Latest Alert Within
All time

First Alert Within
All time

Number of Measurements
1 2241

Cone Search
Center: Enter a coordinate string
Radius: 1 arcsec

Catalogs
gaia_dr2 (22.9M)
2mass_psc (21.6M)
allwise (20.9M)
bright_guide_star_cat (20.7M)
sdss_stars (5.0M)
PS1StarGalaxyCatalog (1.9M)
asassn_variable_catalog_v2_20190802
sdss_gals (220.2k)
galax (161.8k)
asassn_variable_catalog (120.5k)

Newest Thumbnails

ID	ZTF ID	RA	Dec	Latest Mag	Brightest Mag	# Alerts	Latest Alert	First Alert	Actions
ANT2020mndza	ZTF18abadtdx	327.11	26.93	19.23	18.89	284	2022-04-21 12:12:49	2018-06-12 10:40:35	...
ANT2020aafju	ZTF18abcoykg	332.71	27.40	17.62	17.20	358	2022-04-21 12:12:49	2018-06-21 10:36:04	...
ANT2020afohz	ZTF18abajwun	334.20	29.44	16.55	16.31	501	2022-04-21 12:12:49	2018-06-18 10:11:11	...
ANT2018d53fu	ZTF18ablgnyy	331.72	27.97	18.12	17.41	267	2022-04-21 12:12:49	2018-08-02 10:40:37	...
ANT2019mz456	ZTF18abftuua	330.24	27.08	17.24	16.77	235	2022-04-21 12:12:49	2018-08-08 09:31:39	...
ANT2020aafvg6	ZTF18abasywg	331.56	27.22	15.72	15.29	463	2022-04-21 12:12:49	2018-06-18 10:11:51	...
ANT2020aef7c	ZTF18abmatxu	330.61	23.94	19.42	18.85	382	2022-04-21 12:12:49	2018-08-08 09:31:39	...
ANT2020aafwai	ZTF18abccqai	330.37	29.09	17.48	16.21	424	2022-04-21 12:12:49	2018-06-18 10:11:51	...
ANT2018dh6zy	ZTF18abasciv	332.60	23.46	15.92	14.97	284	2022-04-21	2018-07-06	...

Brokers Designed for high alert volume, e.g. ZTF, LSST. Can use filters. No easy way as yet for users to report additional information.

HOPSKOTCH

- ▶ New messaging system being built by SCIMMA (Scalable Cyberinfrastructure for Multimessenger Astrophysics) funded by the NSF - see scimma.org
- ▶ Pub-sub model - only subscribe to the information you want. This allows carrying much more information.
- ▶ Will carry existing existing astronomical messages, e.g. GCN Circulars and Notices, possibly Transient Name Server messages, Astronomer's Telegrams.
- ▶ Goal is to increase machine readable information.
- ▶ Can ultimately support other types of messages, e.g. sending images, spectra, data points, observation plans, instrument availability.
- ▶ Based on Kafka – will scale to LSST era.
- ▶ Cloud-based. Hosted by Amazon Web Services
- ▶ Integrated with Identity and Access Management system (CILogon & KeyCloak).



DIFFERENCE BETWEEN HOPSKOTCH AND HERMES




- ▶ Kafka + Libraries
- ▶ Identity and Access Management
- ▶ Topic creation, permissions
- ▶ Can carry any message type (e.g. GCNs, TNS, something new) – no schema
- ▶ Archive



- ▶ Built on HOPSKOTCH
- ▶ Reader and GUI
- ▶ API for submitting certain well-defined message types
- ▶ Machine-readable protocol

HERMES: Hopscotch Enabled Rapid Message Exchange Service

Adds a message browser, GUI, API, message schema to HOPSKOTCH

HERMES

Browse

Submit Message

Stream Status:

About

ahowell@lco.global

gcn.circular

✓

✕

Search Terms

◆TIMESTAMP	TOPIC	◆TITLE	◆SUBMITTER
2 hours ago	gcn.circular	GRB 230510A: Nanshan/NEXT optical afterglow detection	Hop gcn.circular
5 hours ago	gcn.circular	GRB 230510B: MAXI/GSC detection	Hop gcn.circular
7 hours ago	gcn.circular	GRB 230510B: Fermi GBM Final Real-time Localization	Hop gcn.circular
7 hours ago	gcn.circular	GRB 230506B: Fermi GBM detection	Hop gcn.circular
7 hours ago	gcn.circular	GRB 230510A: Swift-XRT refined Analysis	Hop gcn.circular
10 hours ago	gcn.circular	GRB 230510A: Enhanced Swift-XRT position	Hop gcn.circular
11 hours ago	gcn.circular	GRB 230506C: Fermi GBM detection	Hop gcn.circular
11 hours ago	gcn.circular	Fermi trigger No 705413051: Global MASTER-Net observations report	Hop gcn.circular
15 hours ago	gcn.circular	Fermi Gamma-ray Burst Monitor trigger 230510133/705381054 is not a GRB	Hop gcn.circular
16 hours ago	gcn.circular	GRB 230510A: Swift detection of a burst	Hop gcn.circular

«

<

1

2

3

4

...

>

»

Show: 10

⌵

GRB 230510A: Nanshan/NEXT optical afterglow detection

Message ID: [c4bfbdc8](#)

S.Q. Jiang, T.H. Lu, S.Y. Fu, X. Liu, D. Xu (NAOC), Z.P. Zhu (NAOC, HUST), X. Gao (Urumqi No.1 Senior High School), J.Z. Liu (XAO) report:

We observed the field of GRB 230510A detected by Swift (Eyles-Ferris et al., GCN 33752) and Fermi (Fermi GBM team, GCN 33751) using the NEXT-0.6m telescope located at Nanshan, Xinjiang, China. Observations started at 18:47:49.1 UT on 2023-05-10, i.e., 6.69 hr after the Swift/BAT trigger, and 12x200 s exposures have been obtained in the Sloan r-filter.

We detected an uncatalogued optical transient (OT) within the enhanced Swift/XRT error circle (Evans et al., GCN 33756) at coordinates

R.A. (J2000) = 21:12:32.87
Dec.(J2000) = +34:26:35:59

with an uncertainty of ~ 0.5 arcsec, and it has m(r) = 20.5 +/- 0.1 mag in the co-added image at 7.27 hr post-burst, calibrated with the nearby PanSTAR field. PanSTAR covers this position and is much deeper, but the OT is not present. We thus conclude that the OT is the optical afterglow of the burst.

EXTRA KEYPAIRS

Show JSON:

Filter by Topic ▼  

Search Terms

⬆️TIMESTAMP	TOPIC	⬆️TITLE	⬆️SUBMITTER
11 minutes ago	igwn.gwalert	MS230511f - RETRACTION	cody.messick-30d512c8
16 minutes ago	igwn.gwalert	MS230511f - PRELIMINARY	cody.messick-30d512c8
21 minutes ago	igwn.gwalert	MS230511f - PRELIMINARY	cody.messick-30d512c8
an hour ago	igwn.gwalert	MS230511e - RETRACTION	cody.messick-30d512c8
an hour ago	igwn.gwalert	MS230511e - PRELIMINARY	cody.messick-30d512c8
an hour ago	igwn.gwalert	MS230511e - PRELIMINARY	cody.messick-30d512c8
2 hours ago	igwn.gwalert	MS230511d - RETRACTION	cody.messick-30d512c8
2 hours ago	igwn.gwalert	MS230511d - PRELIMINARY	cody.messick-30d512c8
2 hours ago	igwn.gwalert	MS230511d - PRELIMINARY	cody.messick-30d512c8
3 hours ago	gcn.circular	GRB 230510A: Nanshan/NEXT optical afterglow detection	Hop gcn.circular

HERMES is a Message Exchange Service for Multi-Messenger Astronomy applications that allow users to both send and review messages related to a variety of events and targets of interest.

Submission Form

API View

Text View

Title: Fermi and stuff

Topic: hermes.test

Event ID: ?

Authors: ? Howell et al.

☐ Submit to TNS

☐ Submit to GCN

Targets	  
Photometry	  
Add Spectroscopy (beta)	
Add Astrometry	  
References	  
Extra Data	
Message	

Submit

to hermes.test

Clear Form

SN 2022wpy

SN Ia

z= 0.0152

04:46:28.004 -04:47:23.68

71.6167 -4.7899

- Overview
- Details
- Observations
- Manage Data
- Observing Runs
- Images
- Photometry
- Spectroscopy

Known as:

AT 2022wpy

SN 2022wpy

ATLAS22bhuw

Add a new name

Science Interests:

Classification

Ia

Nearby SNe

Young SNe

Select Science Tags

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

Latest Comments

Craig Pellegrino on 2022-10-03

In NGC 1659 (64.3 Mpc, dm=34.04), discovered at 19.0 with a 1 day nondetection at 19.6

Add a comment

Latest Visibility at LCO

Hours From Now	(LCO) Siding Spring	(LCO) Sutherland	(LCO) Teide	(LCO) Cerro Tololo	(LCO) McDonald	(LCO) Haleakala
0		1.5	1.0			
2				1.2	2.8	
4			1.8			
6				1.0	1.8	2.8
8						1.5
10					1.2	
12	1.5					
14						1.2
16	1.8					
18		1.5				
20			2.5			
22		1.2	1.5			
24		1.5	1.0			

Aladin Viewer

J2000

04 46 28.004 -04 47 23.68

FoV: 2.99'

Recent LCO Images

12/01/2022 TFN 1m0 rp 120s

12/01/2022 TFN 1m0 ip 120s

12/01/2022 TFN 1m0 gp 200s

12/01/2022 TFN 1m0 B 200s

12/01/2022 TFN 1m0 V 120s

11/29/2022 ELP 1m0 ip 120s

11/29/2022 ELP 1m0 gp 200s

11/29/2022 ELP 1m0 B 200s

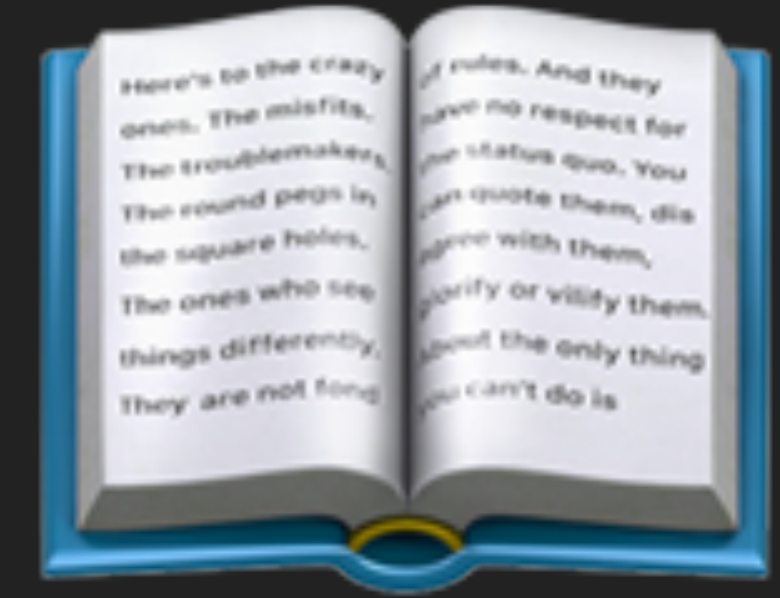
MODERN MESSAGING IS HERE



Low latency



Robust



Machine and human
readable

1

One stop shop



Pub-sub: can distribute any
message

EXTRA SLIDES

Filter by Topic

✓

□

Search Terms

◆TIMESTAMP	TOPIC	◆TITLE	◆SUBMITTER
9 minutes ago	igwn.gwalert	MS230511f - RETRACTION	cody.messick-30d512c8
14 minutes ago	igwn.gwalert	MS230511f - PRELIMINARY	cody.messick-30d512c8
18 minutes ago	igwn.gwalert	MS230511f - PRELIMINARY	cody.messick-30d512c8
an hour ago	igwn.gwalert	MS230511e - RETRACTION	cody.messick-30d512c8
an hour ago	igwn.gwalert	MS230511e - PRELIMINARY	cody.messick-30d512c8
an hour ago	igwn.gwalert	MS230511e - PRELIMINARY	cody.messick-30d512c8
2 hours ago	igwn.gwalert	MS230511d - RETRACTION	cody.messick-30d512c8
2 hours ago	igwn.gwalert	MS230511d - PRELIMINARY	cody.messick-30d512c8
2 hours ago	igwn.gwalert	MS230511d - PRELIMINARY	cody.messick-30d512c8
3 hours ago	gcn.circular	GRB 230510A: Nanshan/NEXT optical afterglow detection	Hop gcn.circular

HERMES is a Message Exchange Service for Multi-Messenger Astronomy applications that allow users to both send and review messages related to a variety of events and targets of interest.

NONLOCALIZED EVENT PAGE IN A TOM, CREATED FROM HERMES MESSAGE

- ▶ Nonlocalized event (e.g. coordinates not well known like in a GW error region) workflow added to TOM Toolkit
- ▶ Your TOM can monitor HERMES and create a page for a GW event automatically thanks to machine readability.
- ▶ Can keep track of viable and non-viable candidates

TOM ToolkitHomeTargetsAlertsObservationsDataNon-Localized EventsUsersjnationLogout

S191216ap

Update 1: 10/28/2022, 6:36:06 AMUpdate 2: 10/28/2022, 6:36:32 AMUpdate 3: 10/28/2022, 6:37:56 AMUpdate 4: 10/28/2022, 6:38:03 AM

S191216ap

Update 4

BNS 0.00

MassGap 0.00

Terrestrial 0.00

NSBH 0.00

BBH 0.99

90%: 253.03

50%: 68.14

FAR 1.131e-23

NS/Rem 0.19

Search Alerts

Identifier	Timestamp	From	Subject
▶ 26835	2020-01-21 08:46:32	Anna Ridnaia at Ioffe Institute	LIGO/Virgo S191216ap: Upper limits from Konus-Wind observations
▶ 26605	2019-12-28 04:40:33	Graham P Smith at U of Birmingham	LIGO/Virgo S191216ap: Two candidate counterparts from UKIRT/WFCAM z-band observations
▶ 26570	2019-12-23 06:27:02	Brandon Piotrkowski at U of Wisconsin-Milwaukee	LIGO/Virgo S191216ap: Updated Source Classification
▶ 26569	2019-12-23 02:58:42	Qi Luo at IHEP	LIGO/Virgo S191216ap: Upper limits from Insight-HXMT/HE observations
▶ 26563	2019-12-22 09:46:21	O. McBrien at QUB	LIGO/Virgo S191216ap: No significant candidates found in Pan-STARRS observations
▶ 26531	2019-12-21 06:40:24	Kunal Mooley at NRAO, Caltech	LIGO/Virgo S191216ap: VLA/JAGWAR radio monitoring of the 1-sigma HAWC region
▶ 26530	2019-12-21 06:33:11	Kunal Mooley at NRAO, Caltech	LIGO/Virgo S191216ap: No radio candidates so far in the VLA/JAGWAR galaxy targeted search
▶ 26529	2019-12-21	Vladimir Lipunov at Moscow State	LIGO/Virgo S191216ap: MASTER optical observation

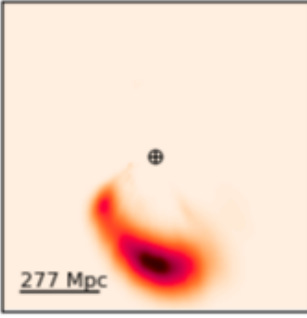
Add Candidate from Existing Target

Add Candidates from Alerts

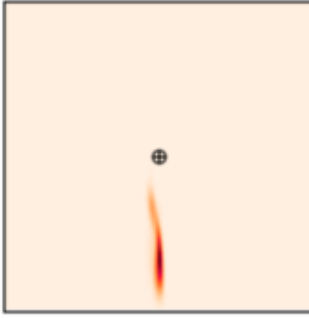
GraceDB BAYESTAR Images



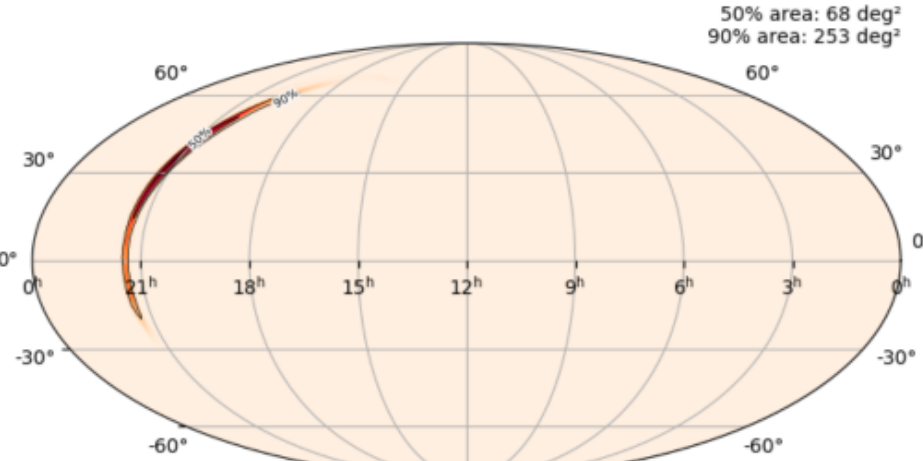
distance: 376±70 Mpc



277 Mpc



555 Mpc




50% area: 68 deg²
90% area: 253 deg²

HERMES – READING

Topic (can read multiple topics simultaneously).

Message text

Selected message

HERMES

[Submit New Non-localized Event](#) [Submit Candidates](#) [Submit Non-Detections](#) [Submit Search Pointings](#) [Report Photometry](#) [Report Spectroscopy](#) [Report Observatory Availability](#) [User](#)

<12345...27>

Topicsgcn.circular

	◆	TIMESTAMP	◆	TITLE	◆	SUBMITTER
	1	2022/06/13		GRB 220608B: Detection by VZLUSAT-2		Jakub Ripa at Masaryk University <ripa.jakub@mail.muni.cz>
	2	2022/06/12		Swift GRB 220611A: Global MASTER-Net observations report		Vladimir Lipunov at Moscow State U/Krylov Obs <lipunov@xray.sai.msu.ru>
	3	2022/06/12		GRB 220611A: Swift-XRT refined Analysis		Phil Evans at U of Leicester <pae9@leicester.ac.uk>
	4	2022/06/12		GRB 220610B: AstroSat CZTI detection		Gaurav Waratkar at IIT,Bombay <gauravwaratkar@iitb.ac.in>
⇒	5	2022/06/11		GRB 220611A: Enhanced Swift-XRT position		Phil Evans at U of Leicester <pae9@leicester.ac.uk>
	6	2022/06/11		GRB 220611A: Swift detection of a burst		David Palmer at LANL <palmer@lanl.gov>
	7	2022/06/11		IPN triangulation of GRB 220609B		Anna Ridnaia at Ioffe Institute <ridnaia@mail.ioffe.ru>
	8	2022/06/11		Fermi GRB 220610A: Global MASTER-Net observations report		Vladimir Lipunov at Moscow State U/Krylov Obs <lipunov@xray.sai.msu.ru>
	9	2022/06/10		GRB 220610A: Fermi GBM Final Real-time Localization		Fermi GBM Team at MSFC/Fermi-GBM <do_not_reply@GIOC.nsstc.nasa.gov>
	10	2022/06/10		Fermi trigger No 676537486: Global MASTER-Net observations report		Vladimir Lipunov at Moscow State U/Krylov Obs <lipunov@xray.sai.msu.ru>

GRB 220611A: Enhanced Swift-XRT position

Phil Evans at U of Leicester <pae9@leicester.ac.uk>

M.R. Goad, J.P. Osborne, A.P. Beardmore and P.A. Evans (U. Leicester) report on behalf of the Swift-XRT team.

Using 496 s of XRT Photon Counting mode data and 1 UVOT images for GRB 220611A, we find an astrometrically corrected X-ray position (using the XRT-UVOT alignment and matching UVOT field sources to the USNO-B1 catalogue): RA, Dec = 66.51464, -37.26019 which is equivalent to:

RA (J2000): 04h 26m 3.51s
Dec (J2000): -37d 15' 36.7"

with an uncertainty of 2.4 arcsec (radius, 90% confidence).

This position may be improved as more data are received. The latest position can be viewed at http://www.swift.ac.uk/xrt_positions. Position enhancement is described by Goad et al. (2007, A&A, 476, 1401) and Evans et al. (2009, MNRAS, 397, 1177).

This circular was automatically generated, and is an official product of the Swift-XRT team.

JSON / data

ADDITIONAL DATA TABLE ≡

Show JSON:

Title:

AT2020vr, AT2020vt, AT2020wa and AT2020wc 10.4m GTC spectroscopy

Topic:





hermes.test

Event ID:

S200114f

Authors:

A. F. Valeev (SAO-RAS), Y.-D. Hu, A. J. Castro-Tirado and E. Fernandez-Garcia (IAA-CSIC), V. Sokolov (SAO-RAS), I. Carrasco and A. Castellon (UMA), S. B. Pandey

ID	RA	Dec	Discovery Date	Telescope	Instrument	Band	Brightness	Brightness Error	Brightness Unit	
AT2020vr	07:34:06.13	+16:46:00.51	58862.15	ztf	ztf	g	20.9	0.209	AB mag	
AT2020vs	07:24:28.50	+16:12:45.85	58862.15	ztf	ztf	g	21.4	0.214	AB mag	
AT2020vu	07:16:47.14	+10:37:18.97	58862.15	ztf	ztf	g	21.6	0.216	AB mag	
AT2020wc	07:03:22.07	+27:22:41.21	58862.16	ztf	ztf	g	20.7	0.207	AB mag	

Add Row

Upload Data to Main Table



A CSV file with the proper header can be uploaded to automatically fill the above table. Click the button below to copy this header to your clipboard.

Copy CSV Header

Choose File

test-hermes-candidates.csv

Additional Data Elements:

Key	Value	
email	ajct@iaa.es	
		

Add Row

Message:

Edit

Preview

Following the detection of AT2020vr/ZTF20aafdytz, AT2020vt/ZTF20aafemum, AT2020wa/ZTF20aafedbk, and AT2020wc/ZTF20aafeccu (Andreoni et al. GCNC 26741) within the error area of the GW event S200114f (LVC, GCNC 26734), we obtained optical spectra covering the range 3700-7400 A with the 10.4m GTC telescope equipped with OSIRIS in La Palma (Spain) starting on Jan 15, 00:01 UT.

For AT2020vr/ZTF20aafdytz, we measure $r = 19.80 \pm 0.02$ on Jan 15, 00:08 UT. The GTC spectrum is consistent with a SN Ia at about 6 days before maximum at redshift $z = 0.213 \pm 0.001$, consistent with the redshift of the host galaxy derived from the emission lines ($z = 0.2132 \pm 0.0005$).

Submit

Clear Form

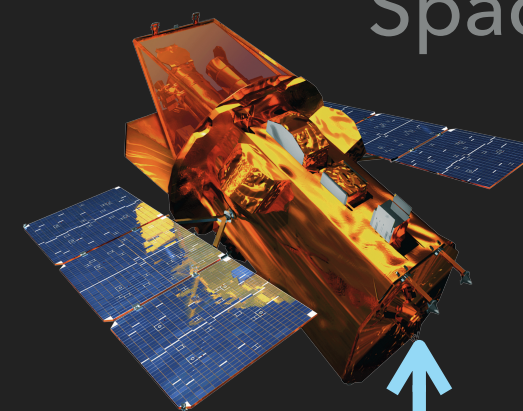


Multimessenger trigger

Broker



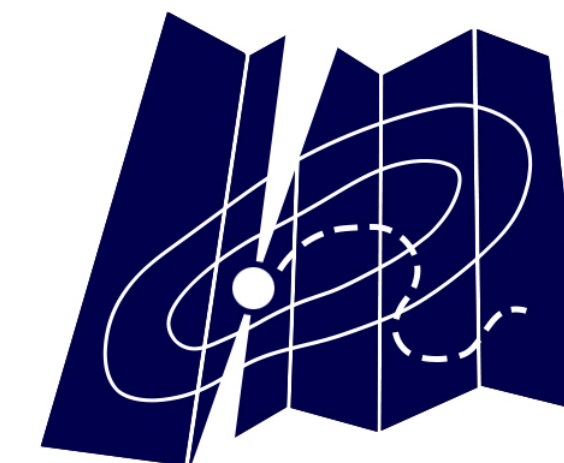
TRANSIENT NAME SERVER



Space Observatories



New Kafka tools

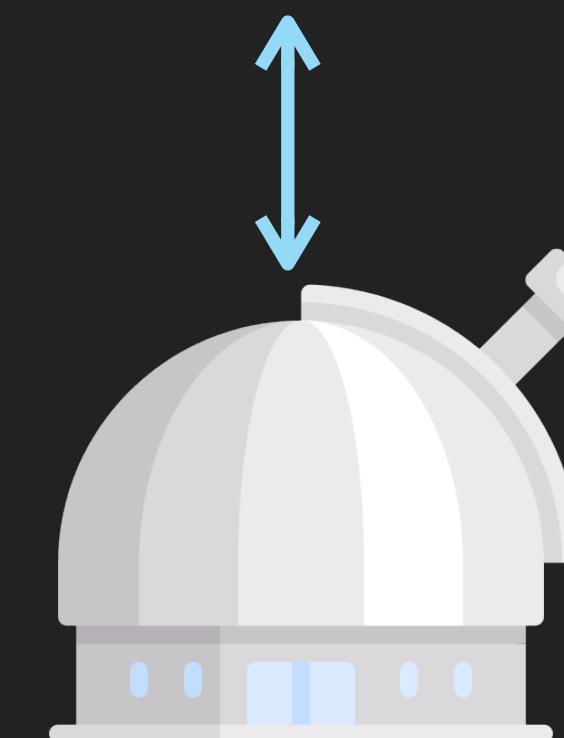


treasuremap.space

Coordinate, visualize follow-up



Target & Observation Manager



Observatory

A NEW SOCIOLOGY?

- ▶ Right now we have either data that is fully public or fully private.
- ▶ This leads to duplication of data and inefficient use of resources because people don't know what others have found.
- ▶ We are disincentivized from sharing in real time because someone else can publish our data without us if we make it public.
- ▶ We need something in-between, a way for people to share preliminary data publicly, but still get credit.
- ▶ **Proposed solution:** a license when you share data that explains how it can be used, like software licenses. For example, "you can use this data for planning purposes and inferences, but if you want to publish it you have to ask me." This could be a flag sent with the data.

SUMMARY

- ▶ We need new communication infrastructure and software tools to fully realize the potential of LIGO-Virgo-Kagra, Vera Rubin Observatory, and other new facilities
- ▶ We are making improvements in nearly every step of this process, especially AEON for streamlining triggering, Treasure Map for finding targets, HEROIC for resource availability, the TOM Toolkit for data reduction, analysis, telescope triggering, and HOPSKOTCH & HERMES for messaging. Many of these were built to work together but can also work on their own.
- ▶ Some problems are still unsolved, especially data lakes and archive compatibility
- ▶ MMA is a useful driver because it has some of the most stringent requirements, but these tools should be useful for many other areas of transient astronomy.