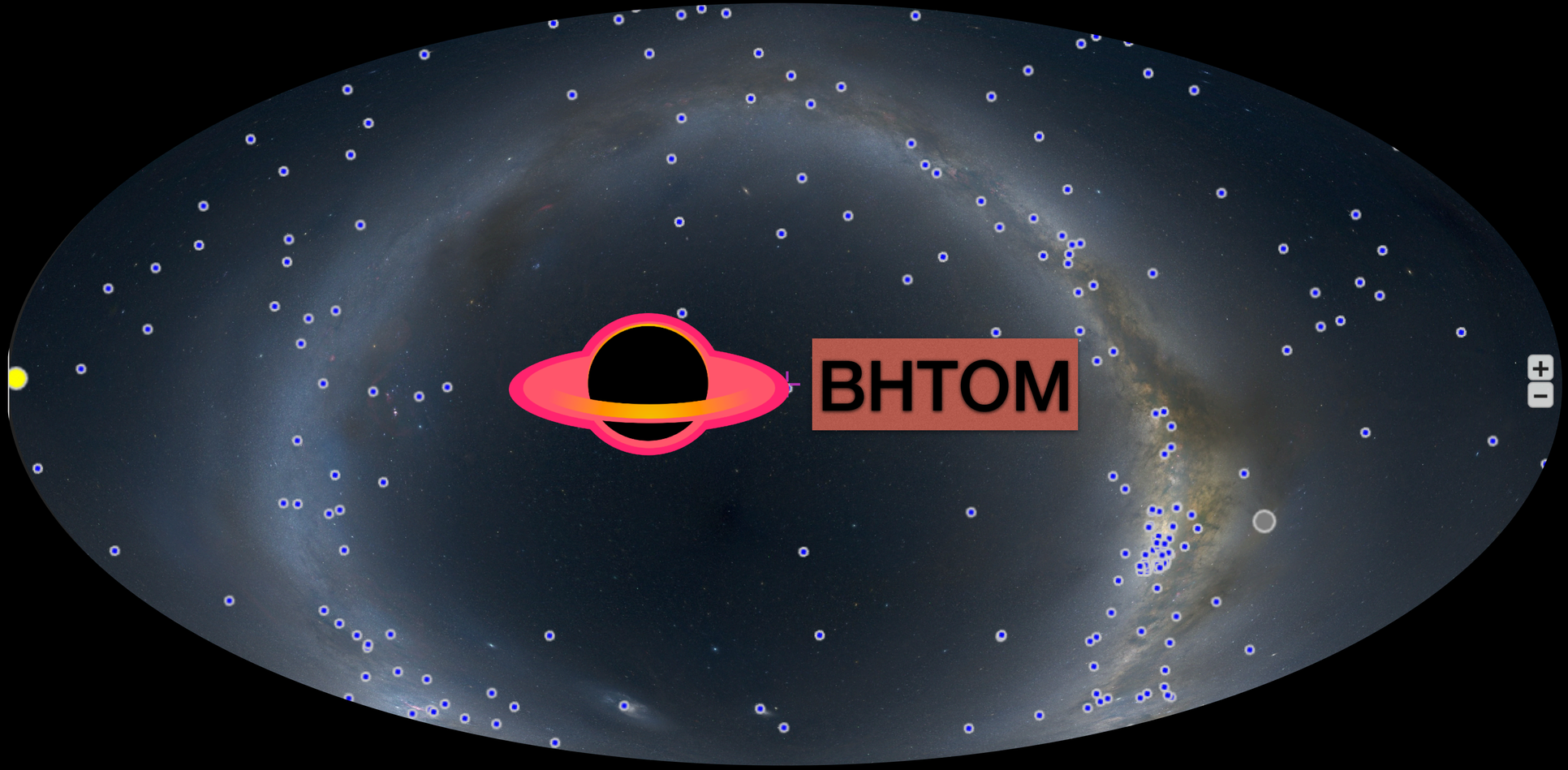

Small telescopes for big science

Łukasz Wyrzykowski

(pron. Woo-cash Vi-zhi-kov-ski)

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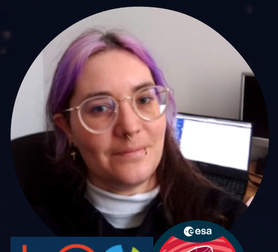

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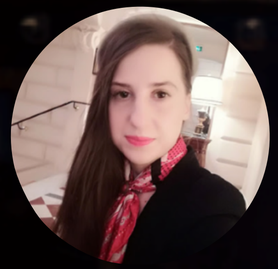

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Funding:

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Funding:

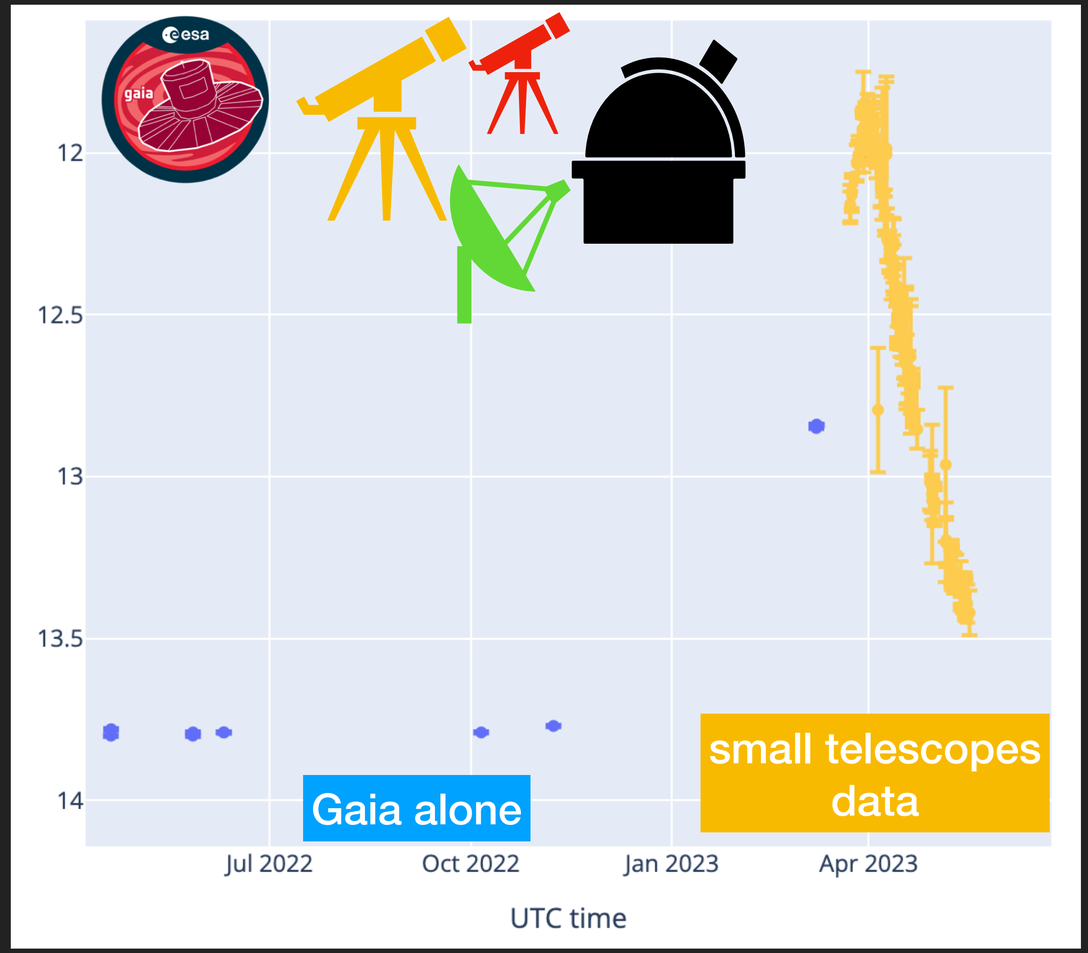
OPTICON-RADIONET PILOT GRANT

https://www.orp-h2020.eu/

- 15 M€ from EC H2020 for 2021-2025.02
- transnational access to optical and radio telescopes and excellence centres (VLTI)
- training via schools and workshops
- improvement of observing services and data access
- harmonisation of observing requests and proposal tools
- virtual access to facilities via coordinated hubs in time-domain

SMALL TELESCOPE FOR BIG SCIENCE

- part of OPTICON since 2013
- there are hundreds of small telescopes (0.3-2m) around the world
- owned by universities, research institutes, outreach institutions, private
- easy and cheap to buy, but hard to operate and use efficiently
- about 100 small telescopes have donated their observing time to our system for time-domain observations, primarily for Gaia microlensing events
- BHTOM system started in 2020 based on LCO's TOM Toolkit

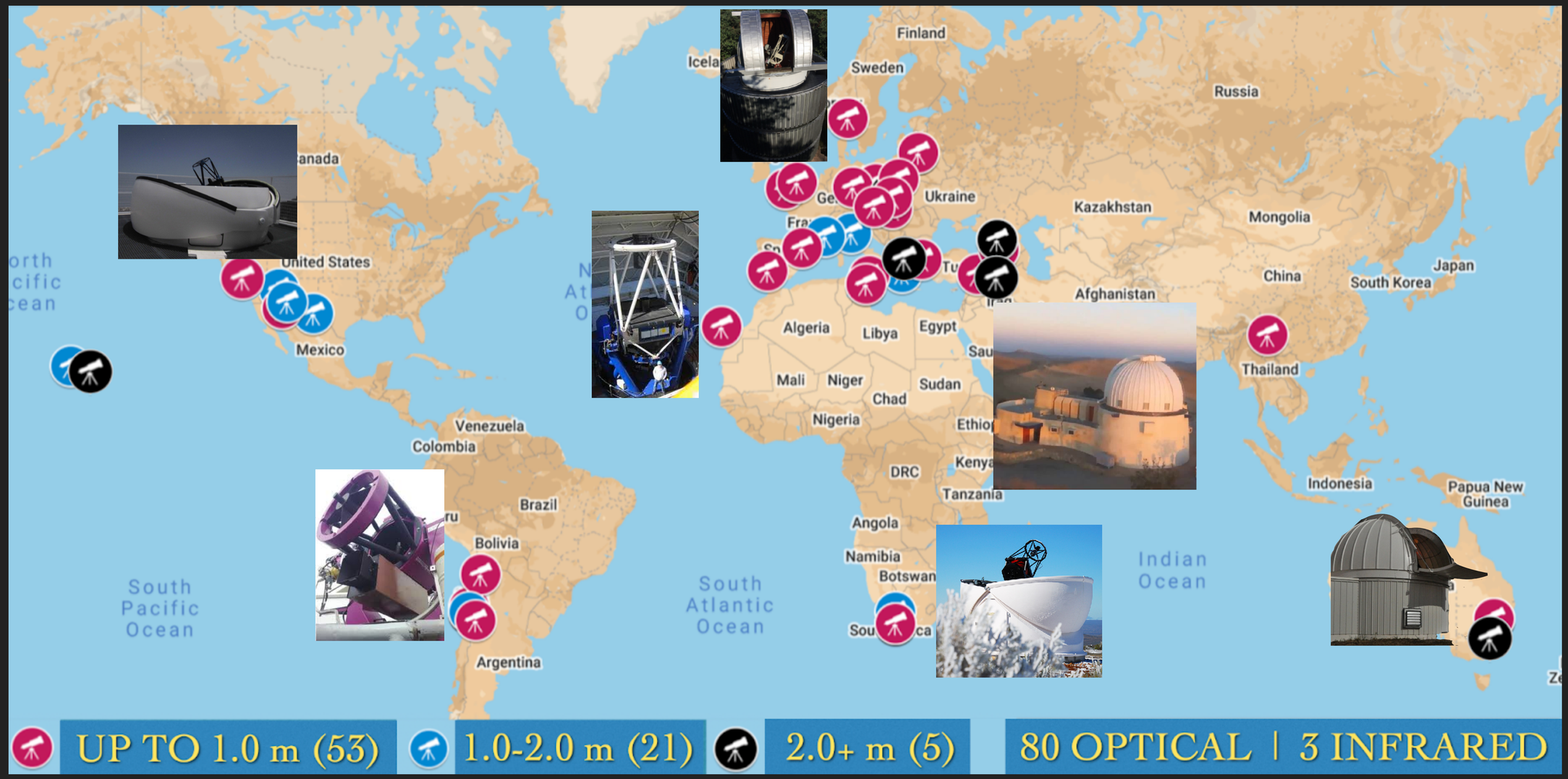


GAIA23BAY

BHTOM TELESCOPE NETWORK

- since 2013, built for Gaia Alerts

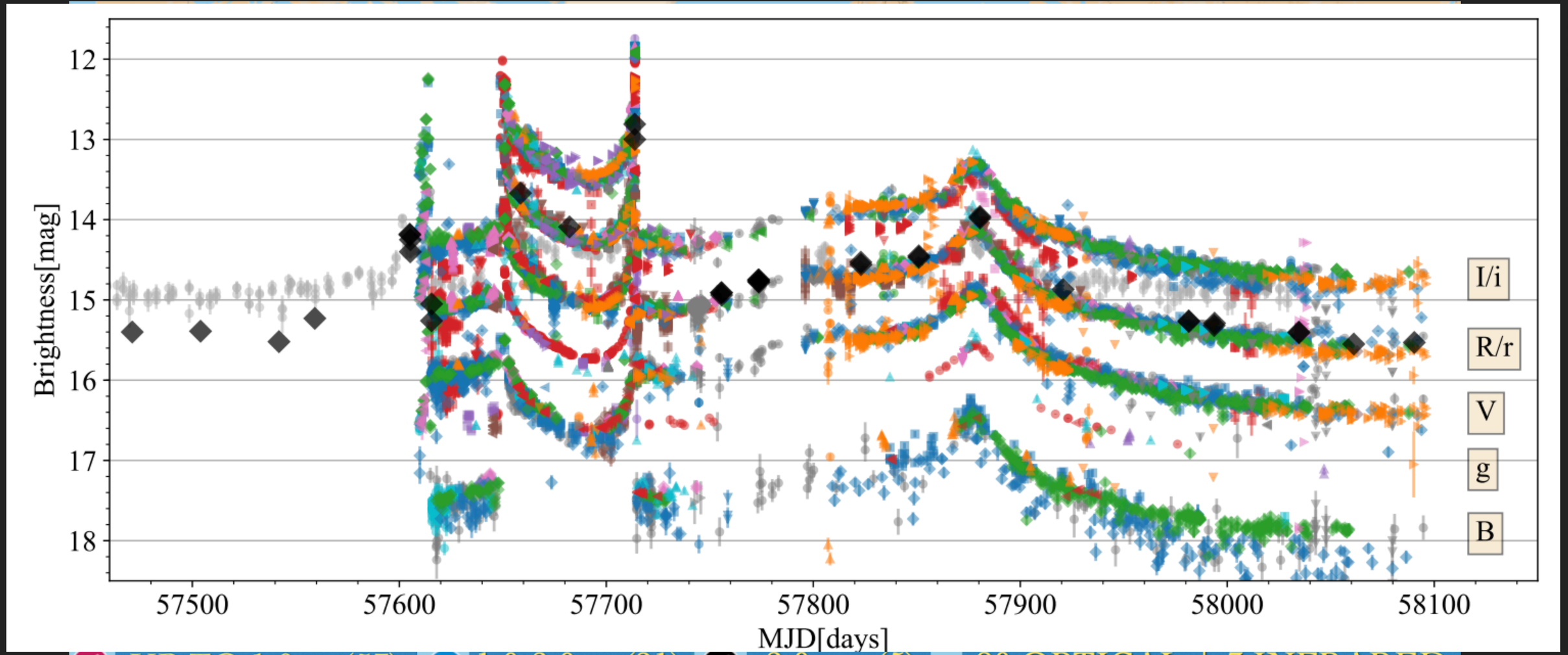
OPTICON RadioNet Pilot



BHTOM TELESCOPE NETWORK

- since 2013, built for Gaia Alerts

OPTICON RadioNet Pilot

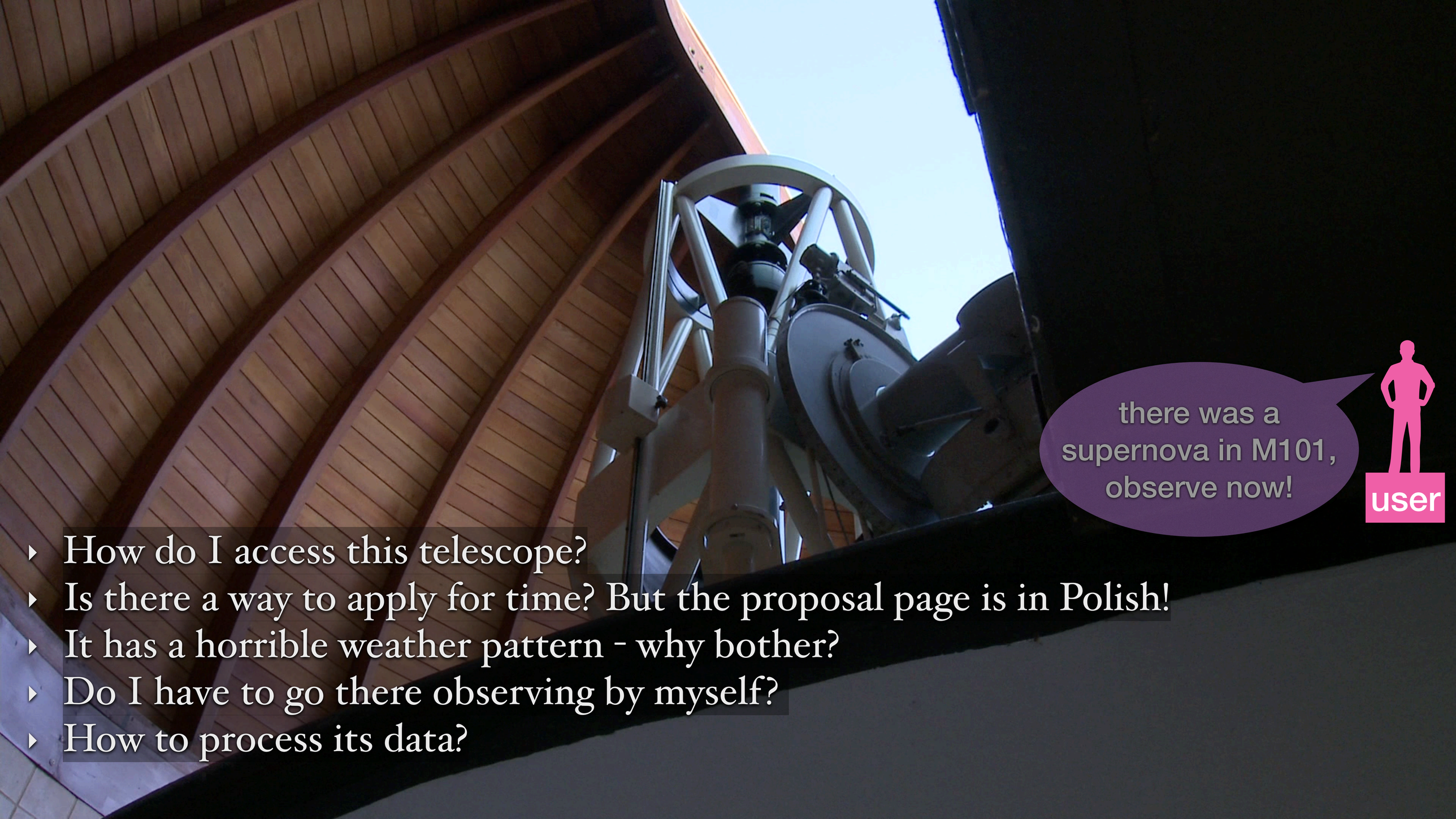


Ostrowik 60-cm telescope founded in 1973

- What can I use my telescope for?
- I only have 30 clear nights a year… Let's close it and sell the forest…
- I can go observing any time but don't know what to observe
- I can process its data in an automated fashion
- My students use the telescope for their training but they lack ideas what to observe
- I need to justify the existence of the telescope with publications

Ostrowik 60-cm telescope founded in 1973


there was a supernova in M101, observe now!
user

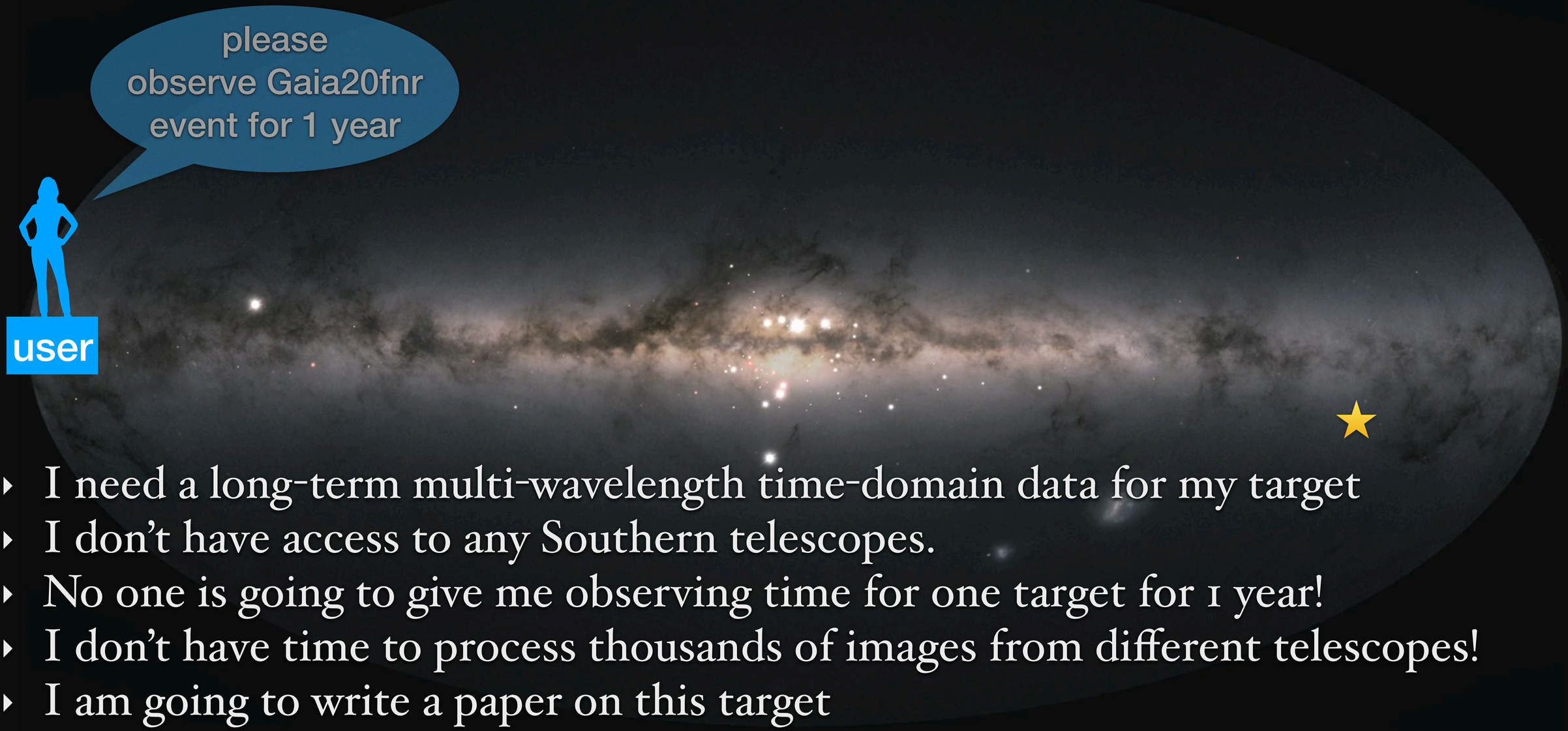


- How do I access this telescope?
- Is there a way to apply for time? But the proposal page is in Polish!
- It has a horrible weather pattern - why bother?
- Do I have to go there observing by myself?
- How to process its data?

MICROLENSING EVENTS DISCOVERED BY GAIA DATA 2014–2018

2016.8 ***Wyrzykowski+2023*** https://youtu.be/o17MoMTbwy0 *anim. by Maja Jabłońska, Andrzej Krupka, LW*

MICROLENSING EVENTS DISCOVERED BY GAIA DATA 2014–2018



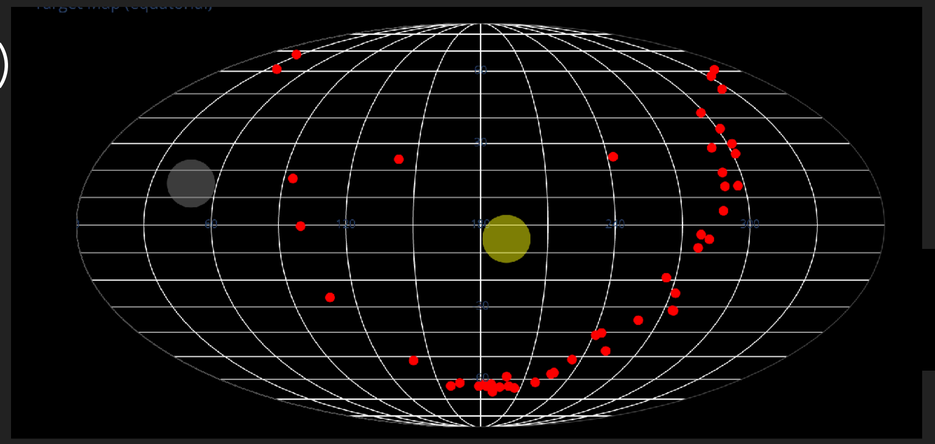
- I need a long-term multi-wavelength time-domain data for my target
- I don't have access to any Southern telescopes.
- No one is going to give me observing time for one target for 1 year!
- I don't have time to process thousands of images from different telescopes!
- I am going to write a paper on this target

2016.8 ***Wyrzykowski+2023*** https://youtu.be/o17MoMTbwy0 *anim. by Maja Jabłońska, Andrzej Krupka, LW*

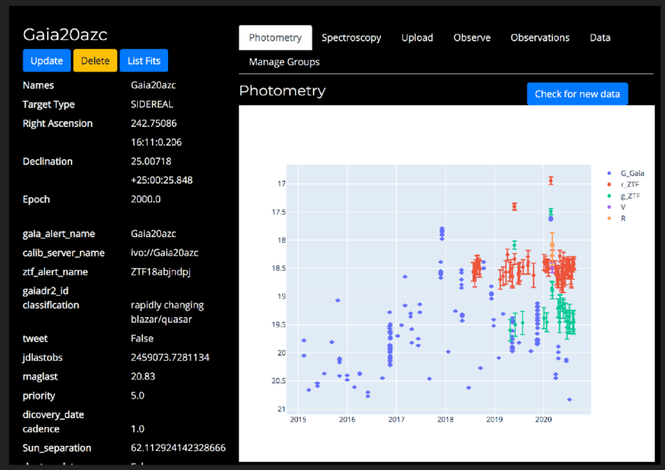
BHTOM V.1 (2021–2023)

https://bhtom.space

- coordination of long-term monitoring of targets
- processing of raw images (PSF photometry)
- automated standardisation (to GaiaSP)
- automated observation requests



Event Name/Aliases	RA	Dec	Number of Observations	Last Gaia [mag]	Target Importance	Time from last obs [days]	Required Cadence [days]	Observing Priority	Sun distance [deg]
Gaia18cbf	241.1619	-41.10483	3164	20.13	10.0	29.9	1.0	299.1	64
Gaia20azc	242.75086	25.00718	444	20.83	5.0	54.1	1.0	270.6	62
Gaia20bof	184.61816	-63.49726	10852	15.7	8.0	13.9	0.5	223.0	61
Gaia19dak	302.36516	29.93588	3316	18.98	9.0	24.3	1.0	219.1	115
Gaia20cek	343.03385	60.66898	3333	12.46	10.0	16.1	1.0	160.6	119
Gaia20bgu	205.559	-64.31565	92	16.57	9.0	11.9	1.0	107.4	64
Gaia19cnm	227.93683	-57.0571	5396	18.03	10.0	9.4	1.0	94.3	65



BHTOM V.2 FROM OCTOBER 2023

https://bhtom.space

- re-designed to work faster (docker, kafka)
- access to the vast number of archives
- facilitates preparing publications (AI-assisted)
- customizable for users, private filters, targets

OPTICON RadioNet Pilot

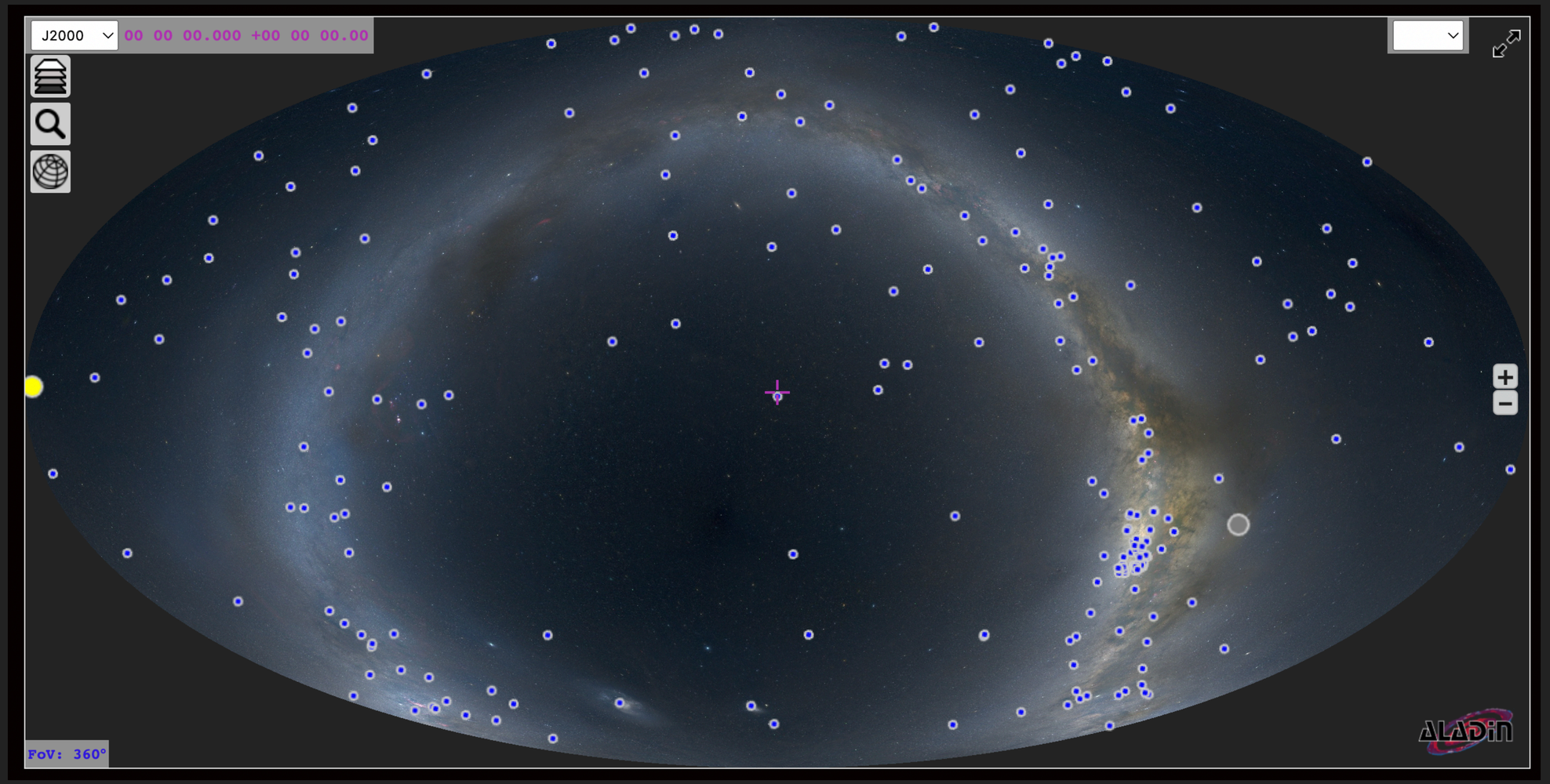
TOM TOOLKIT Las Cumbres Observatory LCO

LCO

///AkondLab.

BHTOM

https://bhtom.space



BHTOM – PRIORITARIZATION OF TARGETS

Any time-domain target can be added! Transients, variable stars, etc.

	Names	RA	Dec	Nobs	Last Gmag	Last Filter	Importance	Created	Priority	Sun	Class
☐	Gaia18acq	22:05:42.324	+03:39:17.064	982	20.2	Gaia/r	9.99	2023-09-18 10:09:17	799.0	155	long_period_variable
☐	Gaia22bpl	10:38:42.425	-61:15:49.680	903	12.7	Gaia/r	9.99	2023-09-18 10:09:48	208.6	64	microlensing_event
☐	Gaia22awa	19:04:51.962	-08:34:00.660	1602	15.0	Gaia/r	9.99	2023-09-17 21:09:11	770.1	111	microlensing_event
☐	ZTF19abflrit	18:24:23.314	-24:36:42.053	842	15.2	Gaia/r	0.0	2023-09-19 11:09:02	0.0	100	long_period_variable

Targets from:

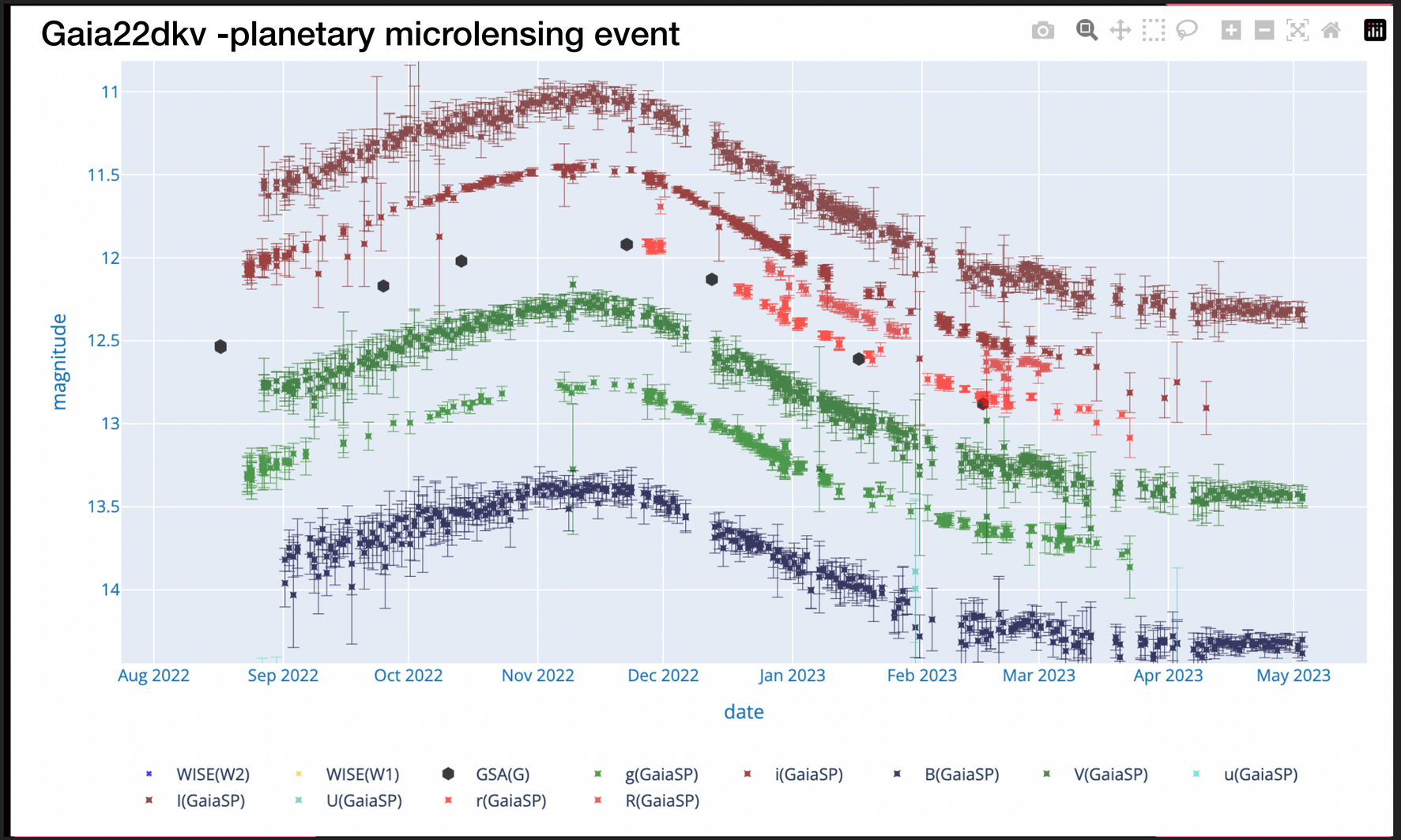
- ✓ Gaia Alerts
- OGLE EWS
- TNS
- ANTARES
- Simbad
- NED
- JPL Horizons

BHTOM – ARCHIVES

- automated harvesting archival time-domain data
- only public
- ZTF
- NEOWISE+ALLWISE
- LINEAR, CRTS
- Gaia DR3
- Gaia Alerts
- SDSS, PS1, DECAPS
- ATLAS almost there
- OGLE EWS almost there
- KMT NET almost there
- DASH - Harvard photografic plates TBA

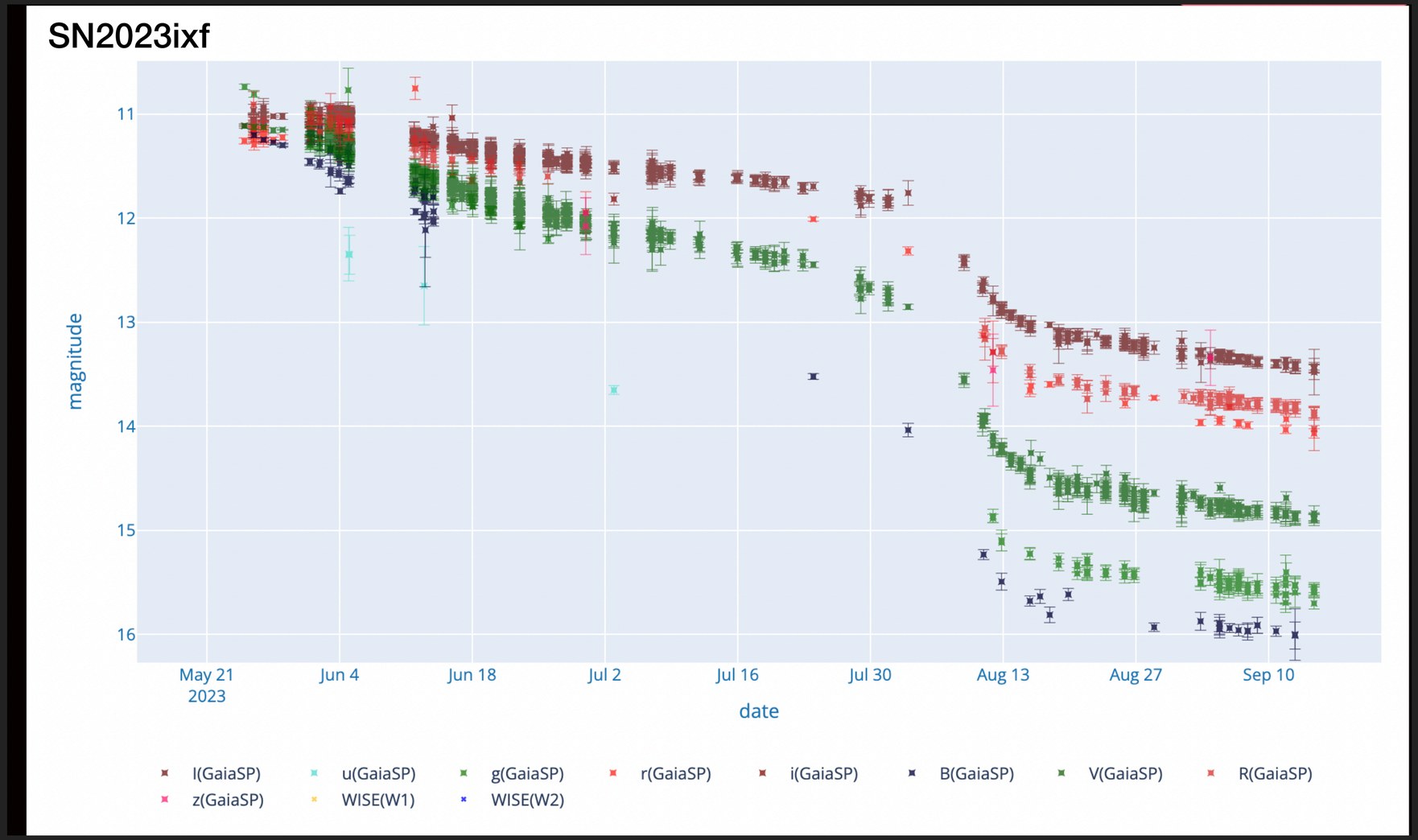
BHTOM – FITS PROCESSING

- CCDPhot - the engine
- combination of SExtractor Daophot and Scamp
- manual set-up per instrument
- automated processing, 99% successful
- slow (minutes)
- upload can be scripted



BHTOM – STANDARDISATION

- instrumental data from users or from CCDPhot
- automated standardisation to Gaia Synthetic Photometry
- formerly run as: Cambridge Photometric Calibration Server (CPCS, Zielinski+ 2019)



BHTOM – MODELS

- automated models for data
- interactive selection of data
- standard microlensing
- parallax microlensing
- planned:
  peak detection
  TDE

Microlensing parallax model for Gaia21azb

Gravitational microlensing model with parallax using MulensModel (Poleski&Yee 2018)

Fit initial values:

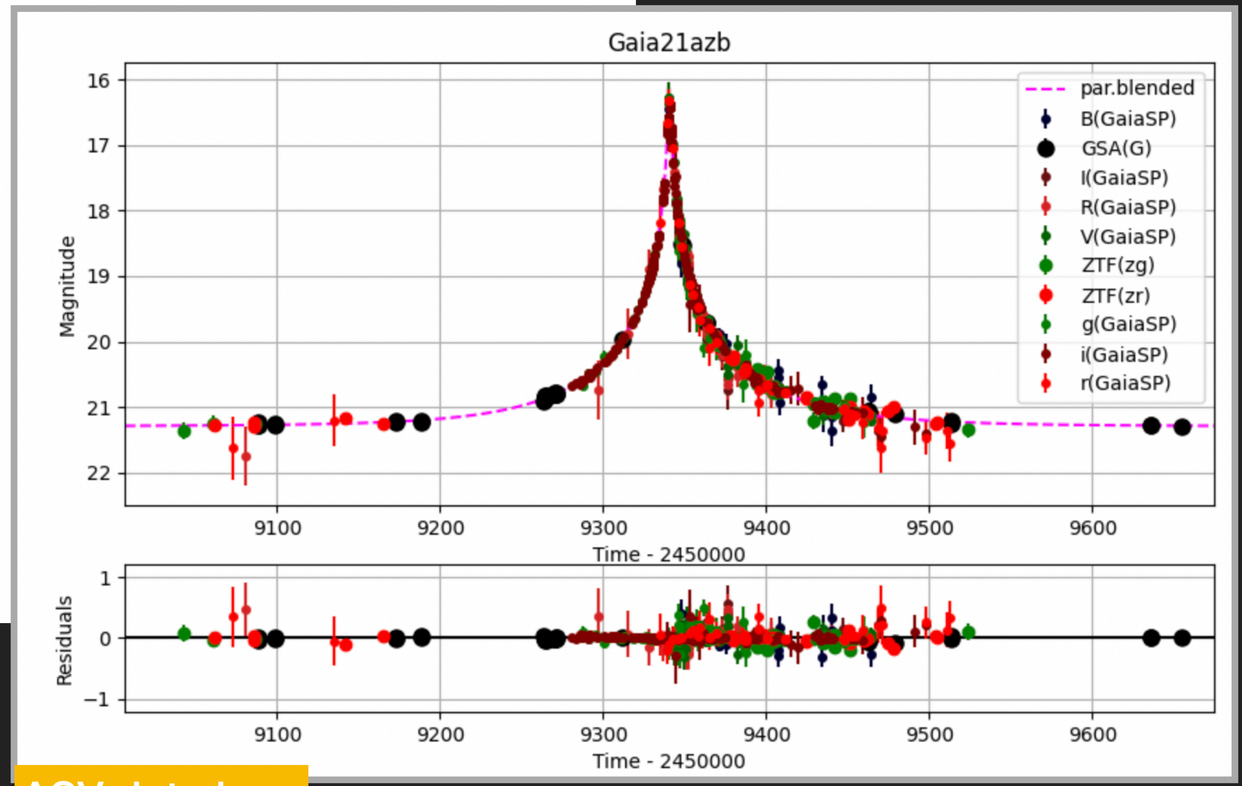
t0: 2459323.038080 u0: 0.158959 tE: 50.0000 piEN: 0.00000 piEE: 0.00000 logu0: ☐ fixblending: ☐ auto_init: ☐

Available filters and number of datapoints:

Select All | Deselect All

- ☐ ASASSN(V) 57
- ☐ ASASSN(g) 1172
- ☑ B(GaiaSP) 39
- ☑ GSA(G) 158
- ☑ I(GaiaSP) 66
- ☐ PS1(g) 1
- ☐ PS1(i) 1
- ☐ PS1(r) 1
- ☐ PS1(z) 1
- ☑ R(GaiaSP) 82
- ☑ V(GaiaSP) 68
- ☑ ZTF(zg) 31
- ☑ ZTF(zr) 38
- ☑ g(GaiaSP) 140
- ☑ i(GaiaSP) 592
- ☑ r(GaiaSP) 41
- ☐ u(GaiaSP) 1
- ☐ z(GaiaSP) 6
- ☐ WISE(W1) 31
- ☐ WISE(W2) 25

MODEL

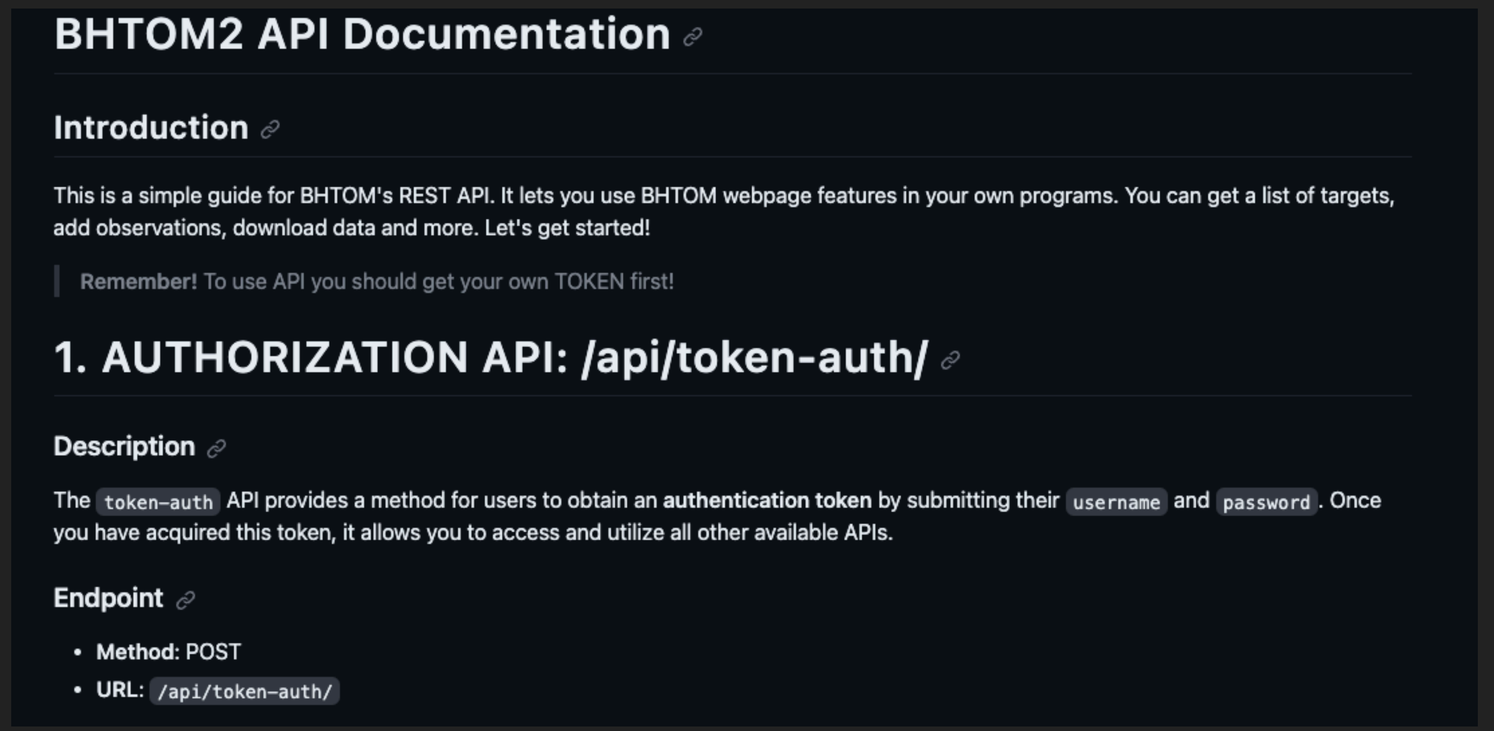


ASV data here

BHTOM - API

https://bhtom.space

- all functionalities of BHTOM available programmatically!
- upload (fits, dat, spec)
- target list and filtering
- data download
- standardisation results



BHTOM2 API Documentation

Introduction

This is a simple guide for BHTOM's REST API. It lets you use BHTOM webpage features in your own programs. You can get a list of targets, add observations, download data and more. Let's get started!

> **Remember!** To use API you should get your own TOKEN first!

1. AUTHORIZATION API: /api/token-auth/

Description

The `token-auth` API provides a method for users to obtain an **authentication token** by submitting their `username` and `password`. Once you have acquired this token, it allows you to access and utilize all other available APIs.

Endpoint

- **Method**: POST
- **URL**: `/api/token-auth/`

docs.bhtom.space

BHTOM – PUBLICATION

Photometry | Models | Spectroscopy | Observe | Observations | Publication | Manage Data | Manage Groups

Generate LaTeX target description

Photometry Stats

Facility	Filters	Number	Min MJD	Max MJD
ALLWISE	WISE(W1), WISE(W2)	41	55369.64	55556.85
CRTS	CRTS(CL)	284	53479.24	56476.45
Gaia Alerts	GSA(G), G(GAIA_ALERTS)	270	56882.22	59948.55
NEOWISE	WISE(W1), WISE(W2)	461	56656.33	59739.5
PS1	PS1(g), PS1(r), PS1(i), PS1(z)	4	55727.28	56137.46
ZTF	ZTF(zg), ZTF(zr), ZTF(zi)	353	58203.3	60064.27

Download photometry stats as LaTeX table

Gaia Archive parameters

Parameter	GDR2	GDR3
parallax [mas]	-0.748±0.48	-0.469±0.4
PM RA [mas/yr]	-0.664±1.144	-0.113±0.502
PM Dec [mas/yr]	-0.186±0.546	0.012±0.349
RUWE / AEN [mas]	1.021 / 0.716	1.026 / 0.85
Dist_med_geo [kpc]	-	3.392

Generate LaTeX description for Gaia21fkl

ChatGPT-generated title:

"Puppis-Powered: Unlocking the Mysteries of Gaia21fkl's Black Hole Candidate!"

Copy/paste to your paper

Prompt used for the title

Suggest a catchy title about a black hole candidate found with microlensing named Gaia21fkl, found in the constellation Puppis.

ChatGPT-generated LaTeX target description:

Gaia21fkl was discovered by \textit{Gaia} Science Alerts (GSA) on 2021-12-03 18:50 (MJD = 59551.78491) and was made available on the GSA website \footnote{\href{http://gsaweb.ast.cam.ac.uk/alerts/alert/Gaia21fkl/}{http://gsaweb.ast.cam.ac.uk/alerts/alert/Gaia21fkl/}}. Transient name server designations for this event are Gaia21fkl (GAIA_ALERTS) 5712117323266396544 (GAIA_DR3) NEOWISE+J116.61824_-21.87556 (NEOWISE) CRTS+J116.61824_-21.87556 (CRTS) PS1_81741166182359645 (PS1). It has equatorial coordinates RA, Dec(J2000.0)= 07:46:28.378, -21:52:32.016 and galactic coordinates l,b = 238.551541, 1.520389 in the constellation Puppis. A finding chart with the event's

Copy/paste to your paper

Prompt used

Rephrase and keep LaTeX: \quad Gaia21fkl({tns} according to the IAU transient name server) Gaia21fkl was discovered by \textit{Gaia} Science Alerts (GSA) on 2021-12-03 18:50 (MJD = 59551.78491) and was posted on the GSA website \footnote{\href{http://gsaweb.ast.cam.ac.uk/alerts/alert/Gaia21fkl/}{http://gsaweb.ast.cam.ac.uk/alerts/alert/Gaia21fkl/}}. Other surveys' names include: Gaia21fkl(GAIA_ALERTS) 5712117323266396544(GAIA_DR3) NEOWISE+J116.61824_-21.87556(NEOWISE) CRTS+J116.61824_-21.87556(CRTS) PS1_81741166182359645(PS1) . The event was located at equatorial coordinates RA, Dec(J2000.0)= 07:46:28.378, -21:52:32.016 and galactic coordinates l,b = 238.551541, 1.520389 in constellation Puppis. The finding chart with the

BHTOM – PUBLICATION ▸ All observers acknowledged as co-authors

OPTICON RadioNet Pilot

Monthly Notices of the ROYAL ASTRONOMICAL SOCIETY
MNRAS 515, 1774–1787 (2022) https://doi.org/10.1093/mnras/stac1915
Advance Access publication 2022 July 12

Photometric and spectroscopic study of the burst-like brightening of two *Gaia*-alerted young stellar objects

Zsófia Nagy [1,2★] Péter Ábrahám,[1,2,3] Ágnes Kóspál,[1,2,3,4] Sunkyung Park [1,2] Michał Siwak,[1,2] Fernando Cruz-Sáenz de Miera,[1,2] Eleonora Fiorellino,[1,2,5] David García-Álvarez,[6,7] Zsófia Marianna Szabó,[1,2,8,9] Simone Antoniucci,[5] Teresa Giannini,[5] Alessio Giunta,[10] Levente Kriskov Mária Kun [1,2] Gábor Marton,[1,2] Attila Moór,[1,2] Brunella Nisini,[5] Andras Pál,[1,2,3] László Szaba Paweł Zieliński[11] and Łukasz Wyrzykowski[12]

The Astrophysical Journal, 899:130 (8pp), 2020 August 20

Gaia 18dvy: A New FUor in the Cygnus OB3 Association

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Full orbital solution for the binary system in the northern Galactic disc microlensing event Gaia16aye★

Łukasz Wyrzykowski[1,★★], P. Mróz[1], K. A. Rybicki[1], M. Gromadzki[1], Z. Kołaczkowski[45,79,★★★], M. Zieliński[1], P. Zieliński[1], N. Britavskiy[4,5], A. Gomboc[35], K. Sokolovsky[19,3,66], S.T. Hodgkin[6], L. Abe[89], G.F. Aldi[20,80], A. AlMannaei[62,100], G. Altavilla[72,7], A. Al Qasim[62,100], G.C. Anupama[8], S. Awiphan[9], E. Bachelet[63], V. Bakis[10], S. Baker[100], S. Bartlett[50], P. Bendjoya[11], K. Benson[100], I.F. Bikmaev[76,87], G. Birenbaum[12], N. Blagorodnova[24], S. Blanco-Cuaresma[15,74], S. Boeva[16], A.Z. Bonanos[19], V. Bozza[20,80], D.M. Bramich[62], I. Bruni[25], R.A. Burenin[84,85], U. Burgaz[21], T. Butterley[22], H. E. Caines[34], D. B. Caton[93], S. Calchi Novati[83], J.M. Carrasco[23], A. Cassan[29], V. Čepas[56], M. Cropper[100], M. Chruślińska[11,24], G. Clementini[25], A. Clerici[35], D. Conti[91], M. Conti[48], S. Cross[63], F. Cusano[25], G. Damljanovic[26], A. Dapergolas[19], G. D'Ago[81], J. H. J. de Bruijne[27], M. Dennefeld[29], V. S. Dhillon[30,4], M. Dominik[31], [31,53], S. J. Fossey[34], A. I. [anowicz[1,36]], C. Han[2], B. [erden[103]], V. L. Hoette[95], K. [. Itoh[43]], P. Iwanek[1], Khamitov[44,76], Y.Kilic[32], J. , G. Latev[16], C-H. Lee[17,18], J. Manser[52], S. Mao[53], D. [ntjes[103]], S. S. Melnikov[76,87], [hy[102]], S. Nazarov[90], H. [laversa[6,74]], A. Pandey[99], E. [96,97]], J. K. T. Qvam[98], C. [89]], G. Rixon[6], D. Roberts[47], [happee[69]], R. Schmidt[41], Y. [es[34]], B. van Soelen[103], Z. T. I. Szegedi[103], L. M. Tinjaca [ambsganss[41,42]], I. P. van der [Toulas[76,87]], D. G. Zhukov[76], J. A. Zubareva[73,3]

Nakhatutai[35], W. Ogłoza[42], J. M. Olszewska[39], M. Polińska[39], A. Popowicz[25], J. K. T. Qvam[26], M. Radziwonowicz[2], A. Słowikowska[37,3], A. Simon[30,31], E. Sonbas[40,41] M. Stojanovic[6] Y. Tsapras[36], S. Vanaverbeke[16], R. W. Wilson[29], M. Zejmo[24], S. Zola[28],

Lens mass estimate in the Galactic disk extreme parallax microlensing event Gaia19dke

M. Maskoliūnas[1], Ł. Wyrzykowski[2], K. Howil[2], K. A. Rybicki[2], P. Zieliński[3], Z. Kaczmarek[4], K. Kruszyńska[2], M. Jabłońska[2], J. Zdanavičius[1], E. Pakštienė[1], V. Čepas[1], P. J. Mikołajczyk[2,8], R. Janulis[1], M. Gromadzki[2], N. Ihanec[2], R. Adomavičienė[1], K. Šiškauskaitė[1], M. Bronikowski[2,7], P. Sivak[2], A. Stankevičiūtė[2], M. Sitek[2], M. Ratajczak[2], U. Pylypenko[2], I. Gezer[5], S. Awiphan[9], E. Bachelet[10], K. Bąkowska[3], R. P. Boyle[12], V. Bozza[32,33], S. M. Brincat[13], U. Burgaz[11], T. Butterley[29], J. M. Carrasco[14], A. Cassan[38], F. Cusano[15], G. Damljanovic[6], V. S. Dhillon[22], M. Dominik[39], F. Dubois[16], H. H. Esenoglu[17], R. Figuera Jaimes[34], A. Fukui[19], C. Galdies[20], A. Garofalo[15], V. Godunova[21], T. Güver[17,18], J. Heidt[22], M. Hundertmark[36], I. Izviekova[3], B. Joachimczyk[3], M.K. Kamińska[39],K. Kamiński[39],S. Kaptan[17,18], T. Kvernadze[24], O. Kvaratskhelia[24], S. Littlefair[22], O. Michniewicz[24],

Single lens mass measurement in the high magnification microlensing event Gaia19bld located in the Galactic Disk

K. A. Rybicki,★[1] Ł. Wyrzykowski,[1] E. Bachelet,[2] A. Cassan,[3] P. Zieliński,[1] A. Gould,[4,5] S. Calchi Novati,[6] J.C. Yee,[7] Y.-H. Ryu,[8] M. Gromadzki,[1] P. Mikołajczyk,[9] N. Ihanec,[1] K. Kruszyńska,[1] F.-J. Hambsch,[10,11] S. Zola,[12] S. J. Fossey,[13] S. Awiphan,[14] N. Nakharutai,[15] F. Lewis,[16,17] F. Olivares E.,[18] S. Hodgkin,[19] A. Delgado,[19] E. Breedt,[19] D. L. Harrison,[19,20] M. van Leeuwen,[19] G. Rixon,[19] T. Wevers,[19] A. Yoldas,[19] A. Udalski,[1] M. K. Szymański,[1] I. Soszyński,[1] P. Pietrukowicz,[1] S. Kozłowski,[1] J. Skowron,[1] R. Poleski,[1] K. Ulaczyk,[21,1] P. Mróz,[1,22] P. Iwanek,[1] M. Wrona,[1] R.A. Street,[2] Y. Tsapras,[23] M. Hundertmark Gaudi,[5] C. Henderson,[6] Y. Shvartzvald,[25] W. Zang

SN 2018zd: An Unusual Stellar Explosion as Part of the Diverse Type II Supernova Landscape

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AT2021uey: A planetary microlensing event outside the Galactic bulge

Ban, M.[1], Voloshyn, P.[2,3], Adomavičienė, R.[4], Bachelet, E.[5,6], Bozza, V.[7,8], Brincat, S. M.[9], Bruni, I.[10], Burgaz, U.[11], Carrasco, J. M.[12], Cassan, A.[5], Čepas, V.[4], Dominik, M.[13], Dubois, F.[14], Figuera Jaimes, R.[15], Fukui, A.[16,17], Galdies, C.[18,19], Garofalo, A.[10], Hundertmark, M.[20], Kruszyńska, K.[1], Kulijanishvili, V.[21], Kvernadze, T.[21], Logie, L.[14], Maskoliūnas, M.[4], Mikołajczyk, P. J.[1,22], Mróz, P.[1], Narita, N.[16,17,23], Pakštienė, E.[4], Peloton, J.[3], Poleski, R.[1], Qvam, J. K. T.[24], Rau, S.[14], Rota, P.[7,8] Rybicki, K. A.[1,25], Street, R. A.[26], Tsapras, Y.[20], Vanaverbeke, S.[14], Wambsganss, J.[20], Wyrzykowski, Ł.[1], Zdanavičius, J.[4], and Zieliński, P.[27]

The *Gaia* alerted fading of the FUor-type star Gaia21elv

Zsófia Nagy,[1,2★] Sunkyung Park,[1,2] Péter Ábrahám,[1,2,3] Ágnes Kóspál,[1,2,3,4] Fernando Cruz-Sáenz de Miera,[1,2] Mária Kun,[1,2] Michał Siwak,[1,2] Zsófia Marianna Szabó,[1,2,5,6] Máté Szilágyi,[1,2,3] Eleonora Fiorellino,[7] Teresa Giannini,[8] Jae-Joon Lee,[9] Jeong-Eun Lee,[10] Gábor Marton,[1,2] László Szabados,[1,2] Fabrizio Vitali,[8] Jan Andrzejewski,[11] Mariusz Gromadzki,[12] Simon Hodgkin,[13] Maja Jabłońska,[12] Rene A. Mendez,[14] Jaroslav Merc,[15] Olga Michniewicz,[11] Przemysław J. Mikołajczyk,[12,16] Uliana Pylypenko,[12] Milena Ratajczak,[12] Łukasz Wyrzykowski,[12] Michal Zejmo,[11] Paweł Zieliński[17]

6 more submitted or in prep.

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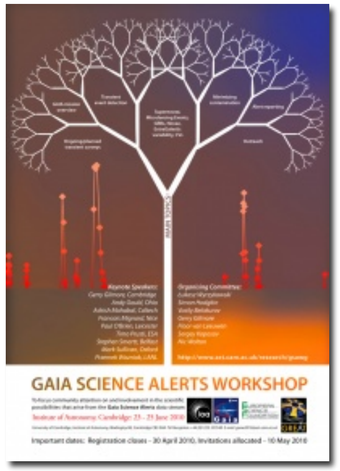

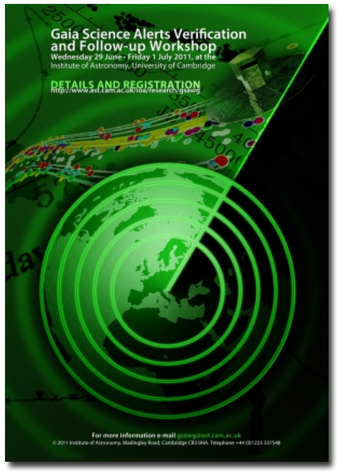

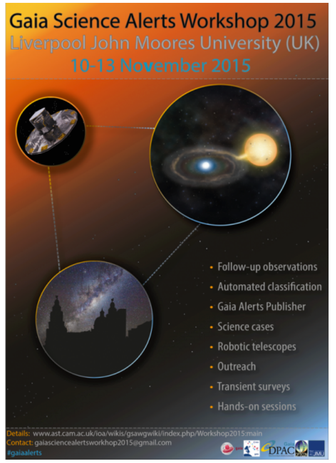

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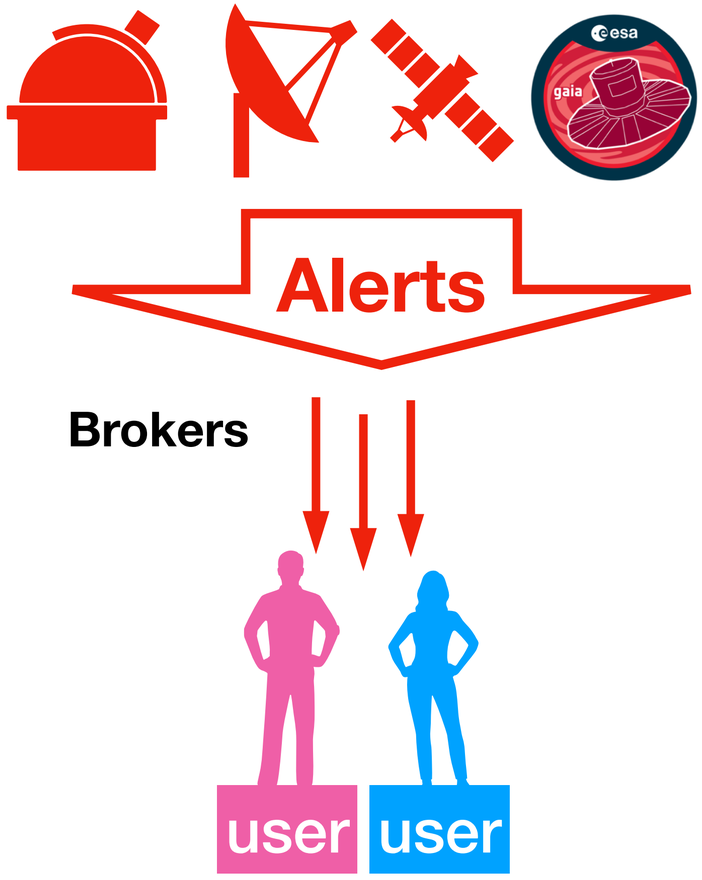

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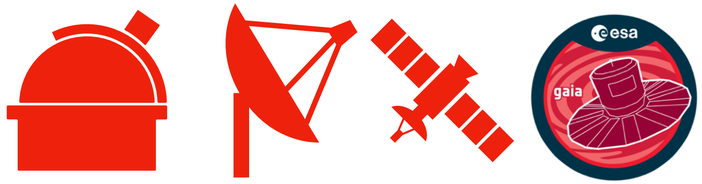

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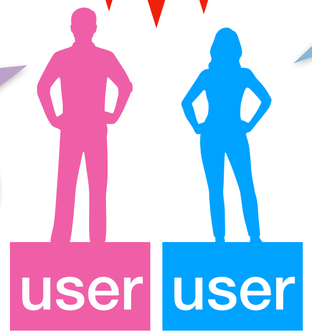

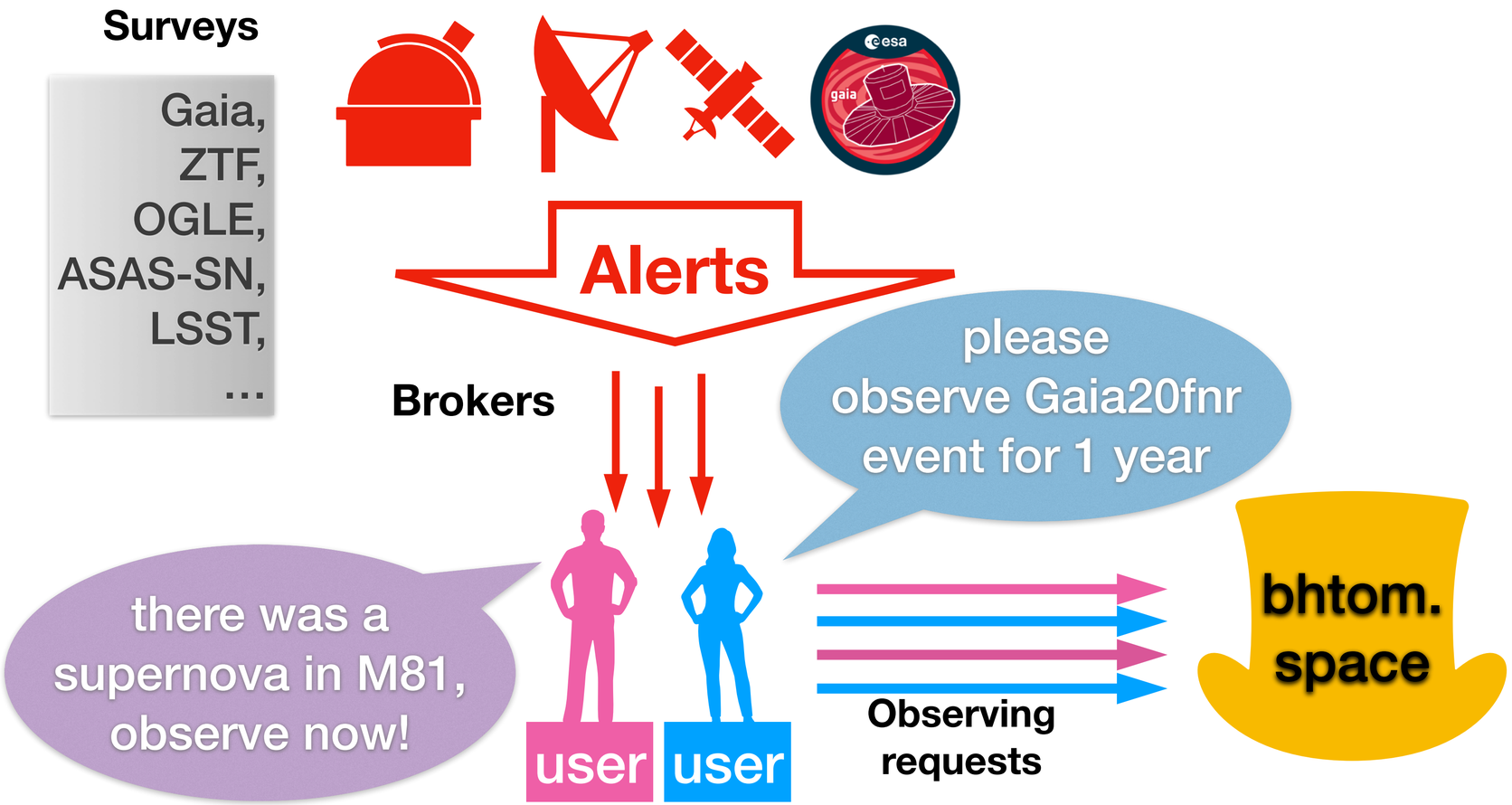
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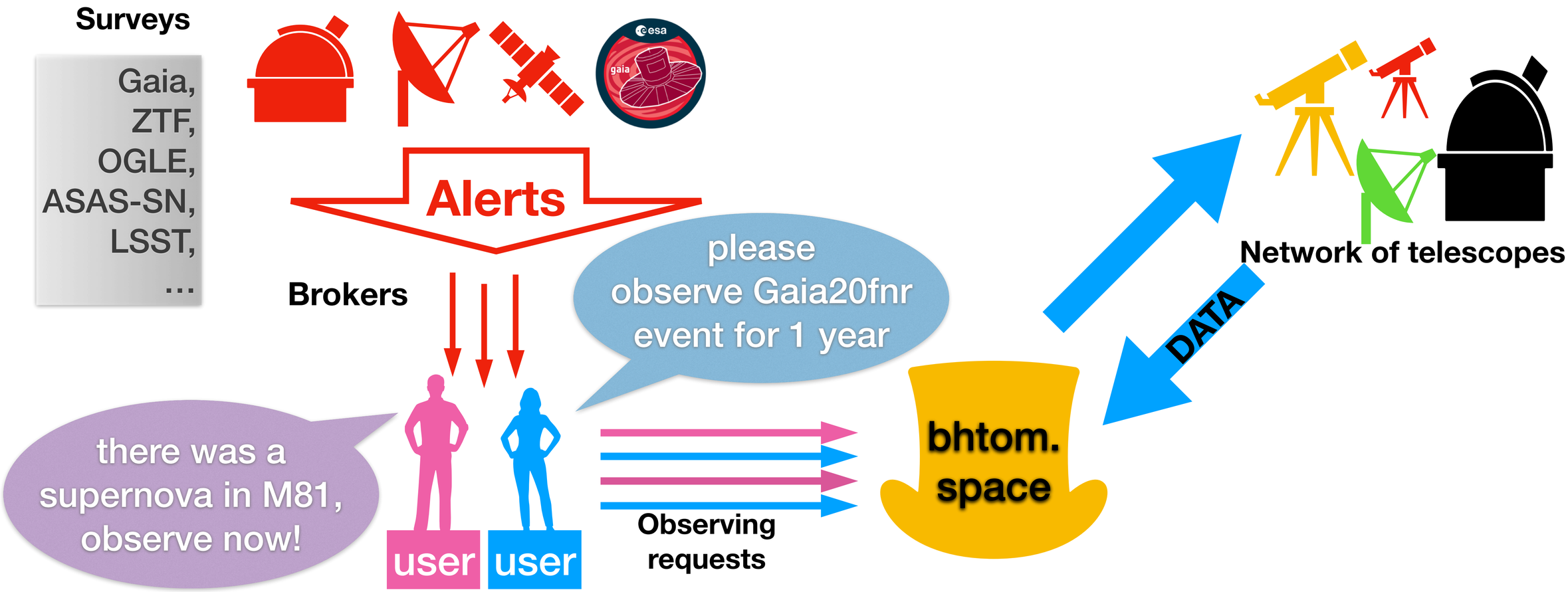
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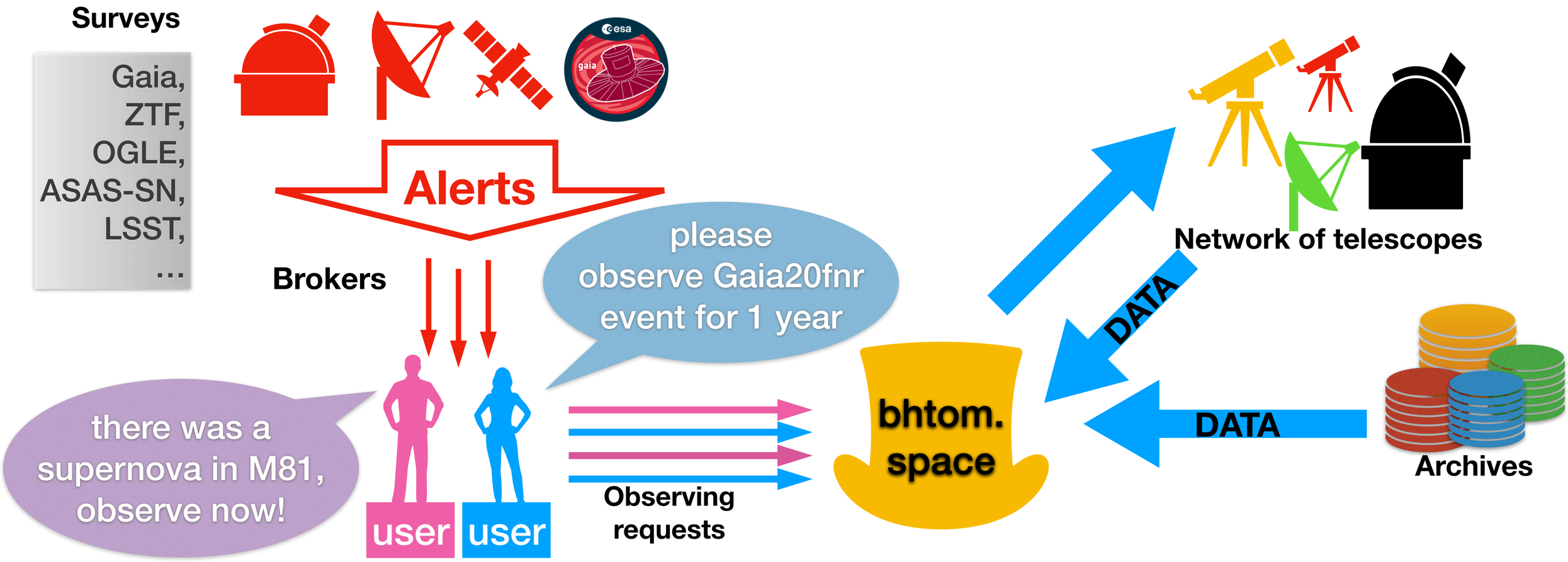
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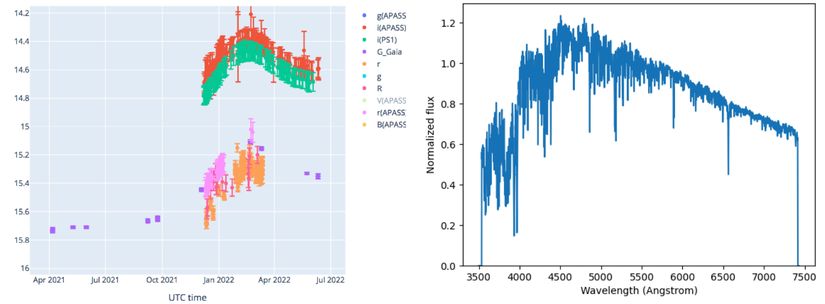

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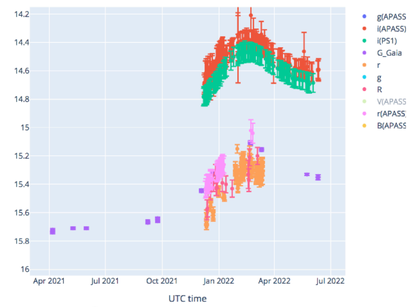

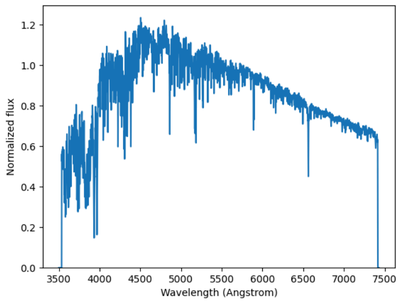

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PUBLICATIONS USING BHTOM

Monthly Notices of the ROYAL ASTRONOMICAL SOCIETY
MNRAS 515, 1774–1787 (2022) https://doi.org/10.1093/mnras/stac1915
Advance Access publication 2022 July 12

Photometric and spectroscopic study of the burst-like brightening of two *Gaia*-alerted young stellar objects

Zsófia Nagy,[1,2★] Péter Ábrahám,[1,2,3] Ágnes Kóspál,[1,2,3,4] Sunkyung Park,[1,2] Michał Siwak,[1,2] Fernando Cruz-Sáenz de Miera,[1,2] Eleonora Fiorellino,[1,2,5] David García-Álvarez,[6,7] Zsófia Marianna Szabó,[1,2,8,9] Simone Antoniucci,[5] Teresa Giannini,[5] Alessio Giunta,[10] Levente Krisko Mária Kun,[1,2] Gábor Marton,[1,2] Attila Moór,[1,2] Brunella Nisini,[5] Andras Pál,[1,2,3] László Szaba Paweł Zieliński[11] and Łukasz Wyrzykowski[12]

The Astrophysical Journal, 899:130 (8pp), 2020 August 20

Full orbital solution for the binary system in the northern Galactic disc microlensing event Gaia16aye★

Łukasz Wyrzykowski[1,★★] P. Mróz[1] K. A. Rybicki[1] M. Gromadzki[1] Z. Kołaczkowski[45,79,★★★] M. Zieliński[1] P. Zieliński[1] N. Britavskiy[4,5] A. Gomboc[35] K. Sokolovsky[19,3,66] S.T. Hodgkin[6] L. Abe[89] G.F. Aldi[20,80] A. AlMannaei[62,100] G. Altavilla[72,7] A. Al Qasim[62,100] G.C. Anupama[8] S. Awiphan[9] E. Bachelet[63] V. Bakis[10] S. Baker[100] S. Bartlett[50] P. Bendjoya[11] K. Benson[100] I.F. Bikmaev[76,87] G. Birenbaum[12] N. Blagorodnova[24] S. Blanco-Cuaresma[15,74] S. Boeva[16] A.Z. Bonanos[19] V. Bozza[20,80] D.M. Bramich[62] I. Bruni[25] R.A. Burenin[84,85] U. Burgaz[21] T. Butterley[22] H. E. Caines[34] D. B. Caton[93] S. Calchi Novati[83] J.M. Carrasco[23] A. Cassan[29] V. Čepas[56] M. Cropper[100] M. Chruślińska[1,24] G. Clementini[25] A. Clerici[35] D. Conti[91] M. Conti[48] S. Cross[63] F. Cusano[25] G. Damljanovic[26] A. Dapergolas[19] G. D'Ago[81] J. H. J. de Bruijne[27] M. Dennefeld[29] V. S. Dhillon[30,4] M. Dominik[31] J. Dziedzic[1] O. Erece[32] M. V. Eselevich[86] H. Esenoglu[33] L. Eyer[74] R. Figuera Jaimes[31,53] S. J. Fossey[34] A. I. Galeev[76,87] S. A. Grebenev[84] A. C. Gupta[99] A. G. Gutaev[76] N. Hallakoun[12] A. Hamanowicz[1,36] C. Han[2] B. [illegible]erden[103] V. L. Hoette[95] K. [illegible]. Itoh[43] P. Iwanek[1] [illegible] Khamitov[44,76] Y.Kilic[32] J. [illegible], G. Latev[16] C-H. Lee[17,18] [illegible]. Manser[52] S. Mao[53] D. [illegible]tjes[103] S. S. Melnikov[76,87] [illegible]hy[102] S. Nazarov[90] H. [illegible]laversa[6,74] A. Pandey[99] E. [illegible][96,97] J. K. T. Qvam[98] C. [illegible][89] G. Rixon[6] D. Roberts[47] [illegible]happee[69] R. Schmidt[41] Y. [illegible]es[34] B. van Soelen[103] Z. T. I. Szegedi[103] L. M. Tinjaca [illegible]ambsganss[41,42] I. P. van der [illegible]ov[76,87] D. G. Zhukov[76] J.

Lens mass estimate in the Galactic disk extreme parallax microlensing event Gaia19dke

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Gaia 18dvy: A New FUor in the Cygnus OB3 Association

E. Szegedi-Elek[1], P. Ábrahám[1,2], Ł. Wyrzykowski[3], M. Kun[1], Á. Kóspál[1,2,4], L. Chen[1], G. Marton[1,2], A. Moór[1,2], C. Kiss[1,2], A. Pál[1,2,5], L. Szabados[1], J. Varga[1,6], E. Varga-Verebélyi[1], C. Andreas[7], E. Bachelet[8], R. Bischoff[7], A. Bódi[1,9], E. Breedt[10], U. Burgaz[11,12], T. Butterley[13], J. M. Carrasco[14], V. Čepas[15], G. Damljanovic[16], I. Gezer[3], V. Godunova[17], M. Gromadzki[3], A. Gurgul[3], L. Hardy[18], F. Hildebrandt[7], S. Hoffmann[7], M. Hundertmark[19], N. Ihanec[3], R. Janulis[15], Cs. Kalup[1], Z. Kaczmarek[3], R. Könyves-Tóth[1], M. Krezinger[1], K. Kruszyńska[3], S. Littlefair[18], M. Maskoliūnas[15], L. Mészáros[1], P. Mikołajczyk[20], M. Mugrauer[7], H. Netzel[21], A. Ordasi[1], E. Pakštienė[15], K. A. Rybicki[3], K. Sárneczky[1], B. Seli[1], A. Simon[22], K. Šiškauskaitė[15], Á. Sódor[1], K. V. Sokolovsky[23,24,25], R. Szakáts[1], L. Tomasella[26], Y. Tsapras[19], K. Vida[1,2], J. Zdanavičius[15], M. Zieliński[3], P. Z

Single lens mass measurement in the high magnification microlensing event Gaia19bld located in the Galactic Disk

K. A. Rybicki,★[1] Ł. Wyrzykowski,[1] E. Bachelet,[2] A. Cassan,[3] P. Zieliński,[1] A. Gould,[4,5] S. Calchi Novati,[6] J.C. Yee,[7] Y.-H. Ryu,[8] M. Gromadzki,[1] P. Mikołajczyk,[9] N. Ihanec,[1] K. Kruszyńska,[1] F.-J. Hambsch,[10,11] S. Zola,[12] S. J. Fossey,[13] S. Awiphan,[14] N. Nakharutai,[15] F. Lewis,[16,17] F. Olivares E.,[18] S. Hodgkin,[19] A. Delgado,[19] E. Breedt,[19] D. L. Harrison,[19,20] M. van Leeuwen,[19] G. Rixon,[19] T. Wevers,[19] A. Yoldas,[19] A. Udalski,[1] M. K. Szymański,[1] I. Soszyński,[1] P. Pietrukowicz,[1] S. Kozłowski,[1] J. Skowron,[1] R. Poleski,[1] K. Ulaczyk,[21,1] P. Mróz,[1,22] P. Iwanek,[1] M. Wrona,[1] R.A. Street,[2] Y. Tsapras,[23] M. Hundertmark Gaudi,[5] C. Henderson,[6] Y. Shvartzvald,[25] W. Zang

SN 2018zd: An Unusual Stellar Explosion as Part of the Diverse Type II Supernova Landscape

Jujia Zhang,[1,2,3,4★] Xiaofeng Wang,[5,6] József Vinkó[7,8,9] Qian Zhai,[1,2,3,4] Tianmeng Zhang,[10] Alexei V. Filippenko,[12,13] Thomas G. Brink,[12] WeiKang Zheng,[12] Łukasz Wyrzykowski,[14] Przemysław Mikołajczyk,[14] Fang Huang,[15] Xinhan Zhang,[5] Huijuan Wang,[10,11] Jame A. Bódi,[7,18] G. Csörnyei,[7,8] O. Hanyecz,[7] I R. Könyves-Tóth,[7,8] A. Ordasi,[7] A. Pál,[7,8] G. Zsidi[7,8,19]

AT2021uey: A planetary microlensing event outside the Galactic bulge

Ban, M.[1], Voloshyn, P.[2,3], Adomavičienė, R.[4], Bachelet, E.[5,6], Bozza, V.[7,8], Brincat, S. M.[9], Bruni, I.[10], Burgaz, U.[11], Carrasco, J. M.[12], Cassan, A.[5], Čepas, V.[4], Dominik, M.[13], Dubois, F.[14], Figuera Jaimes, R.[15], Fukui, A.[16,17], Galdies, C.[18,19], Garofalo, A.[10], Hundertmark, M.[20], Kruszyńska, K.[1], Kulijanishvili, V.[21], Kvernadze, T.[21], Logie, L.[14], Maskoliūnas, M.[4], Mikołajczyk, P. J.[1,22], Mróz, P.[1], Narita, N.[16,17,23], Pakštienė, E.[4], Peloton, J.[3], Poleski, R.[1], Qvam, J. K. T.[24], Rau, S.[14], Rota, P.[7,8] Rybicki, K. A.[1,25], Street, R. A.[26], Tsapras, Y.[20], Vanaverbeke, S.[14], Wambsganss, J.[20], Wyrzykowski, Ł.[1], Zdanavičius, J.[4], and Zieliński, P.[27]

The *Gaia* alerted fading of the FUor-type star Gaia21elv

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Photometric and spectroscopic study of the burst-like brightening of two *Gaia*-alerted young stellar objects

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Gaia 18dvy: A New FUor in the Cygnus OB3 Association

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SN 2018zd: An Unusual Stellar Explosion as Part of the Diverse Type II Supernova Landscape

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Full orbital solution for the binary system in the northern Galactic disc microlensing event Gaia16aye★

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Lens mass estimate in the Galactic disk extreme parallax microlensing event Gaia19dke

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Single lens mass measurement in the high magnification microlensing event Gaia19bld located in the Galactic Disk

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