


Data Aggregation Service

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data  central



MACQUARIE
University

Overview

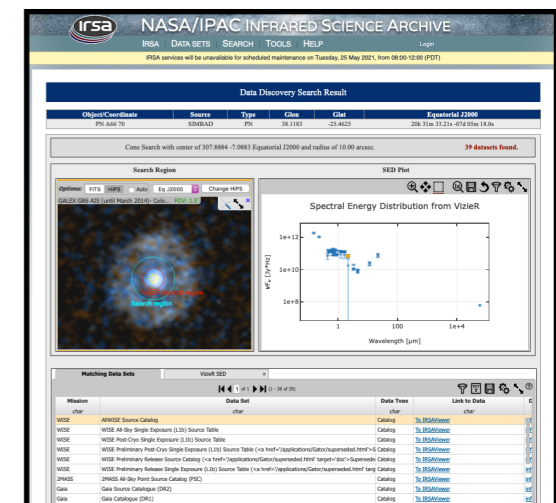
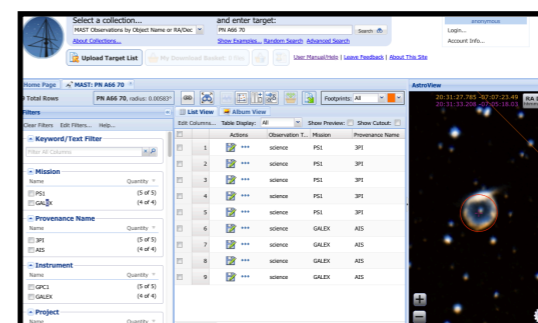
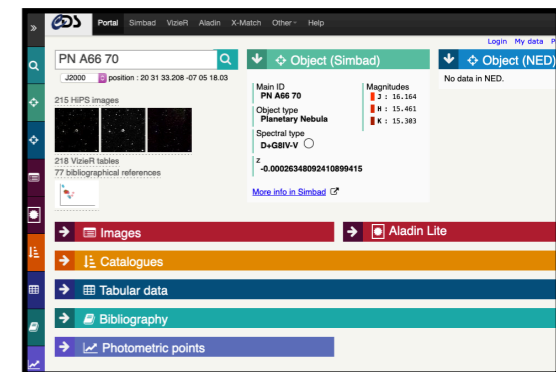
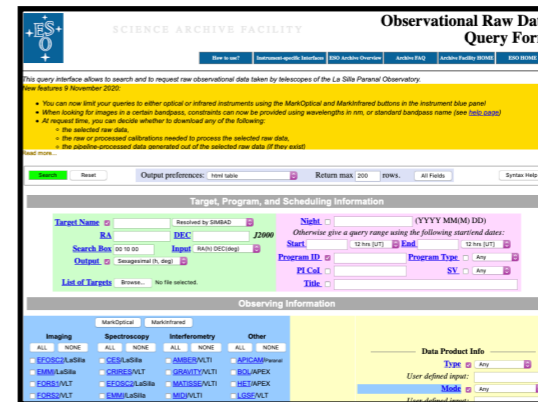
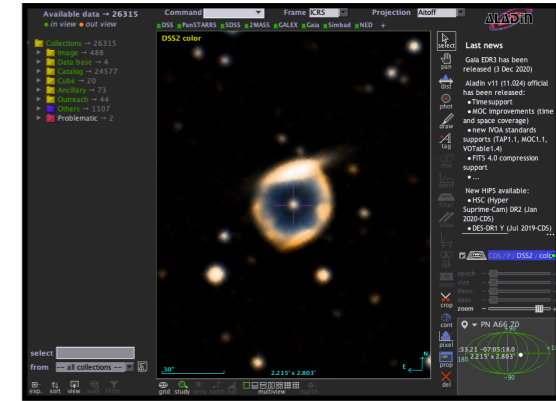
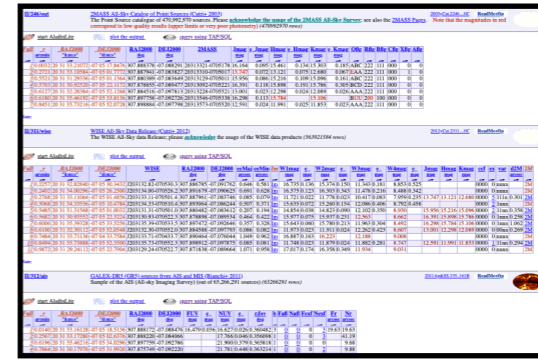


- There are so many astronomical data services online
- Querying each of them: starting to be overwhelming and tedious
- Transient surveys will generate very large lists of targets.
- We can't inspect **ALL** of them, but we may want to inspect a **SUBSET**.
- Focus has been on transient brokers and their alert streams but what happens **downstream** of this? What **software ecosystem** do we need?
- **Data Central** has developed extensible infrastructure to aggregate and visualise information for large numbers of targets. **Data Aggregation Service**
- **Observatory Archives** (e.g. AAT, ESO) can assume a prominent role:
 - They may contain precious observations for transients lacking data elsewhere.
 - Archives could issue automatic notifications (VOEvents) when transient alerts are cross-matched with archival data (or even future data) — an **active** archive!
 - Data may be reduced on-demand via **Pipeline As a Web Service (PAWS)** developed by **Data Central** and built into above infrastructure (e.g. 2dFdr).

Project motivation

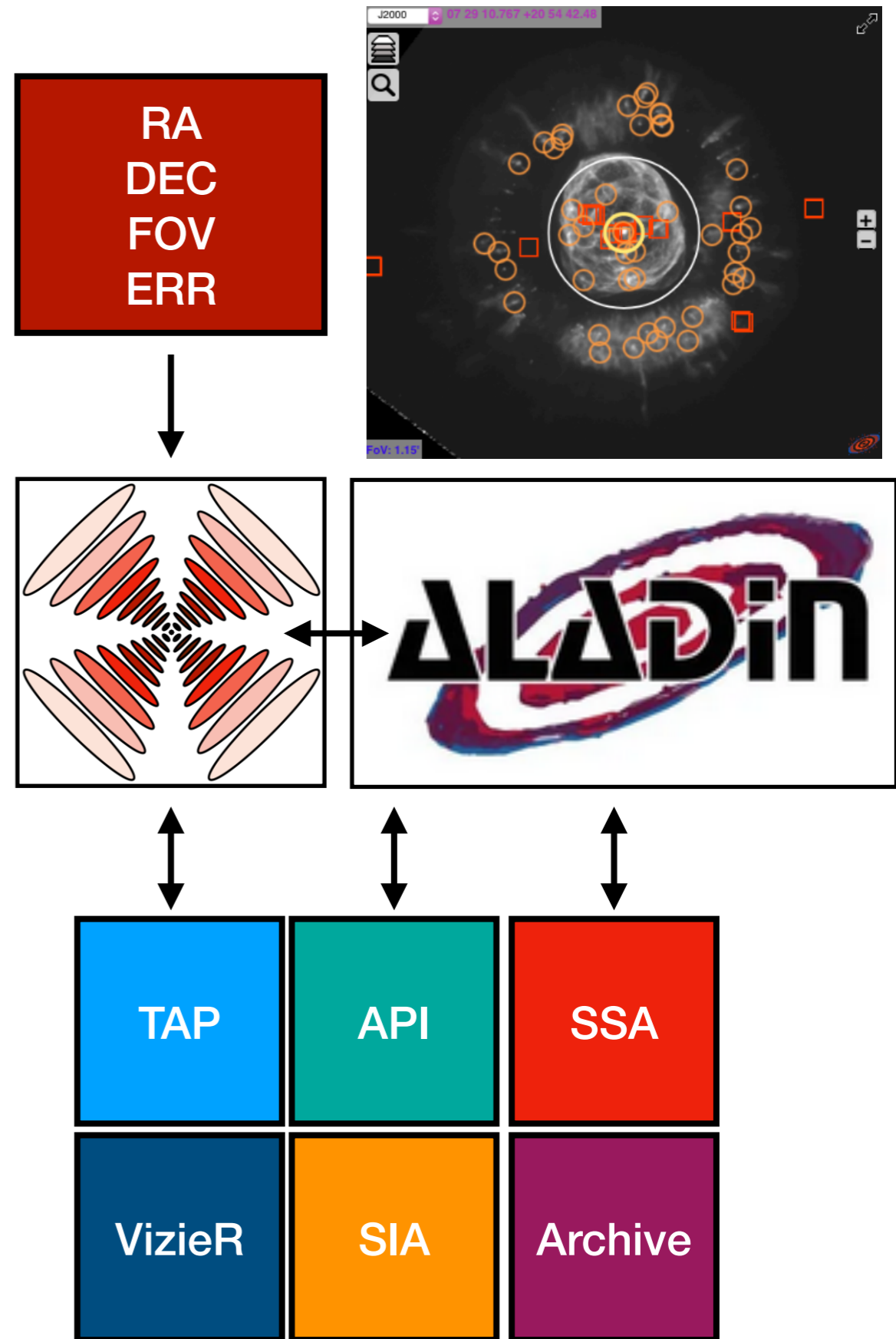


- **Data Aggregation:** Find all data for a sky position and radius (e.g. **images and catalogues**).
- **CRAFT survey team:** inspect FRB candidates. Large uncertainty in position. Host galaxy? Redshift?
- Several **mature and powerful data platforms:** VizieR, CDS Portal, Telescope Archives, MAST Portal, Aladin, IRSA/Firefly, etc.
- Checking each platform can be **time consuming and error prone**. Especially for **large numbers of targets**.



Data Aggregation Service

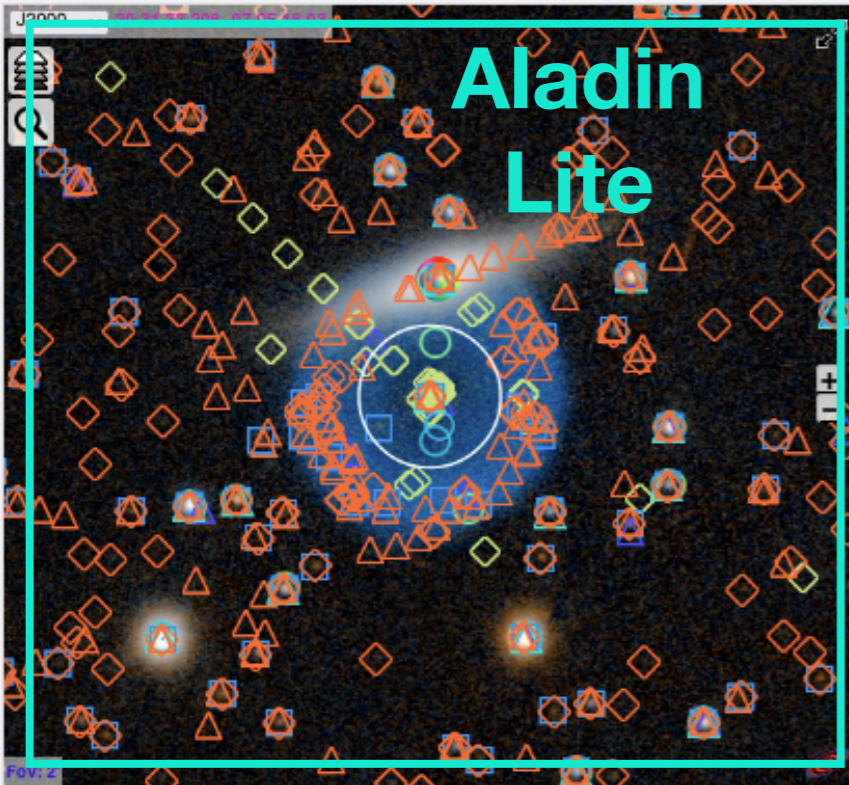
- **A web application** that simultaneously queries multiple online data services. Query results are displayed in browser and may be exported (TOPCAT and Aladin via Web SAMP, .csv, .xls, .vot)
- **Aladin Lite:** interactive visualisation of images and catalogues. Convert FITS images to HiPS on-the-fly.
- **Input GET parameters:** RA, DEC, FOV and ERR (position uncertainty).
- **Fast and asynchronous** from the ground up.



Data Aggregation Service



SAMP **Brent Miszalski** Overlay Transparency: 100%
Enable Logout NONE



Aladin
Lite

Resolve Name
Resolve
Resolve name with Sesame
Right Ascension
307.888365097
Decimal degrees, "H M S" or "H:M:S"
Declination
-7.08834222636
Decimal degrees, "D M S" or "D:M:S"

FOV
2.0
Width of the field-of-view (arcmin)
Error radius
10.0
Radius of the error circle (arcsec)

Submit

SIMBAD
Name
resolver

Catalogues	DCSSA	VizieTables	WISE	ESO	NVSS	SIMBAD	SkyMapper	TIC	DCSCS	GAIA	PS1	ZTF
✓ Catalogue	Status	SAMP	Excel	CSV	VOTable							
✓ LS	265 rows											
✓ ZTF	241 rows											
✓ ESO	139 rows											
✓ PS1	106 rows											
✓ TIC	36 rows											
✓ GAIA	36 rows											
✓ WISE	34 rows											
✓ SkyMapper	32 rows											
✓ DCSSA	3 rows											

Catalogues
(Vizier, TAP, SSA, API)

- Toggle on/off
- Mouseover: highlights location in image
- Vizier tables: load on demand

Images	Status	SAMP	Excel	CSV	VOTable							
SMASH	0 rows											
LS	6 rows											
DES	0 rows											
HLA	0 rows											
PS1	5 rows											
SkyMapper	6 rows											
FORS2	1 row											
Gemini	4 rows											
DCSIA	0 rows											
DECAPS	0 rows											

Images
(SIA, API, Custom Pipelines)

- Mouseover: display image
- Trigger downloads: Large images (HST)

das.datacentral.org.au

DAS structure

ASGI application

(Asynchronous Server Gateway Interface)

Fast ASGI server



uvicorn

uvicorn.org



socket.io



starlette.io

(FastAPI ASGI web framework
is built upon Starlette)

socket.io server
(python-socketio)

Real-time bidirectional,
event-based
communication between
server and web browser

Starlette
ASGI web framework

Jinja2 templates,
websockets,
async background tasks,
session middleware, etc.



Main dependencies



Aladin Lite
FITS image and
catalogue display. HiPS
management: **Hipsgen**
and **MOCPy**.



Data Sources
IVOA Data Access Layer
(DAL): TAP, SIA, SSA, SCS



VizieR catalogues (ASU
interface)



socket.io
websocket message
handling from browser



APIs: PanSTARRS, Gemini
archive, IRSA, SIMBAD
(search and name resolver)



httpx/aiohttp
async file
downloads



redis

redis
VOTable and
file caching

Celery

async task execution
invoked **asynchronously**
from **Starlette**



pandas
astropy
VOTable
parsing and
filtering



MontagePy
Mosaic
production



Fast from the ground up: Asynchronous with caching

- **Simultaneous queries of multiple** services (e.g. TAP, SIA, SSA) from asynchronous functions launched as background tasks (asyncio)
- Tasks may also spawn background tasks (e.g. downloading multiple images) OR more complex pipelines (e.g. creation of mosaics)
- Task results sent to browser via websocket messages. Contain tabular data (json) or image location on disk.
- Browser listens for messages: **Results added to page when received.**
- VOTable/ASCII query results cached (redis) and converted to pandas dataframes (astropy) for internal handling and filtering
- FITS files are converted to HiPS format using Aladin and cached on disk (location cached with redis)

Custom Redshift Aggregator

data central Data Aggregation Service

SAMP **Brent Miszalski** Overlay Transparency: 100%

J2000 22 16 4.720 -07 53 53.94

FRB + Host Galaxy

TYPED_ID	ANG_DIST	MAIN_ID	OTYPE_S	RA_d	DEC_d	COO_ERR_MAJA_d	COO_EI
0.15	FRB	190608	radioBurst	334.01975	-07.89822		

Resolve Name: Resolve name with Sesame Right Ascension

FOV: Width of the field-of-view (arcmin)

Error radius: Radius of the error circle (arcsec)

Vizier catalogues: UCD src.redshift

Catalogues SkyMapper TIC SIMBAD DUST SDSS GAIA WISE ESO HST

_r_arcsec	RA	DEC	Z	ZCOLS	vizier_cat	vizier_cat_description
2.3436	334.02	-7.89884	0.1157	z	VII/281/glade2	GLADE v2.3 catalog (Dalya+, 2018)
2.4804	334.02	-7.89888	0.1178	z	J/AbJS/223/20/spec	SDSS-DR8 galaxies classified by WND-CHARM (Kuminski+, 2016)
2.5056	334.019989	-7.89889	0.1176	z	J/MNRAS/455/2440/catalog	Gal. 2D phot. decompositions in r, g & i bands (Meert+, 2016)
2.5056	334.019989	-7.89889	0.1176	z	J/MNRAS/446/3943/catalog	galaxies 2D phot. decompositions in SDSS-DR7 (Meert+, 2015)

Images PS1 LS SkyMapper FORS2

	access_url	Object	Filter	Exptime	Date	ProgID	RA	DEC
<input checked="" type="checkbox"/>		FRB 190608 HOST	G_HIGH	499.9899902344	2020-09-21T02:41:36.975	105.204W.001	334.02083305	-7.899
<input checked="" type="checkbox"/>		FRB 190608 HOST	G_HIGH	499.9779968262	2020-09-21T02:50:35.321	105.204W.001	334.01803194	-7.896
<input checked="" type="checkbox"/>		FRB 190608 HOST	G_HIGH	499.9819946289	2020-09-21T02:59:32.606	105.204W.001	334.01802694	-7.901
<input checked="" type="checkbox"/>		FRB 190608	G_HIGH	499.9909973145	2020-09-21T03:08:31.312	105.204W.001	334.023635	-7.901

Multi-wavelength HiPS overlays



SAMP Brent Miszalski
Enable Logout

Overlay Transparency: 41%
RACS



Resolve Name
[input]
Resolve

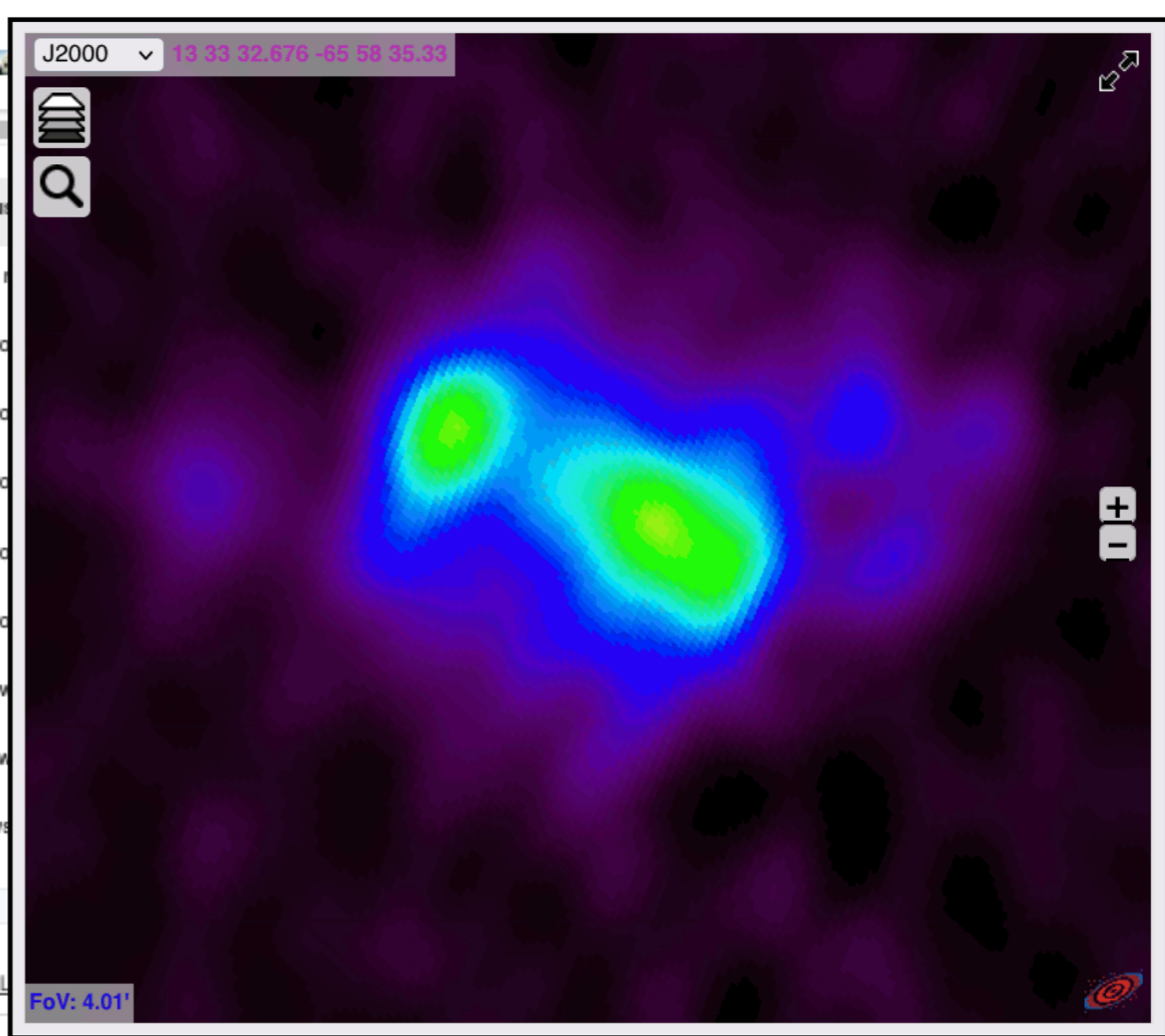
Resolve name with Sesame
Right Ascension
[input]

FOV
[input: 2.0]
Width of the field-of-view (arcmin)

Error radius
[input: 10.0]
Radius of the error circle (arcsec)

Catalogues SkyMapper

Catalogue	Status
<input type="checkbox"/> DECAPS	3306 r
<input type="checkbox"/> GAIA	878 r
<input type="checkbox"/> TIC	817 r
<input type="checkbox"/> HST	633 r
<input type="checkbox"/> ESO	307 r
<input type="checkbox"/> SkyMapper	209 r
<input type="checkbox"/> WISE	42 r
<input type="checkbox"/> RACS	11 r
<input type="checkbox"/> SIMBAD	3 rows



Images Gemini

access_url	name	program_id	instrument	object	filter_name	exposure_time	qa_state
<input checked="" type="checkbox"/>	<input type="checkbox"/> S20060326S0132.fits	GS-2006A-DD-2	GMOS-S	ngc5189	Ha	300.4924	Usable
<input checked="" type="checkbox"/>	<input type="checkbox"/> S20060326S0133.fits	GS-2006A-DD-2	GMOS-S	ngc5189	Ha	300.4929	Usable
<input checked="" type="checkbox"/>	<input type="checkbox"/> S20060330S0220.fits	GS-2006A-DD-2	GMOS-S	ngc5189	Ha	300.4927	Usable
<input checked="" type="checkbox"/>	<input type="checkbox"/> S20060424S0056.fits	GS-2006A-DD-2	GMOS-S	ngc5189	Ha	300.492	Pass
<input checked="" type="checkbox"/>	<input type="checkbox"/> S20060424S0057.fits	GS-2006A-DD-2	GMOS-S	ngc5189	Ha	300.492	Pass

Authenticated data access

- Data Central's CAS server for authentication (single sign-on)
- Each user may belong to a group (e.g. SkyMapper)
- Seamless data access control based on group membership
- Select SkyMapper TAP and SIA servers: DR3 (Australian) or DR2 (everyone else)
- Lots of other possibilities

The screenshot displays the Data Central interface. At the top, the 'data central' logo is on the left, and 'Data Aggregation Service' is on the right. Below the logo, a user profile for 'Brent Miszalski' is shown with a 'Logout' button highlighted by a red box. To the right of the profile, there are controls for 'SAMP' (with an 'Enable' button), 'Overlay' (set to 'NONE'), and 'Transparency: 100%' with a slider.

The main visualization is a star field with a central cluster labeled 'NGC 6337' in red. The field is overlaid with a grid of small blue diamonds. A search bar at the top left shows 'J2000 17 22 15.872 -36 29 1.74'. The bottom left corner indicates 'FoV: 2'.

On the right side, there are two panels. The top panel shows a list of catalogues:

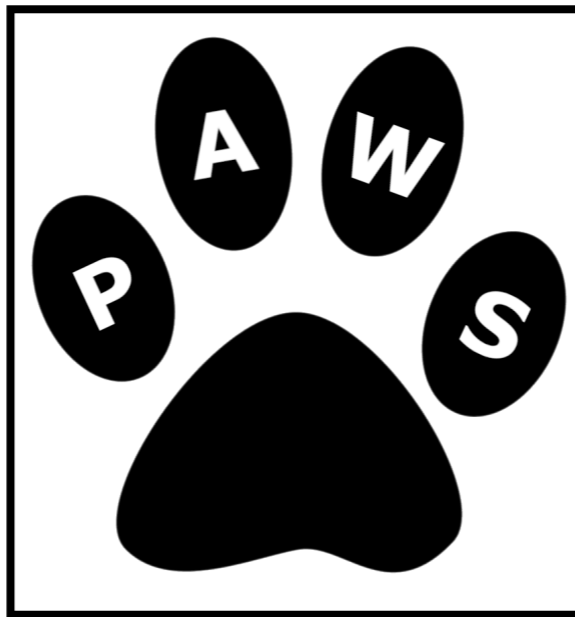
<input type="checkbox"/>	Catalogue	Status	SAMP	Excel
<input type="checkbox"/>	DECAPS	1168 rows		
<input type="checkbox"/>	TIC	414 rows		
<input type="checkbox"/>	GAIA	358 rows		
<input checked="" type="checkbox"/>	SkyMapper	245 rows		
<input type="checkbox"/>	WISE	52 rows		
<input type="checkbox"/>	ESO	13 rows		
<input type="checkbox"/>	SIMBAD	2 rows		
<input type="checkbox"/>	RACS	2 rows		
<input type="checkbox"/>	NVSS	1 row		

The bottom panel shows a list of images:

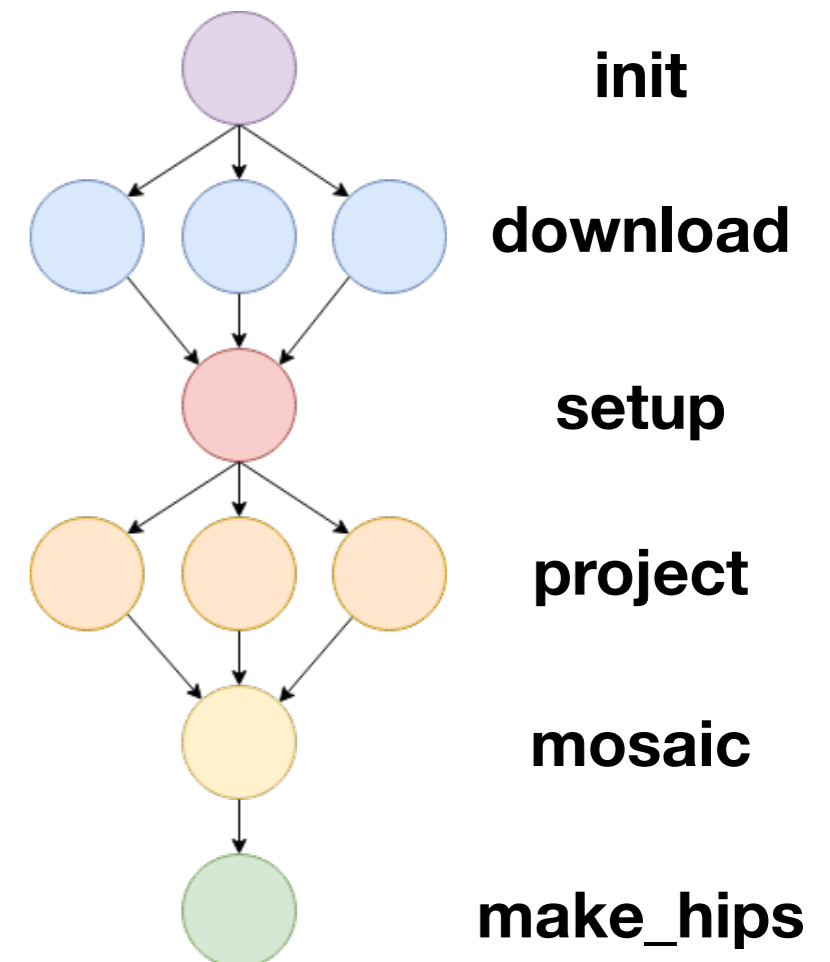
<input checked="" type="checkbox"/>	access_url	images	Filter	dclabel
<input checked="" type="checkbox"/>			g	SkyMapper: g
<input checked="" type="checkbox"/>			r	SkyMapper: r
<input checked="" type="checkbox"/>			i	SkyMapper: i

SkyMapper DR3: catalogue (TAP) + mosaic (SIA)

Pipeline As a Web Service (PAWS) Technology Demonstrator



- **Async DAS architecture:** ideal testbed for PAWS
- Use **celery** to prepare and schedule complex workflows, e.g. image mosaics (**IPAC MontagePy**)
- Observatory archive queries input for:
 - Mosaic 10x10 arcmin SkyMapper images (SIA queries in all uvgriz filters)
 - Mosaic GMOS images (Gemini archive json API)
 - Mosaic VLT FORS2 images (ESO archive TAP query)



Browsing NGC6302 VLT FORS2 mosaics (R, I, V and Halpha)



FOV

Width of the field-of-view (arcmin)

Error radius

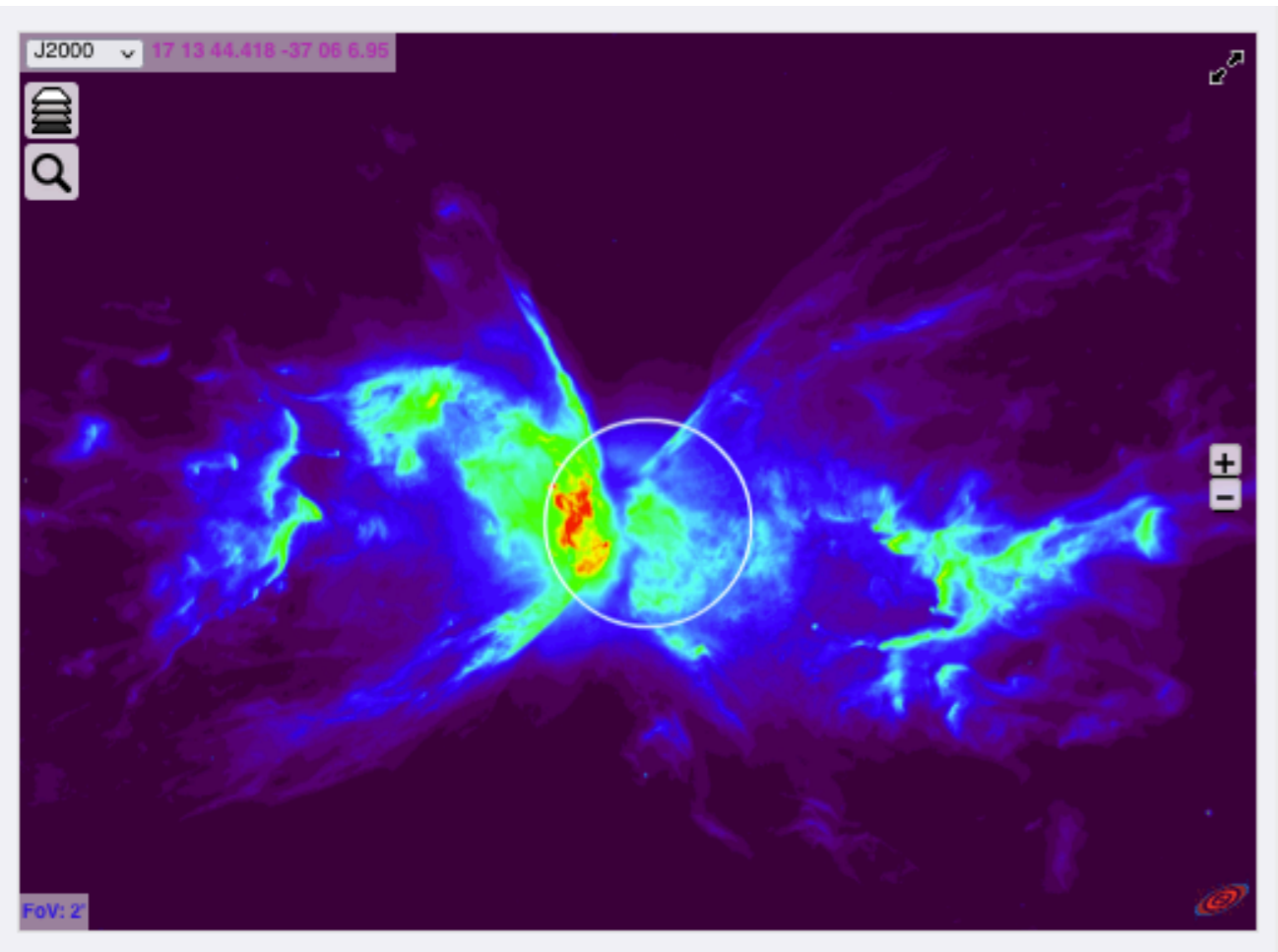
Radius of the error circle (arcsec)

<input type="checkbox"/>	GAIA	505 rows				
<input type="checkbox"/>	TIC	470 rows				
<input type="checkbox"/>	SkyMapper	166 rows				
<input type="checkbox"/>	WISE	25 rows				
<input type="checkbox"/>	SIMBAD	5 rows				
<input type="checkbox"/>	RACS	4 rows				

[Images](#) *
 [SkyMapper](#)
[HLA](#)
[FORS2](#)
[DECAPS](#)

	access_url	Object	Filter	Exptime	Date	ProgID	F
<input checked="" type="checkbox"/>		NGC 6302	G_HIGH	0.2579999864	2018-04-21T04:05:34.553	60.A-9801(C)	2
<input checked="" type="checkbox"/>		NGC 6302	R_SPECIAL	5.0040001869	2018-04-21T04:07:26.115	60.A-9801(C)	2
<input checked="" type="checkbox"/>		NGC 6302	I_BESS	4.9809999466	2018-04-21T04:08:39.213	60.A-9801(C)	2
<input checked="" type="checkbox"/>		NGC 6302	V_HIGH	5.006000042	2018-04-21T04:09:27.728	60.A-9801(C)	2
<input checked="" type="checkbox"/>		NGC 6302	H_ALPHA	8.0010004044	2018-04-21T04:10:26.874	60.A-9801(C)	2
<input checked="" type="checkbox"/>		NGC 6302	G_HIGH	5.006000042	2018-04-21T04:12:16.525	60.A-9801(C)	2

NGC6302 F658N HST WFPC3



<input type="checkbox"/>	GAIA	505 rows				
<input type="checkbox"/>	TIC	470 rows				
<input type="checkbox"/>	SkyMapper	166 rows				
<input type="checkbox"/>	WISE	25 rows				
<input type="checkbox"/>	SIMBAD	5 rows				
<input type="checkbox"/>	RACS	4 rows				

Images SkyMapper HLA FORS2 DECAPS

	URL	RA	DEC	Level	Target	Detector	Aperture	Spectral
		258.43064	-37.102087	2	NGC-6302-V1	WFC3/UVIS	UVIS-CENTER	F656N
<input checked="" type="checkbox"/>		258.43064	-37.102087	2	NGC-6302-V1	WFC3/UVIS	UVIS-CENTER	F658N

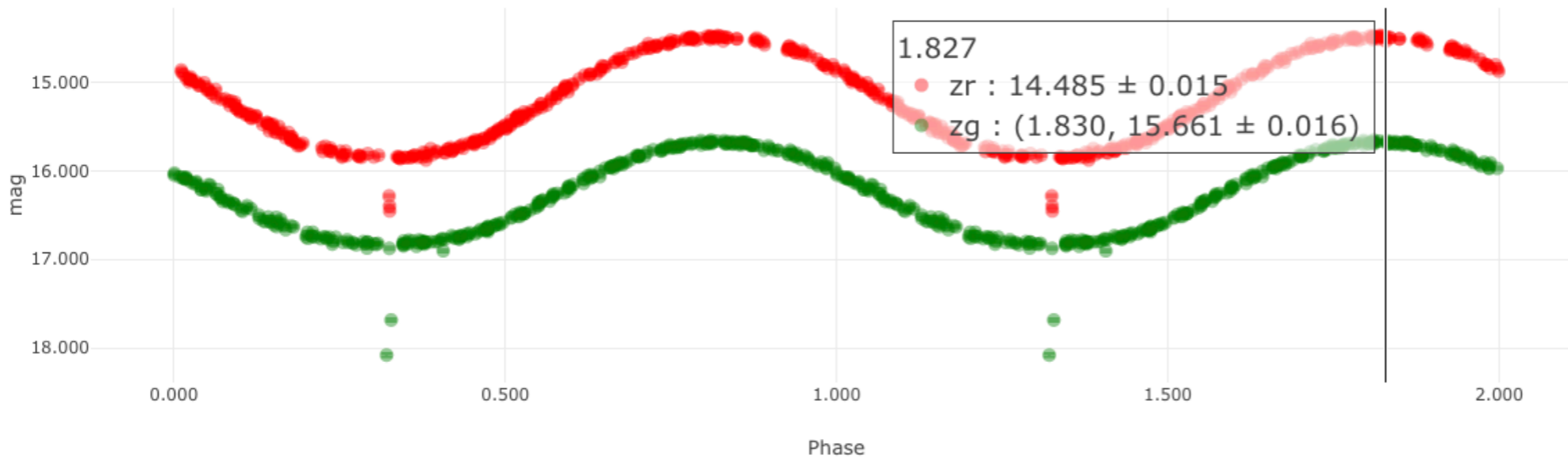
**Large image downloads (~500 MB)
triggered manually + progress bar
(Hubble Legacy Archive SIA)**

Todo: add support for time series data

Period: Mag offset: Double Phase: Phased:

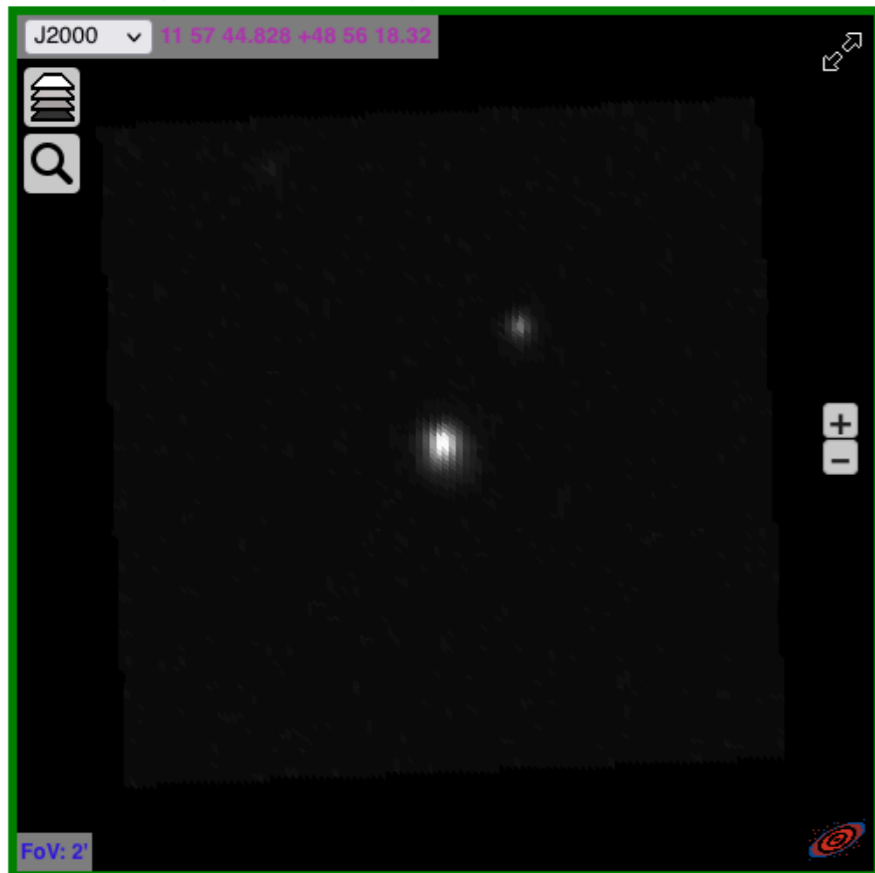


BE UMa ZTF Lightcurves

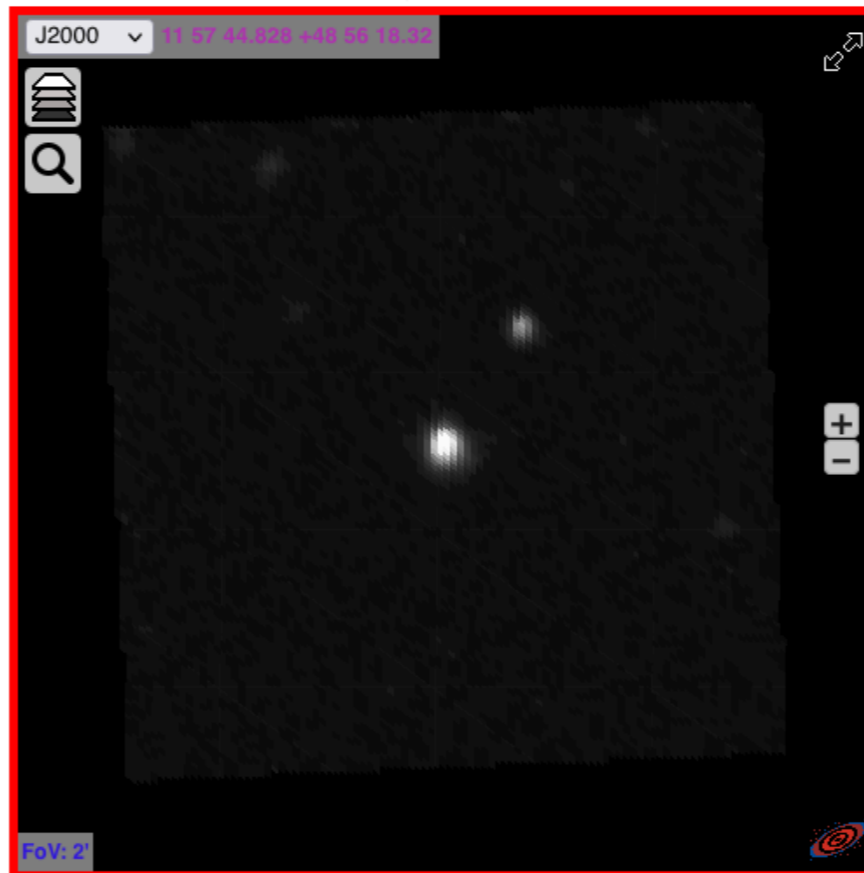


Interactive
ZTF
lightcurve
(plotly.js)

phase=1.846 g=15.682 +/- 0.016 mag ; airmass=1.44 [Download FITS](#)



phase=1.827 r=14.485 +/- 0.015 mag ; airmass=1.74 [Download FITS](#)



zg and zr
individual
epoch images
at cursor
position

Target Visualisation and Classification

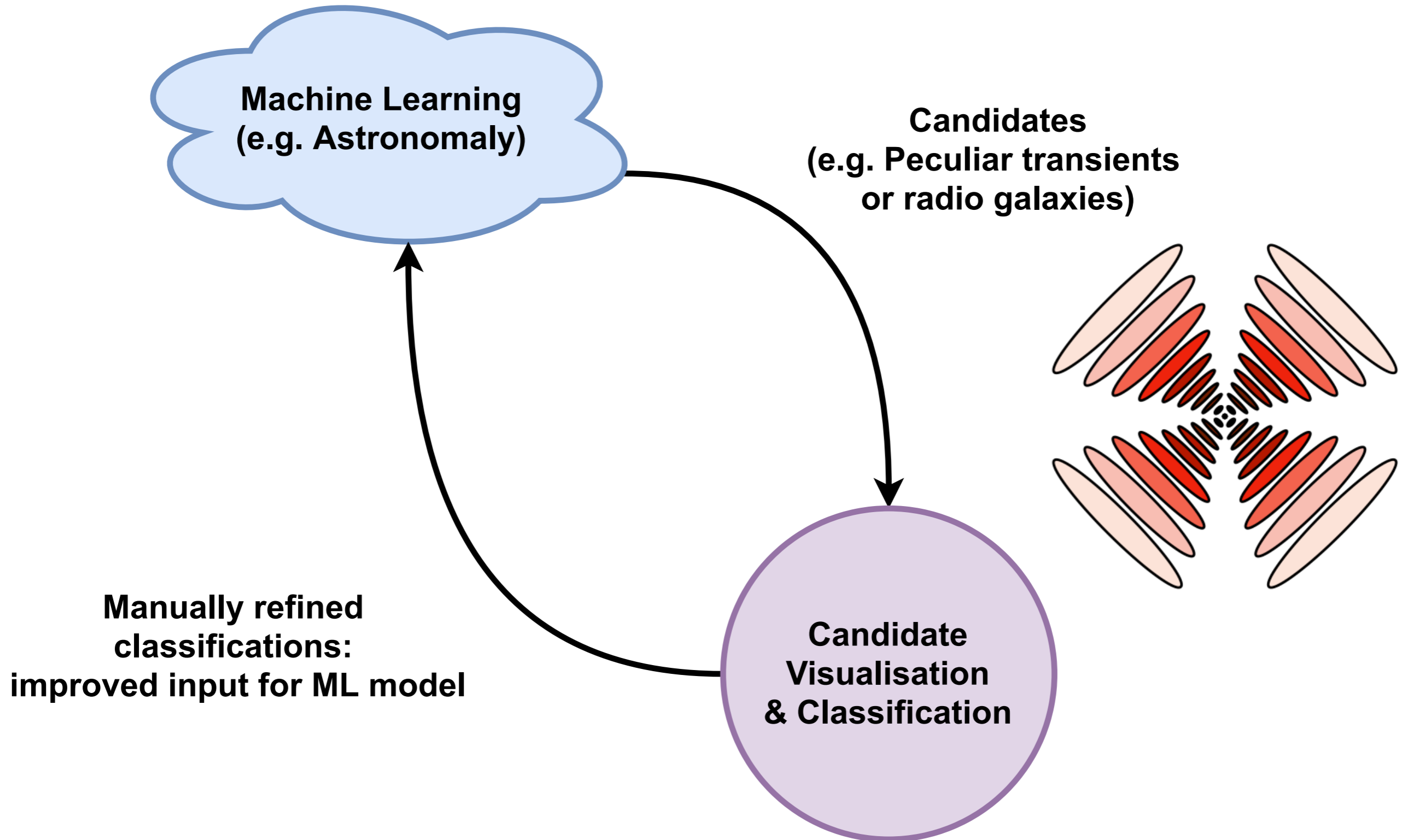
- **Target visualisation and classification app:** Repurposed DAS for upcoming Hector Survey
- **Target lists:** Import CSV into MongoDB. Classify targets (**keyboard shortcuts**) and export results.
- **Aladin Lite:** Images and catalogues (**loaded asynchronously**) per target. Display instrument footprints.
- **Filter catalogues:** Radius and magnitude cuts. Mouseover to view.

Up to a few hundred targets per page

data central | Choose a file... pne.csv | Load File | Overwrite | | All | Filter Target... | | 101-200 of 200 | 100 | Jump to Target... |

<p>004.1-03.8 ↗</p> <p>J2000 <input type="text" value="18 16 12.321 -27 16 30.75"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>004.2-03.2 ↗</p> <p>J2000 <input type="text" value="18 08 1.476 -26 54 0.75"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>004.2-04.3 ↗</p> <p>J2000 <input type="text" value="18 12 24.713 -27 38 54.55"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>004.2-05.9 ↗</p> <p>J2000 <input type="text" value="18 08 18.731 -26 08 5.45"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>004.3+01.8 ↗</p> <p>J2000 <input type="text" value="17 48 34.331 -23 18 30.55"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>004.3-02.6 ↗</p> <p>J2000 <input type="text" value="18 05 17.059 -26 29 41.75"/></p> <p>FoV: 39.29"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>004.6+06.0 ↗</p> <p>J2000 <input type="text" value="17 53 57.758 -26 34 17.55"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>004.7-11.8 ↗</p> <p>J2000 <input type="text" value="18 44 13.409 -30 18 26.95"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>004.8+02.0 ↗</p> <p>J2000 <input type="text" value="17 48 34.331 -23 42 54.75"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>004.8-05.0 ↗</p> <p>J2000 <input type="text" value="18 16 11.489 -27 14 57.05"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>004.8-22.7 ↗</p> <p>J2000 <input type="text" value="18 02 7.051 -24 12 53.45"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>004.9+04.9 ↗</p> <p>J2000 <input type="text" value="17 58 28.319 -23 08 28.55"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>004.9-04.9 ↗</p> <p>J2000 <input type="text" value="18 16 17.384 -27 04 32.65"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>005.0+03.0 ↗</p> <p>J2000 <input type="text" value="17 45 36.920 -23 02 26.55"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>005.0+04.4 ↗</p> <p>J2000 <input type="text" value="17 48 13.053 -23 15 17.55"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>
<p>005.0-03.9 ↗</p> <p>J2000 <input type="text" value="18 12 23.557 -26 33 54.55"/></p> <p>FoV: 59.76"</p>	<p>BADCLASS: 0 default</p> <p>Select an option...</p> <p><input checked="" type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2</p> <p><input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5</p> <p><input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8</p> <p>Bundle: <input checked="" type="checkbox"/> Small <input checked="" type="checkbox"/> Large</p> <p><input checked="" type="checkbox"/> SkyMapper <input type="checkbox"/> SDSS</p>

Accelerating Machine Learning Applications



Recent additions to DAS

- GET parameters: allows users to toggle on/off individual data sources
- More detailed provenance information (see below)
- Added VHS catalogue (hosted by Noirlab) and images (VISTA Science Archive)
- Want to see more data added to DAS? Let me know!

Catalogues

<input checked="" type="checkbox"/>	Catalogue	Rows	SAMP	Excel	CSV	VOTable	Origin	Description
<input checked="" type="checkbox"/>	ZTF	381						Zwicky Transient Facility (ZTF) DR10: IRSA TAP query on table ztf_objects_dr10
<input checked="" type="checkbox"/>	LS	266						NOIRLab TAP: The DECam Legacy Survey (LS) DR9
<input checked="" type="checkbox"/>	DELVE	177						NOIRLab TAP: The DECam Local Volume Exploration Survey (DELVE) DR2
<input checked="" type="checkbox"/>	ESO	139						CDS VizieR table: B/eso/eso_arc
<input checked="" type="checkbox"/>	PS1	106						MAST Pan-STARRS DR2: Stack API service
<input checked="" type="checkbox"/>	VizierTables	105						CDS VizieR Table Metadata Search

**Provenance
info**

Showing 1 to 27 of 27 entries

Search:

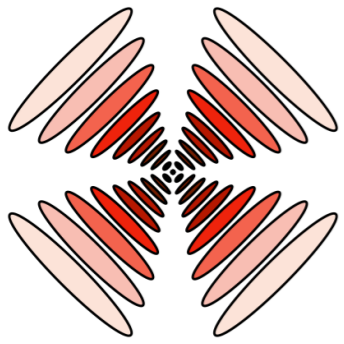
Previous 1 Next

Customising DAS: Examples of GET parameter usage

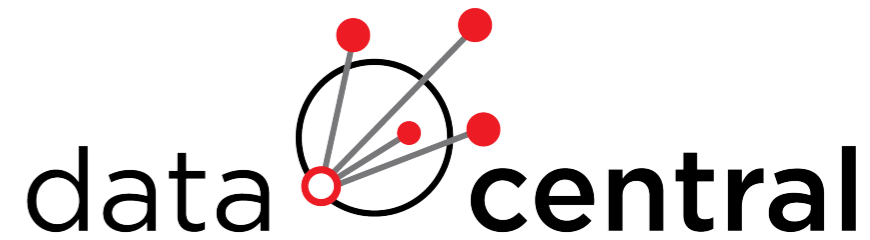
- Load only image sources: <https://das.datacentral.org.au/das?CAT=0>
- Load only image sources and the Acker catalogue of Planetary Nebulae: <https://das.datacentral.org.au/das?VIZ=acker,V/84>
- Load the DEFAULT catalogue sources and the Acker catalogue: <https://das.datacentral.org.au/das?CAT=DEFAULT&VIZ=acker,V/84>
- Load only the FINK and ZTF catalogues: <https://das.datacentral.org.au/das?CAT=ZTF&CAT=FINK&IMG=0>

Future DAS plans

- Add API endpoints for different functionality:
 - Fast cross-matching against multiple catalogues
 - e.g. cone search match with WISE, GALEX, SDSS, etc all in one go
 - Redshift aggregator
- Other ideas:
 - Real-time table displaying transient events + triggered cross-matching and data retrieval as soon as events come in
 - Interactive lightcurves and image display for time series data
 - Interactive viewing of spectra
 - Include ESO PAWS for on demand data reduction (e.g. FORS, UVES, X-shooter)



Conclusions



- **DAS** is a powerful and extensible platform for asynchronous data discovery and visualisation
- **DAS** as a platform for **PAWS**: Reduction of **spectroscopic** and **imaging** data sourced directly from multiple observatory archives. *Visualisation and download of reduced data products without having to download raw data OR install pipelines.*
- Development version of **Target Visualisation and Classification** app in place to view many targets using same asynchronous infrastructure as DAS underneath.
- Very interested in supporting transient science: opening up AAT archive: VOEvents and PAWS