

AsteroidDB: The Asteroid Legacy Archive of the Canary Islands Observatories

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The Canary Islands Observatories have around thirty optical-infrared telescopes belonging to public and private institutions from fifteen different countries. These telescopes share part of their total observing time with the Spanish astrophysical community, which has access to it through a time allocation committee managed by the Instituto de Astrofísica de Canarias.

The images obtained during these observations usually have a proprietary period of one year. After this period, all the data must be made freely available to the public.

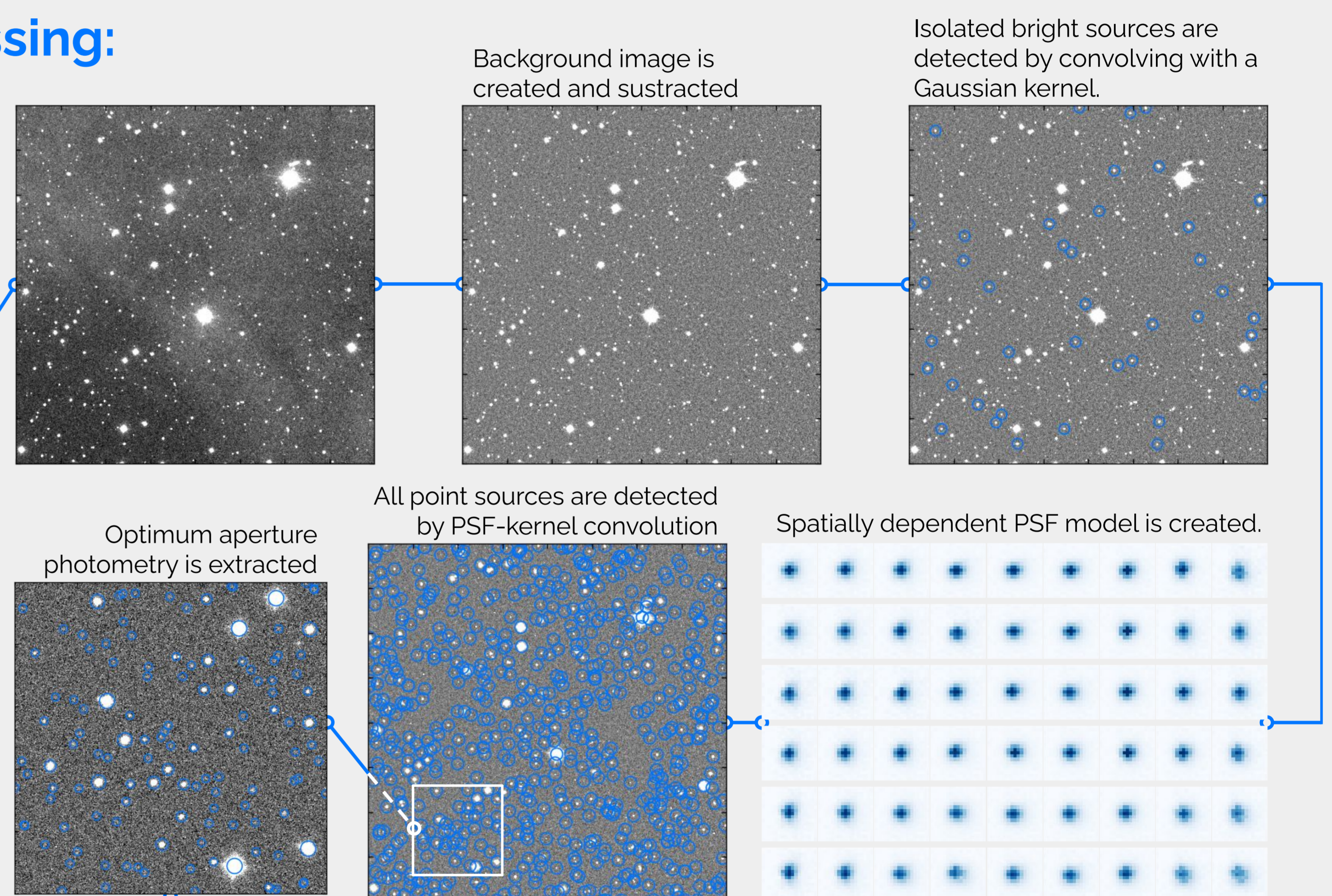
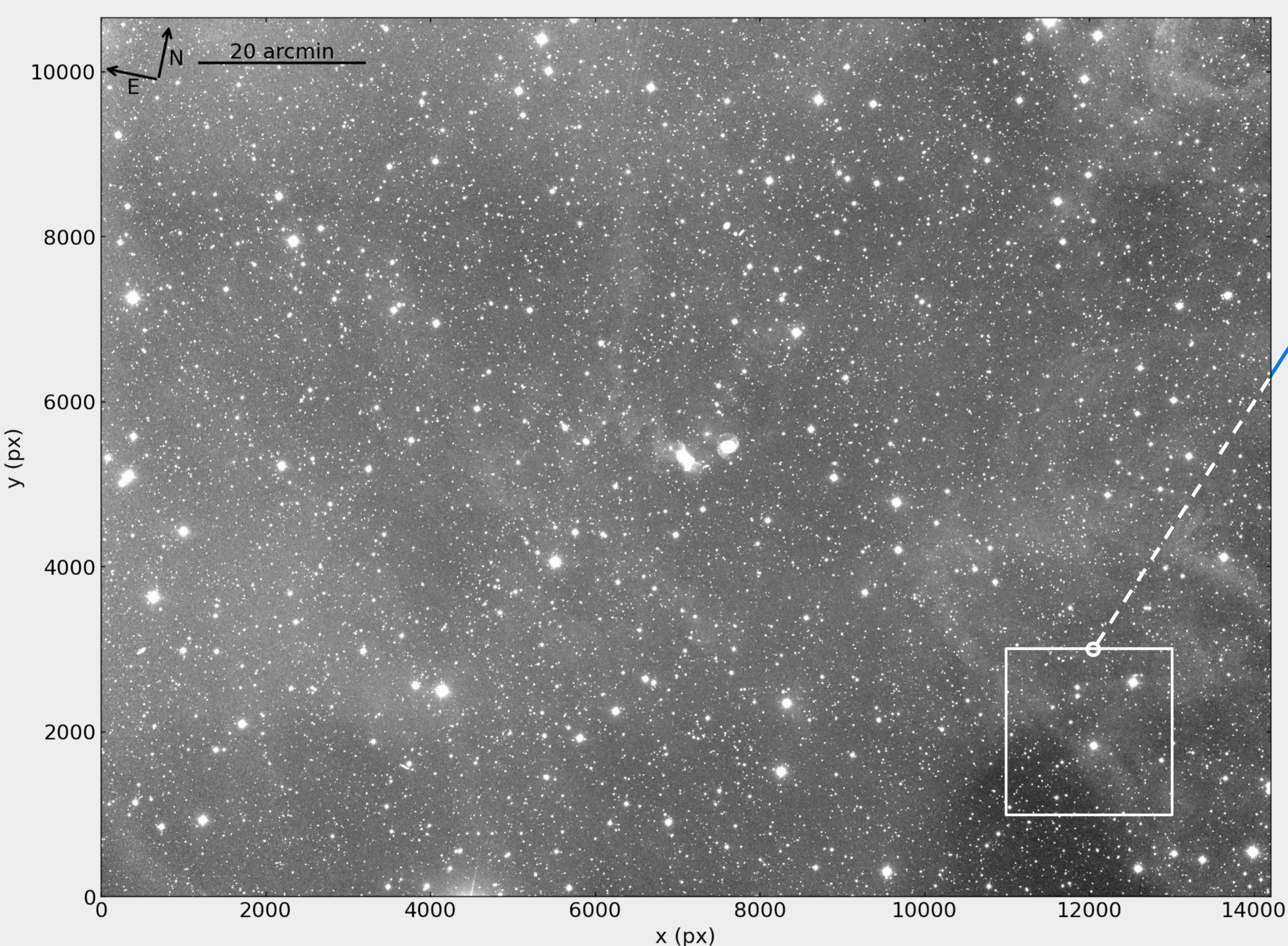
AsteroidDB is a pilot initiative to standardise, index and massively process images from different telescopes to extract photometric data of known asteroids. The open-access images are being processed in real time to complete an asteroid photometric database, accessible through a web portal (soon to be public). This portal will provide tools for selecting, visualising, downloading and analysing data and image stamps. It will also allow the calculation of derived variables such as rotation period, amplitude, G1 and G2 parameters and, in the future, shape models by light-curve inversion.

Telescope	Ø (m)	Instrument	FOV (")	Scale ("/px)	Filter	# images	Volume (TB)
TTT-1	0.80	iKon936-L BEX2-DD	17.3 x 17.3	0.50	Lum ugriz	80896	1.3
TTT-1	0.80	sCMOS QHY411	52 x 39	0.22	Lum gri	58195	33.6
TTT-2	0.80	sCMOS QHY411	52 x 39	0.22	Lum gri	314175	181.3
TST	1.0	sCMOS QHY411	144 x 106	0.6	Lum gr	1405	0.8
To be processed...							
ATLAS-Teide	16 x 0.28	sCMOS QHY600	99 x 66	1.2	Lum		
IAC80	0.82	CAMELOT-2	11.8 x 11.8	0.3	gri UBVRi		

A new set of **convolution-based algorithms for CUDA-enabled GPUs** has been developed for fast image processing. They have been integrated into the **GPUPHOT** package, which will be released in the coming months.

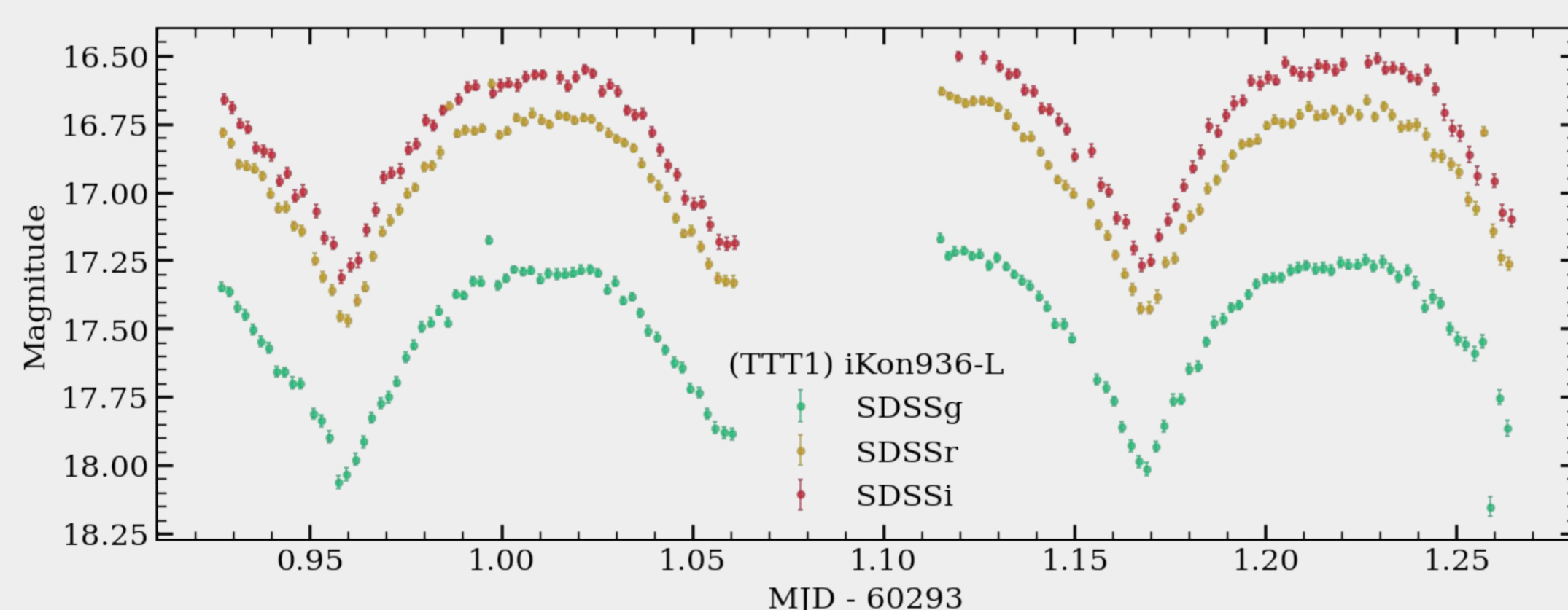
GPU (NVIDIA)	#	VRAM (GB)	CUDA cores
A100 SXM4	4	80	6912
L40S	4	48	18176
H100 PCIe	1	80	7296

Convolution-based algorithms for fast image processing:



Current works using data from AsteroidDB:

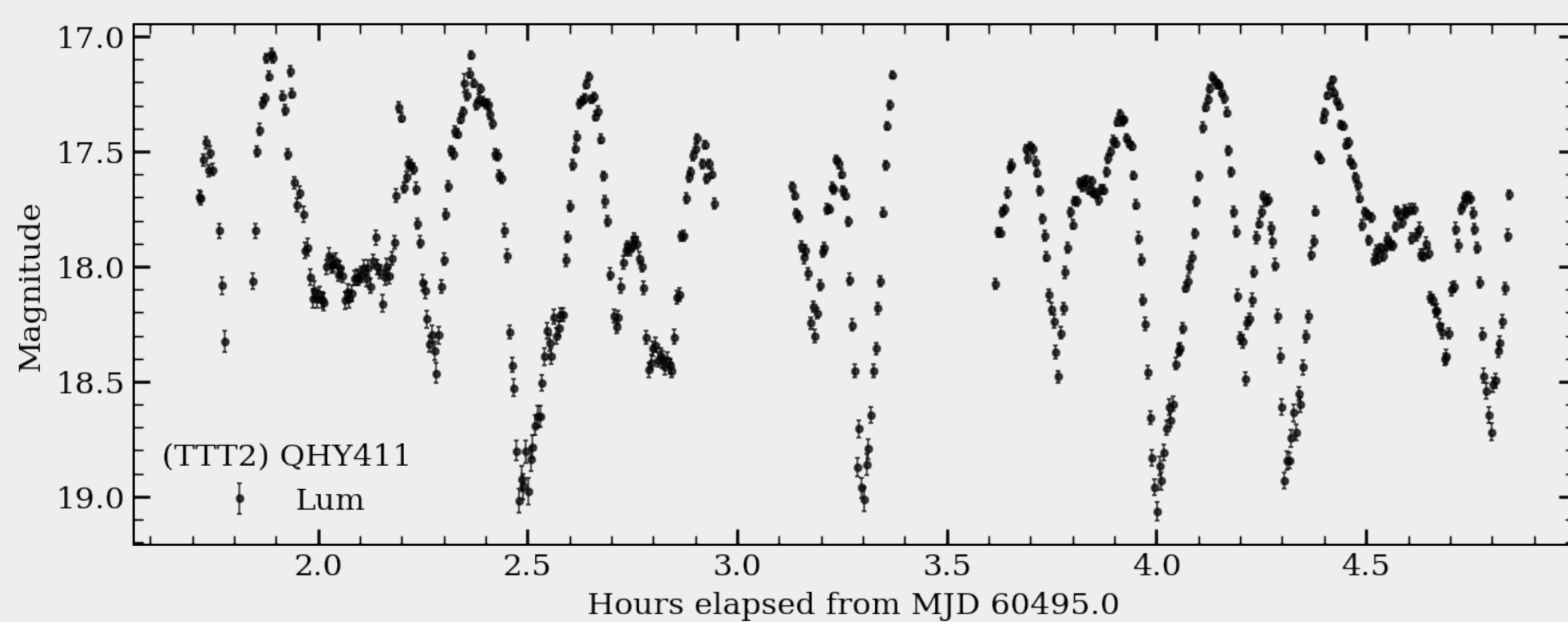
Popescu et al. (2024). Submitted to PSJ



The target of the Hayabusa2# space mission, (98943) 2001 CC21, was observed with TTT-1 and TTT-2 during 52 different nights. A total of ~35000 images were processed.

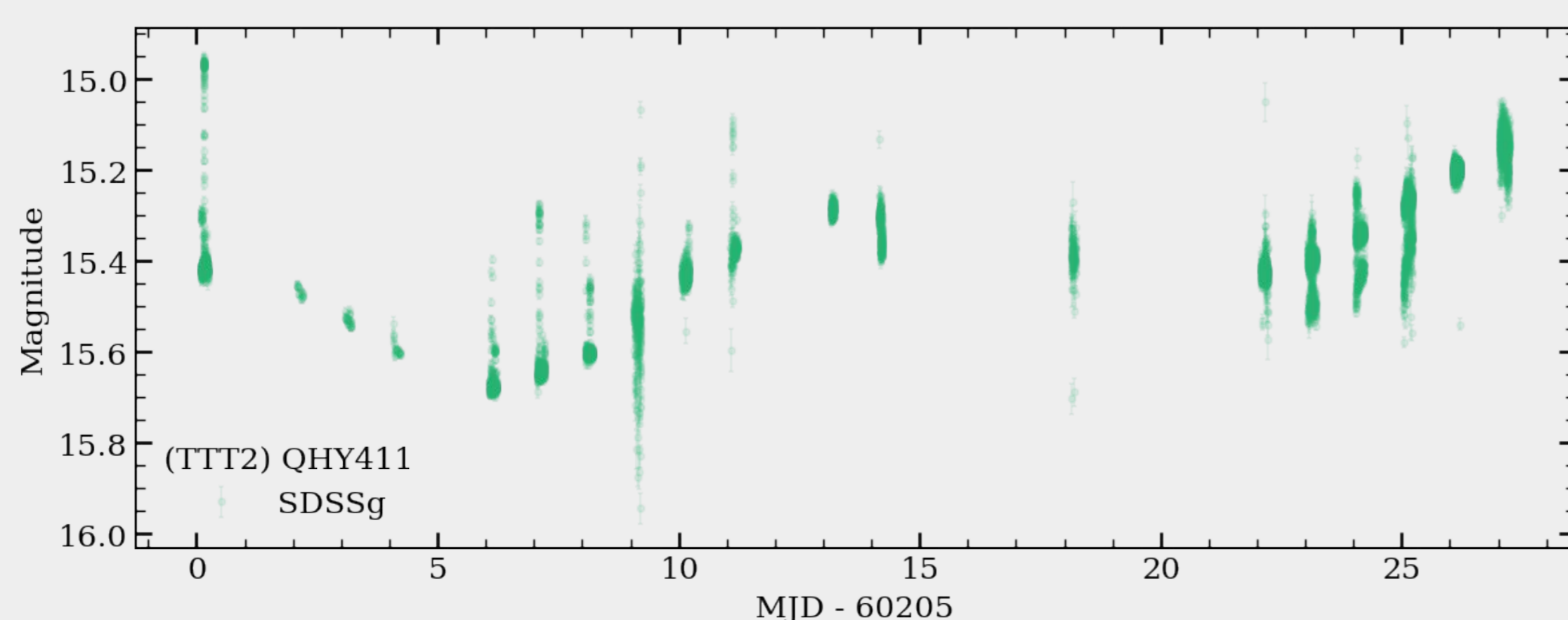
Newly discovered NEA: 2024 MK

Newly discovered NEAs are observed as soon as possible and the resulting photometry is automatically retrieved on the fly.



Ortiz et al. (2023). MNRAS Letters 528(1), L139-L145.

Photometric monitoring of the asteroid (319) Leona over several months in preparation for the Betelgeuse occultation in Dec 2023.



PostgreSQL

Photometric and astrometric data of all detected point sources are stored in a PostgreSQL relational database. For each image, the position of known asteroids is queried using a custom engine based on Find_Orb + JPL Horizons. The result is cross-referenced with the photometric points and duplicated, together with the main orbital data, into a new multi-table database called **AsteroidDB**.

Number of processed images: **454651**
 Asteroid observations: **1277819**
 Unique objects: **13960**
 Unique Near-Earth-Asteroids: **259**
 with more than 300 points: **129**
 with more than 1000 points: **68**

On-going characterization projects:

- Goldstone targets
- Newly discovered NEAs
- Potential mission targets
- Fast-rotator candidates

Coming soon: accessible via an interactive web portal with tools for analysing and retrieving data on the fly.