

FINAL DESIGN REVIEW:



SPACIOUS final design review

Sep 28 -- Sep 30, 2026

Institute for Astronomy, University of Edinburgh



Astronomical Observatory Institute
Faculty of Physics and Astronomy
Adam Mickiewicz University in Poznań

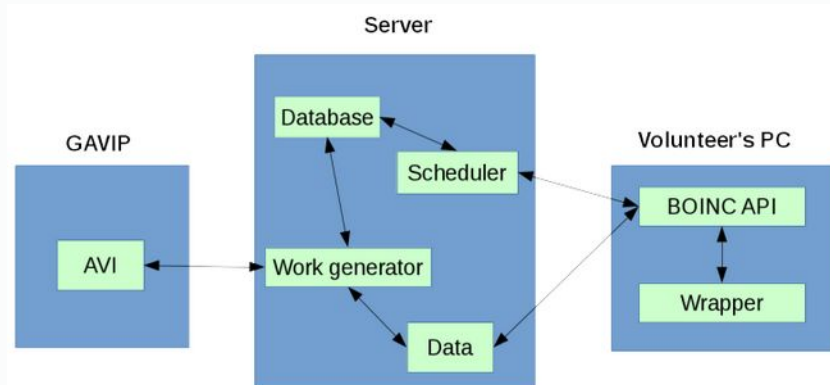
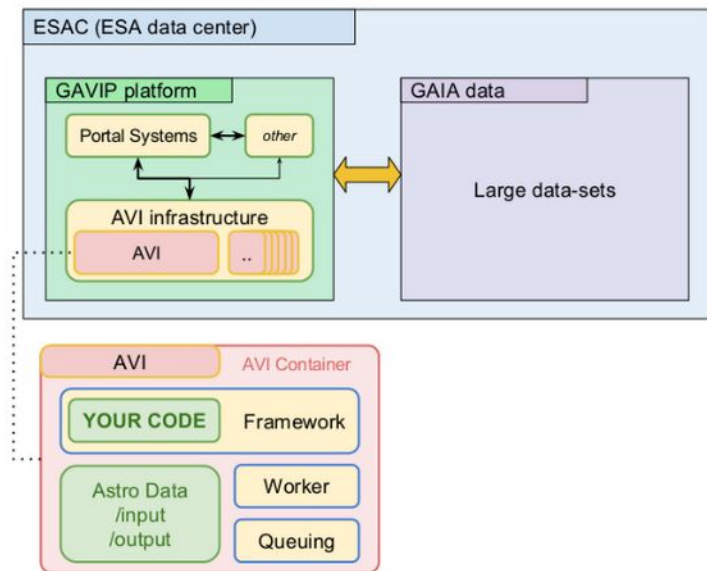


Institut de Ciències del Cosmos
UNIVERSITAT DE BARCELONA

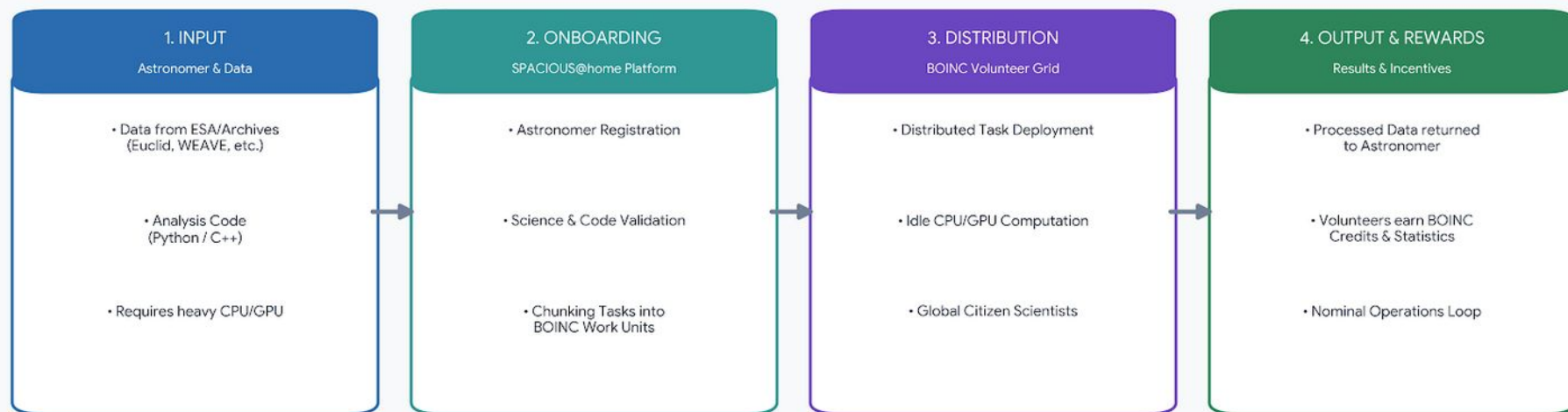


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SPACIOUS@home Architecture & Workflow





allows you to support professional astronomers by sharing your idle computing time to speed up their research.

Sign up as an ASTRONOMER
(Professionals only)

Does your research require heavy computations?

Use SPACIOUS@home to easily split
and confidentially distribute your computations
in small jobs through the BOINC platform.

Collect and analyse your results after being
computed by thousands of volunteers!

Compute for ASTRONOMERS
(Citizen science)

Start contributing to top-notch astronomy!

Join SPACIOUS@home at the BOINC platform
to share your idle computing time to help
professional astronomers to disentangle
the secrets of the universe.

<https://spaciousathome.eu/>

Overview

First seen on	2025-11-03 14:42:52
Category	Astrophysics
Total credit	1,037,025,168 Comprising 1,037,025,168 from the daily update + 0 since then
Recent average credit RAC	2,947,365
Recent average credit RAC (according to BOINCstats)	944,305
Average floating point operations per second	14,736.8 GigaFLOPS / 14,737 TeraFLOPS
Contribution to BOINC combined total credit	0.00215%
Contribution to BOINC combined total RAC	0.09722%
Users	363
Active users	130 (35.81%)
Hosts	1,439
Active hosts	0 (0.00%)
Teams	54
Active teams	34 (62.96%)
Last update user XML	2026-09-25 03:25:02 UTC (12:47:25 old)
Last update host XML	2026-09-25 03:25:02 UTC (12:47:25 old)
Last update team XML	2026-09-25 03:25:02 UTC (12:47:25 old)

[Overview](#) [Best ten days](#) [Last 40 days](#) [Credit overview](#) [Users overview](#) [Teams overview](#) [Hosts overview](#) [Countries overview](#)

Overview

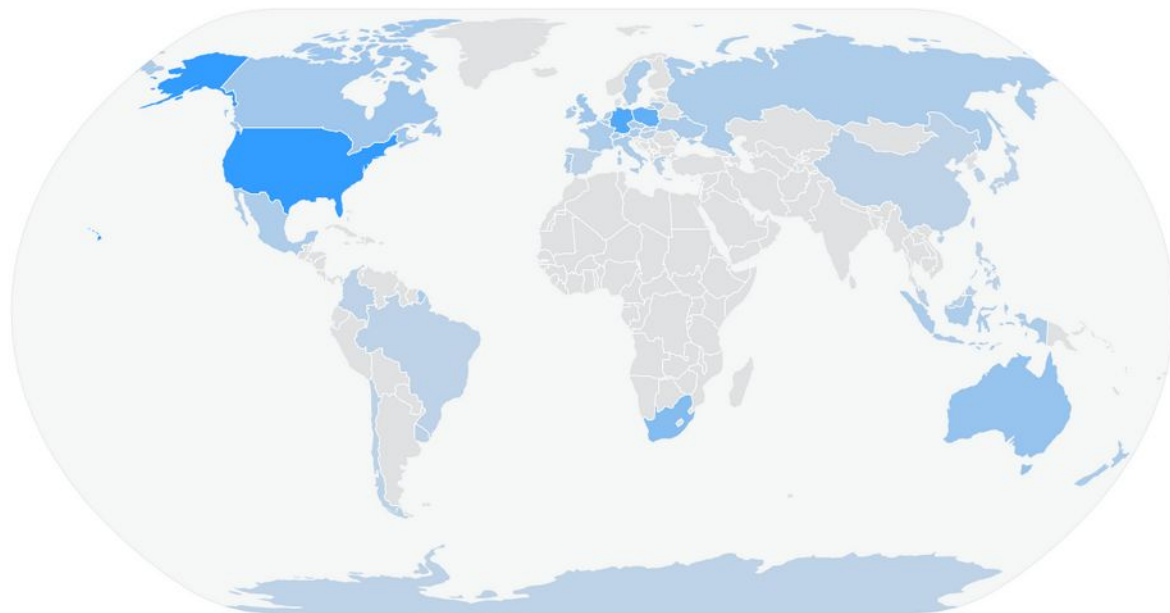
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Participants principaux

Categoria	Nom	Crédit mitja més recent	Pais	Participant des de
1	Crissy 🏆	69,639	89,063,489 Germany	14 Jan 2026, 2:04:53 UTC
2	utg 🏆	44,126	50,811,927 Germany	24 Oct 2025, 19:28:02 UTC
3	Goesnet 🏆	22,965	12,792,473 United States	22 Jul 2026, 22:08:19 UTC
4	Moor 🏆	14,000	21,311,268	1 Dec 2025, 9:29:44 UTC
5	mmonnin 🏆	12,137	18,677,538 United States	21 Oct 2025, 8:37:52 UTC
6	STEVE 🏆	11,957	13,877,493	21 Oct 2025, 2:49:05 UTC
7	Gunnar Hjern 🏆	10,910	12,528,091 Sweden	17 Apr 2026, 23:52:50 UTC
8	roundup 🏆	10,416	16,317,516 Hungary	26 Oct 2025, 7:27:47 UTC
9	mikey 🏆	10,152	7,534,790	21 Oct 2025, 14:13:41 UTC
10	Stiller Cruncher 🏆	8,676	7,741,258	5 Dec 2025, 8:27:11 UTC
11	JZD 🏆	8,542	12,341,986 International	21 Oct 2025, 11:01:24 UTC
12	[SG-FC] hi 🏆	8,402	10,081,677 Germany	3 Jul 2026, 7:03:34 UTC
13	makracz 🏆	8,342	11,910,361 Poland	27 Oct 2025, 13:12:49 UTC
14	BobDole 🏆	8,329	13,727,229 United States	2 Nov 2025, 4:15:34 UTC
15	prazape 🏆	7,416	7,559,342 Czech Republic	29 Apr 2026, 6:46:14 UTC
16	Conan 🏆	6,557	10,874,679 Australia	20 Oct 2025, 22:04:24 UTC
17	Laird o' th' wee White Hoose 🏆	6,370	15,338,318 Faroe Islands	27 Oct 2025, 21:58:42 UTC
18	Chris Skull 🏆	5,236	11,218,027 Germany	31 Mar 2026, 19:45:40 UTC
19	Valkanovsky 🏆	5,166	6,998,818 Czech Republic	16 Apr 2026, 21:42:03 UTC
20	GarrettG 🏆	5,075	4,408,048 Canada	14 Jan 2026, 14:26:11 UTC

https://spaciousathome.eu/spaciousathome/top_users.php

Team distribution by country



Highest values

1	United States	21
2	Germany	14
3	Poland	11

Value scale

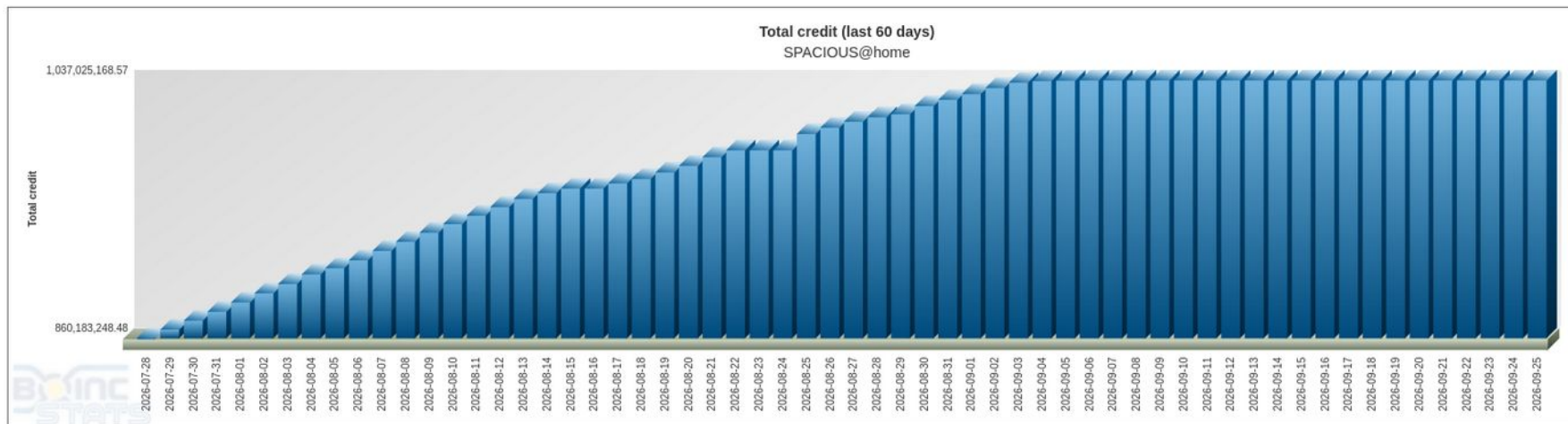


Outside the map:

International - 32, None - 3

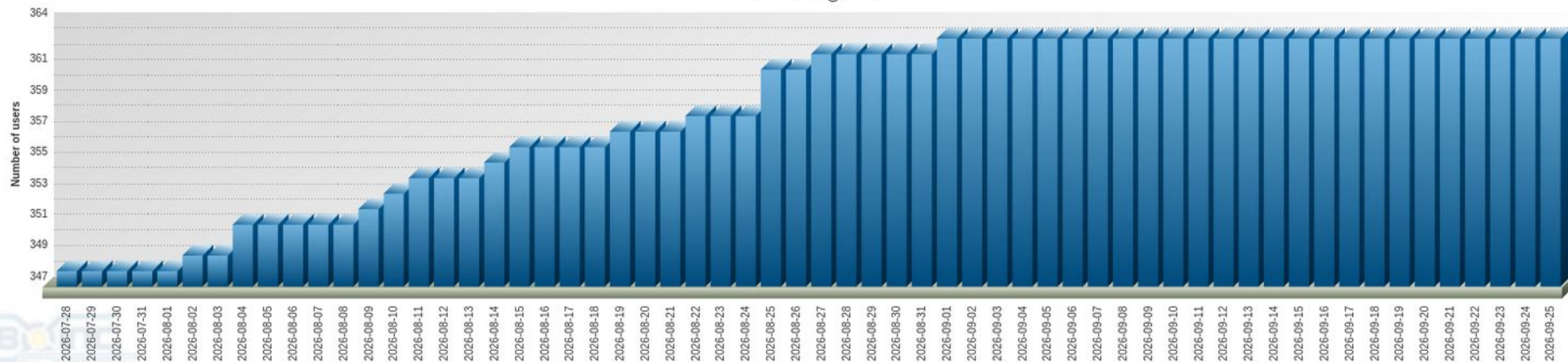
Anguilla - 1 (geometry unavailable)

Credit overview

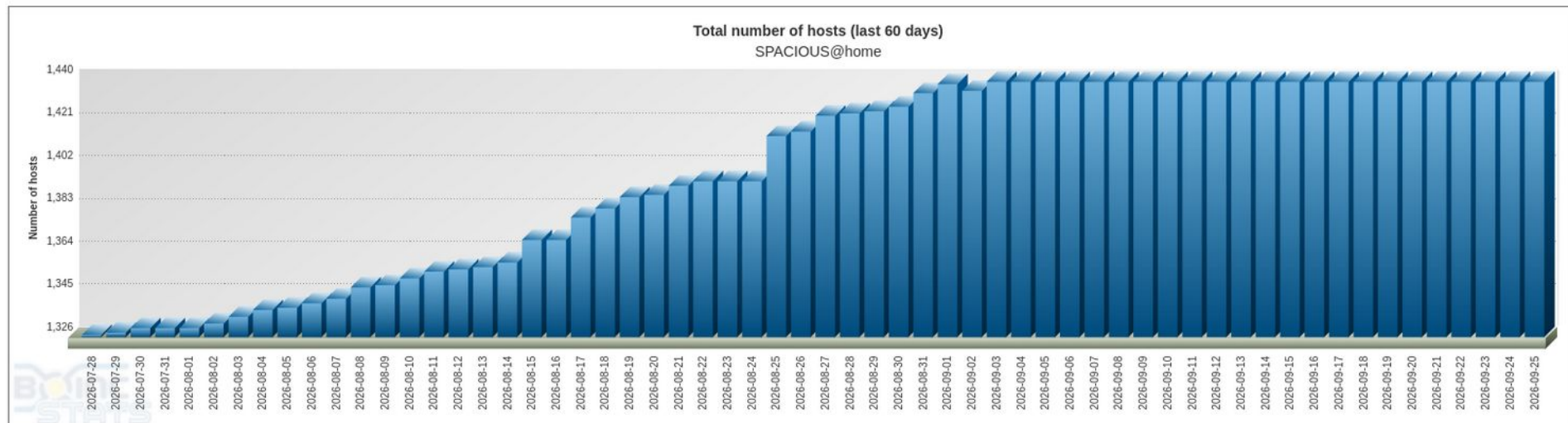


Users overview

Total number of users (last 60 days)
SPACIOUS@home



Hosts overview



spacious@home Timeline Stats				
Show	100	▼	entries	First PREVIOUS
↕	Date	↕	Event	↕ Team
1	Saturday, 19 July 2025		First user created	
2	Wednesday, 22 October 2025		First user to 10000	
3	Wednesday, 22 October 2025		First user to 100,000	STEVE
4	Wednesday, 22 October 2025		First user to 100,000	Dave Studdert
5	Thursday, 23 October 2025		First user to 250,000	Icecold
6	Thursday, 23 October 2025		First user to 250,000	STEVE
7	Thursday, 23 October 2025		First user to 500,000	Icecold
8	Friday, 24 October 2025		First user to 1,000,000	Icecold
9	Wednesday, 29 October 2025		First user to 2,500,000	ChelseaOilman
10	Friday, 31 October 2025		First user to 5,000,000	KetamiNO [YouTube]
11	Sunday, 2 November 2025		First user to 10,000,000	KetamiNO [YouTube]
12	Monday, 3 November 2025		First team to 100,000	L'Alliance Francophone
13	Monday, 3 November 2025		First team to 100,000	TeAm AnandTech
14	Monday, 3 November 2025		First team to 100,000	Ukraine
15	Monday, 3 November 2025		First team to 1,000,000	L'Alliance Francophone
16	Monday, 3 November 2025		First team to 1,000,000	TeAm AnandTech
17	Monday, 3 November 2025		First team to 1,000,000	Ukraine
18	Monday, 3 November 2025		First team to 250,000	L'Alliance Francophone
19	Monday, 3 November 2025		First team to 250,000	TeAm AnandTech
20	Monday, 3 November 2025		First team to 250,000	Ukraine
21	Monday, 3 November 2025		First team to 500,000	L'Alliance Francophone
22	Monday, 3 November 2025		First team to 500,000	TeAm AnandTech
23	Monday, 3 November 2025		First team to 500,000	Ukraine
24	Tuesday, 4 November 2025		First team to 2,500,000	TeAm AnandTech
25	Tuesday, 4 November 2025		First team to 2,500,000	Ukraine
26	Saturday, 8 November 2025		First team to 5,000,000	TeAm AnandTech
27	Tuesday, 11 November 2025		First team to 10,000,000	TeAm AnandTech
28	Monday, 15 December 2025		First team to 50,000,000	TeAm AnandTech
29	Monday, 5 January 2026		First user to 50,000,000	10esseeetony
30	Monday, 5 January 2026		First user to 50,000,000	stoneageman
31	Friday, 6 February 2026		First team to 100,000,000	TeAm AnandTech
32	Saturday, 18 April 2026		First user to 100,000,000	10esseeetony

Asteroid phase curve modeling with empirical correction for shape and viewing geometry

Dagmara Oszkiewicz^a, Przemysław Bartczak^{a,b}, Milagros Colazo^a and Antti Penttilä^c

^a*Astronomical Observatory Institute, Faculty of Physics and Astronomy, A. Mickiewicz University, Słoneczna 36, 60-286 Poznań, Poland*

^b*Instituto Universitario de Física Aplicada a las Ciencias y las Tecnologías (IUFACyT). Universidad de Alicante, Ctra. San Vicente del Raspeig s/n. 03690 San Vicente del Raspeig, Alicante, Spain*

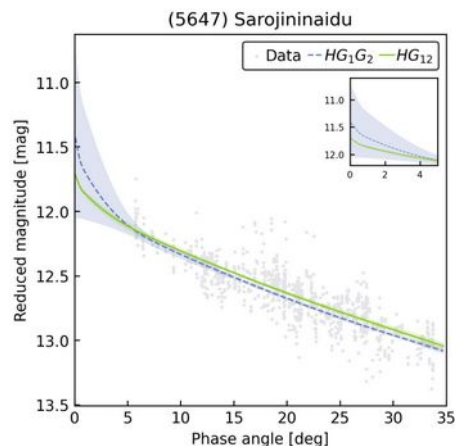
Asteroid phase curve modeling with empirical correction for shape and viewing geometry

Dagmara Oszkiewicz^a, Przemysław Bartczak^{a,b}, Milagros Colazo^a and Antti Penttilä^c

^a*Astronomical Observatory* ABSTRACT

^b*Instituto Universitario de
s/n. 03690 San Vicente del*

We present a novel empirical method for correcting asteroid phase curves for rotational and geometrical effects using precomputed spin-and-shape models. Our approach normalizes sparse photometric data to a pole-on geometry, enabling consistent phase-curve fitting across apparitions. We fit both the H, G_1, G_2 and H, G_{12} phase functions to the normalized data. We also numerically derive new constraints on parameter ranges that ensure physically meaningful solutions. These constraints are based on the requirement that the reduced magnitude must monotonically decrease with phase angle and remain within plausible slope bounds. Compared to earlier bounds, our new constraints are more permissive. We also compare derivative-based and derivative-free optimization methods, highlighting convergence issues with the H, G_{12} function and offering mitigation strategies. We applied our method to over 25,000 asteroids observed by the ATLAS survey, demonstrating its usability. The new method enables the selection of the preferred spin-and-shape solution based on either statistical phase-curve model selection criteria and/or physically motivated constraints on the phase-curve shape.



Modelling Asteroid Photocentre Offset and Application to Gaia FPR Astrometry and the 2029 Close Approach of (99942) Apophis

Karolina Dziadura,¹★ Ziyu Liu,²† Karolina Dombek,¹ Przemysław Bartczak,^{1,3} Dagmara Oszkiewicz,¹ Daniel Hestroffer,² Josselin Desmars,^{4,2} Pedro David,² Agnieszka Kryszczyńska¹

¹ *Astronomical Observatory Institute, Faculty of Physics and Astronomy, Adam Mickiewicz University, Słoneczna 36, 60-286 Poznań, Poland*

² *LTE, Observatoire de Paris, Université PSL, Sorbonne Université, Université de Lille, LNE, CNRS, 61 Avenue de l'Observatoire, 75014 Paris, France*

³ *Instituto Universitario de Física Aplicada a las Ciencias y a las Tecnologías, Universidad de Alicante, San Vicente del Raspeig, Alicante, Spain.*

⁴ *Institut Polytechnique des Sciences Avancées IPSA, 63b Bd. de Brandebourg, 94200, Ivry-sur-Seine, France*

Modelling Asteroid Photocentre Offset and Application to Gaia FPR Astrometry and the 2029 Close Approach of (99942) Apophis

ABSTRACT

Mara Oszkiewicz,¹

Photocentre offsets refer to the difference between the centre of light and the centre of mass of a celestial body. This effect is increasingly observable as modern astrometric data reach milliarcsecond and sub-milliarcsecond precision, particularly in the context of Gaia data.

*Warsaw, Poland
75014 Paris, France
Alicante, Spain.*

In this study, we examine how photocentre offsets depend on the size, shape, rotation, and surface scattering of asteroids, as well as the observer's distance and the solar phase angle. We first develop a spherical reference model to characterize the first-order dependence on observation geometry and object size, followed by a set of 1,000 random Gaussian spheres to quantify the effects of irregular shape and orientation. We find that irregular shapes produce a broad range of possible offsets, particularly at large phase angles, whereas the scattering law has a comparatively smaller effect. We then investigate the impact of photocentre offsets on Gaia FPR astrometry, finding that accounting for them reduces the reduced χ^2 by approximately 75% for orbital fit.

Finally, we assess the photocentre offsets of NEA (99942) Apophis during the 2029 close Earth encounter using both spherical and radar-derived shape models. We find that the offsets depend strongly on the asteroid's instantaneous orientation, as it tumbles. We therefore provide an publicly available tool to predict the photocentre offset and relative brightness of Apophis for different epochs and orientations. The combined photocentre and brightness modelling provides complementary astrometric and photometric constraints on Apophis's orientation and can help refine its non-principal-axis rotational state before and during the encounter.

Modelling Asteroid P Astrometry and the 2

tion to Gaia FPR) Apophis

ABSTRACT

Photocentre offsets refer to the difference b
increasingly observable as modern astrometry



model 146



model 704



model 555



model 886



model 714



model 232



model 622



model 364



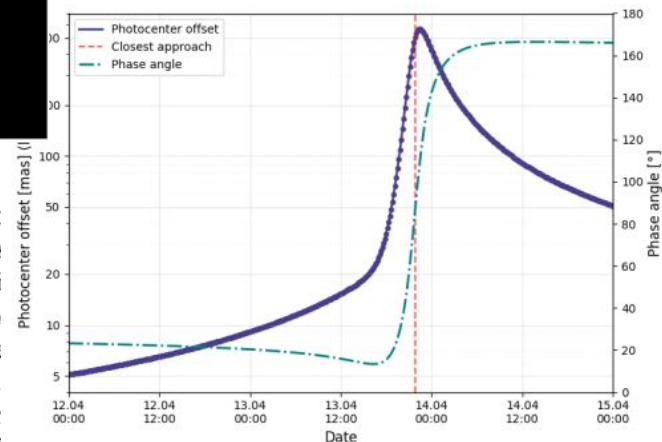
model 487



model 36



shape, rotation, and surface
elop a spherical reference mc
y a set of 1,000 random Gaus
produce a broad range of possi
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he reduced χ^2 by approximate
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ly on the asteroid's instantar
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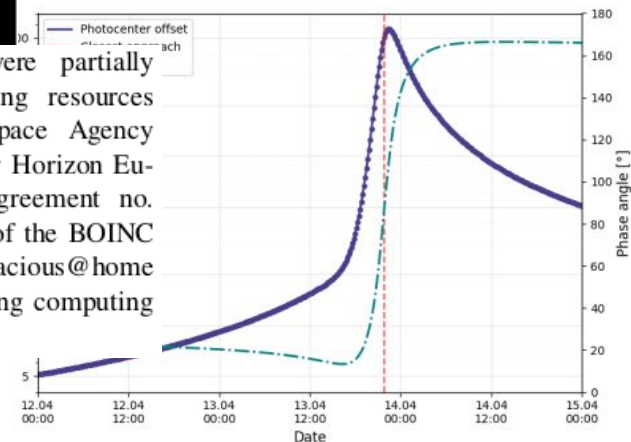
Modelling Asteroid P Astrometry and the 2

tion to Gaia FPR) Apophis

ABSTRACT

Photocentre offsets refer to the difference between the true centre of mass and the apparent centre of light, which is increasingly observable as modern astrometry

The calculations which led to this work were partially supported by the projects: "GAVIP-GC: processing resources for Gaia data analysis" funded by European Space Agency (4000120180/17/NL/CBi) and SPACIOUS funded by Horizon Europe HORIZON-CL4-2023-SPACE-01-71 (grant agreement no. 101135205). The authors also thank the volunteers of the BOINC Gaia@home (<http://gaiaathome.eu>) and Spacious@home (<http://spaciousathome.eu>) projects for providing computing power used in this research.



model 146



model 704



model 555



model 232



model 622



model 364



model 487



model 36



g the 2029 close Earth encounter on the asteroid's instantaneous photocentre offset and relative brightness modelling provides complementary astrometric and n-principal-axis rotational state before and during the

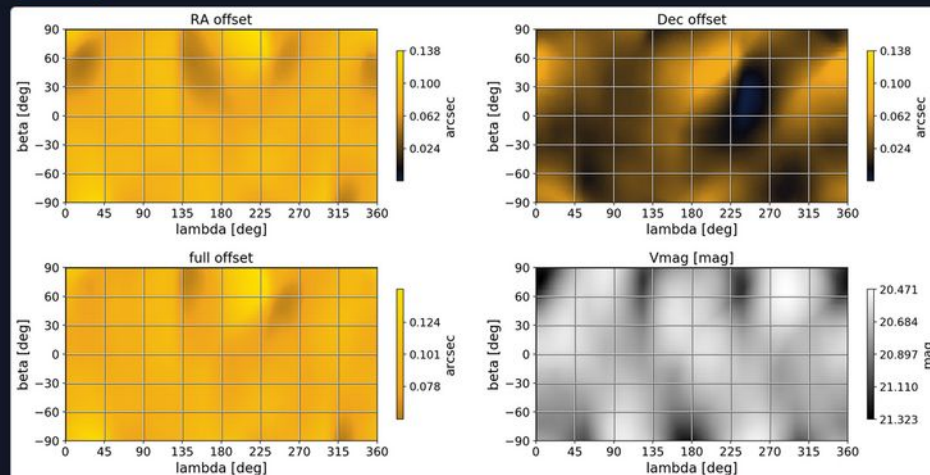
Apophis (99942) model viewer

quantities: ra_offset, dec_offset, Vmag - JD 2461406.50000 ... 2462241.40833 - gamma: min=0.0 step=4.0 N=90

1. lambda x beta maps (ra_offset, dec_offset, magnitude, Vmag) — for a date and gamma

date (JD), range 2461406.50000...2462241.40833 gamma [deg] projection sampling holes
 2461406.50000 0 rectangular interpolated (exact date & gamma, smooth) show (gray)

Draw maps



2. Trajectory — upload a file 'jd,lambda,beta,gamma' → time-series plots

file (one row per line: jd,lambda,beta,gamma)

Navega... No s'ha seleccionat cap fitxer.

Draw time series

Downloaded CSV columns: jd,lambda,beta,gamma,ra_offset,dec_offset,Vmag. ra/dec are interpolated model values; Vmag is the corrected value (same as the plot, table-mean subtracted, mean = 0; with a distances file also +5 log10(r/Δ)). The Vmag plot Y axis is auto-scaled.

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