

The background of the poster is a composite image. The top half shows a vast, star-filled night sky with the Milky Way galaxy visible as a bright, hazy band of light. The bottom half shows a desert landscape at night. In the foreground on the left, there is a large, white, angular structure representing the LSST telescope. In the distance on the right, there are some small, illuminated buildings, possibly part of an observatory or a town.

Rubin Observatory LSST@Europe4

Shaping the European Contribution to LSST

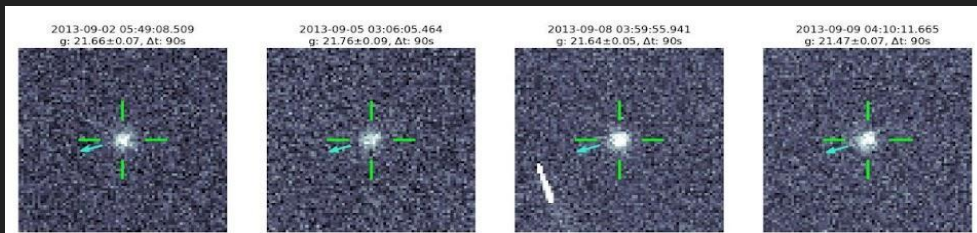
Rome, Italy | October 24-28 2022

<https://ls.st/lssteu4youtube>

Poster Lightning Talks

Kathleen Kiker: The Asteroid Discovery, Analysis, and Mapping (ADAM) Precovery Service

- Working service at: <https://adam.b612.ai/>
- New algorithm improves speed over traditional/brute force precovery methods
- Searches entire NSC DR2 in ~35 seconds
- Precovery searches can extend the arcs of newly discovered objects, recover lost objects, and refine orbits



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ADAM :: Precovery

Search a set of catalogs for precovery observations of an object.

The objects can be specified via orbital elements or state vectors (given in usual IAU76/J2000 reference frame as used by JPL Horizons), or by selecting one of the sample objects. The search will return all matches within 5° of the predicted object position. The typical search time is about 1 minute. The results will be downloadable as a CSV file.

Currently available catalogs:

NSC/Lab Source Catalog: Includes 1,763,381,575 observations spanning 9/23/2012 (MJD 56193) to 11/16/2019 (MJD 58804). The full NSC has 67,822,619,019 observations of 3,932,838,064 unique objects, but we exclude any object with more than four detections as those are likely to be static (stars, quasars, galaxies) and not moving (asteroids/TNOs).

Please suggest potential features or report any bugs to our [GitHub Issue Tracker](#).

Start MJD: 56193 End MJD: 58804 Radius (Arcsec): 5

Coordinate System: ☒ Keplerian ☐ Cartesian ☐ Cometary

a (au): 3.1940376465936557 e: 0.1954951986510803 i (deg): 27.595175225725132

an (deg): 314.24273945356265 ap (deg): 229.53814741310825 ma (deg): 5.485024438173199

Epoch (MJD TDB): 57863.0 Pick a Sample Object: 458508 (2011 CM42)

☐ Email Me Candidate Cutsouts

RESUBMIT

DOWNLOAD CSV

Mouse over column headers to view additional information

MJD (UTC)	RA (°)	DEC (°)	Filter	Magnitude	Magnitude Error	dRA (")	RA Error (")	dDEC (")	DEC Error (")	Pred
56538.20262	325.80246	-1.15352	g	20.948	0.02813	0.37582	0.02635	0.03664	0.02524	321
56546.17172	324.26915	-1.24465	i	20.625	0.03105	0.34650	0.02526	0.06387	0.02785	321
56546.48703	324.26903	-1.24405	i	20.653	0.05315	0.30509	0.03505	0.06085	0.02455	321

Find the complete talk at: <https://ls.st/lssteu4youtube>

Bryce Bolin: (594913) 'Ayló'chaxnim, a kilometer-scale asteroid inside Venus' orbit

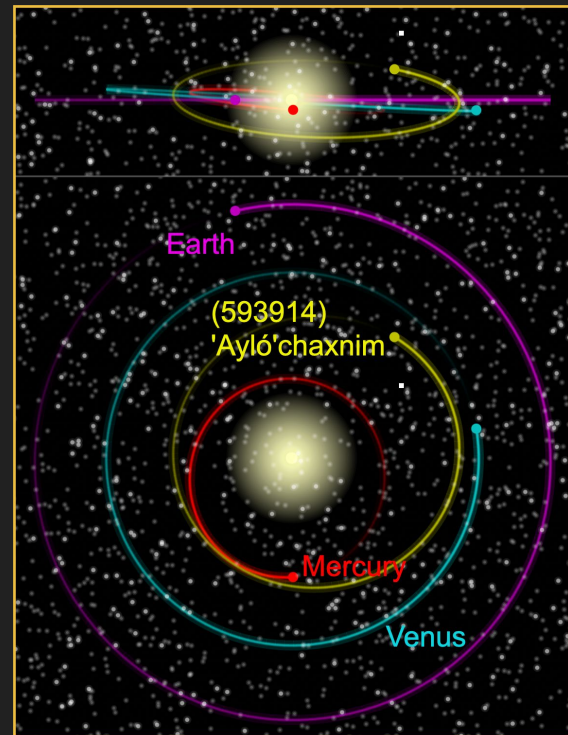


- (594913) 'Ayló'chaxnim is the first known asteroid confined within the orbit of Venus
- Max Solar distance 0.65 au, ~2 km size
- ~10 Myr lifetime, likely to hit Venus
- Possibly 10 x more 'Ayló'chaxnim asteroids compared to NEO models
- May hint of an additional source of asteroids inside the orbit of Mercury



Scan QR code for manuscript:

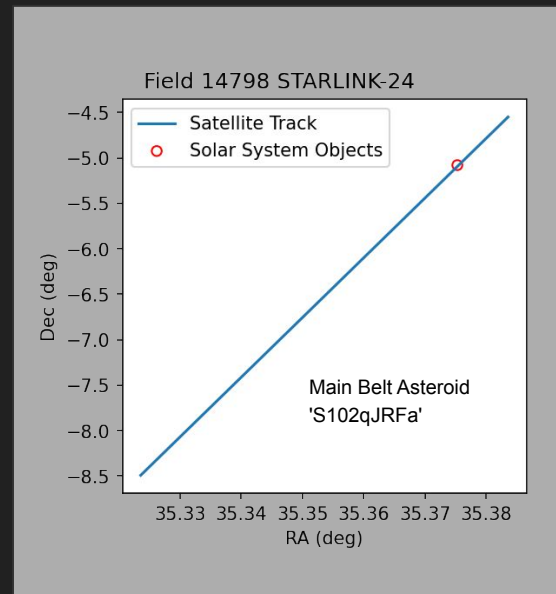
Bolin et al. 2022, MNRAS:L, 517, 1,
L49-L54



Find the complete talk at: <https://ls.st/lssteu4youtube>

Siegfried Eggl: The Impact of Mega Constellations on Solar System Science with LSST

- Mega constellations of Artificial Satellites are a reality for LSST
- Even with considerable efforts by operators to darken satellites they are still bright $\sim 7\text{--}8$ mag
- An impact analysis on static sources and cosmology has been attempted (e.g. Tyson et al. 2020)
- We are studying the impact of mega constellations on moving sources such as Solar System Objects (SSOs) via higher fidelity, direct simulations.
- Our preliminary results regarding suggest a loss of SSO detections in the few % range due to Starlink satellites alone.
- Through the current “6 detection” requirement for discoveries even small percentages lost can have undesirable consequences.
- Nothing to panic about but keep an eye out for.



Find the complete talk at: <https://ls.st/lssteu4youtube>

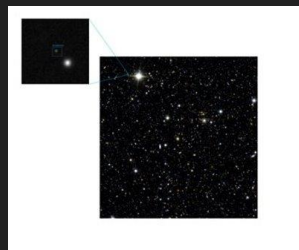
Detection of slow-moving solar system objects using 3D convolutional neural networks

Scientific Goal

Detecting long-period comets in support of the ESA F mission Comet Interceptor.

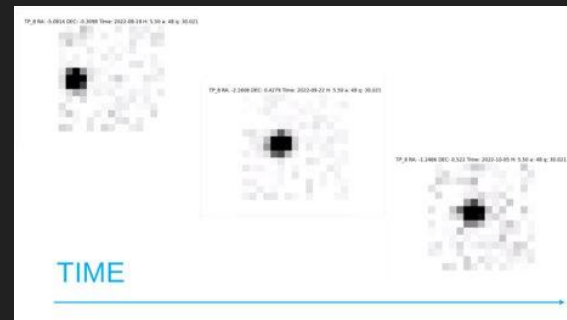
Develop and test a Machine Learning-based algorithm to detect slow-moving objects in LSST images.

Slow-moving object

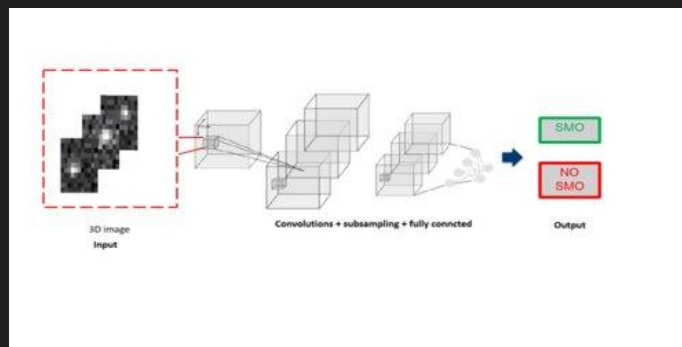


Data augmentation

- Luminosity
- Orientation
- speed



Input: frames sequence



Output: binary classification:
include a SMO or not.

Find the complete talk at: <https://ls.st/lssteu4youtube>

Hybrid Solar System Catalogue

Tom Wagg

Motivation: Make predictions for LSST that **account for prior detections** - let's not predict the (re)discovery of Ceres!

We combined simulated objects from **S3M** (Grav+2011) with detections from **MPCORB** without changing underlying distributions

Hybrid catalogue can be used for mock LSST observations in the same way as S3M, allowing for **more accurate predictions**

Creation is **fast**, can be updated for every night of LSST detections



Full talk available here

<https://youtu.be/WXLA vV4dz uM> • tomwagg@uw.edu • https://github.com/dirac-institute/hybrid_sso_catalogue

