

Recent and current DLR NEO observing activities from the 1.2m Calar Alto telescope

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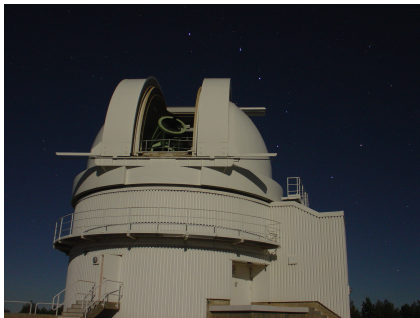
Knowledge for Tomorrow



Observational Setup

Hardware and targets

- ▶ 1.23m f/8 telescope, remotely controlled
- ▶ 4k x 4k e2v CCD
 - ▶ Field of view of about 22×22 arcmin
 - ▶ $15 \mu\text{m}$ pixel size
 $\approx 0.6 \text{ arcsec/pixel}$
 - ▶ Exposure times 0.1 ... 300 s
- ▶ 100 nights per year of which about 50 are usable
- ▶ photometric observations of
 - ▶ Jupiter Trojans
 - ▶ NEOs
 - ▶ Jupiter irregular satellites
 - ▶ Comets
 - ▶ TNO occultation events



CAHA 1.23m Telescope



Scheduling and performing observations

- [illegible]

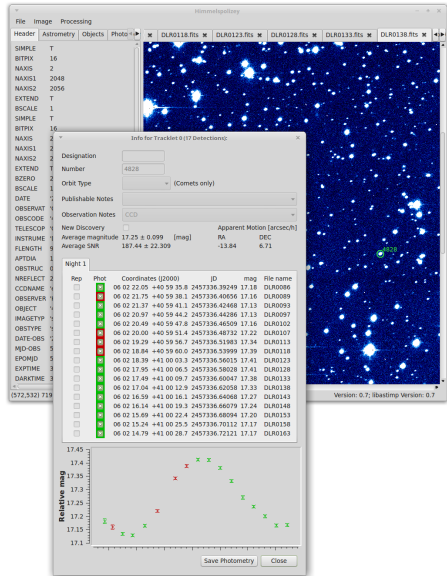
ScriptGen and Starchart



Observational Setup

Data reduction

- ▶ Software for astrometric reduction, moving object detection and identification and (preliminary) photometric reduction (Himmelspolizey, Stephan Hellmich)
- ▶ Positions from all objects observed reported to MPC
- ▶ Newly discovered objects linked over multiple nights based on orbits computed with openorb
- ▶ Results of preliminary photometric reduction used for scheduling ongoing observations



Himmelspolizey

NEO Observation Programs

SSA – P2-NEO-IV – OBSERVATIONS WITH COOPERATING SENSORS

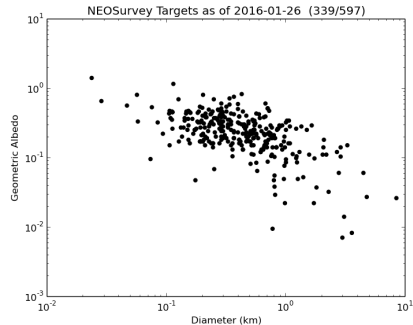
- ▶ NEO followup observations of objects on the NEOCP and SCN priority list (2014/2015)
- ▶ Observing strategy:
 - ▶ High desirability score NEOCP / urgent SGN list objects with uncertainties of less than 10' selected for observation
 - ▶ Scheduled NEOCP objects reported on NEOCP blog
 - ▶ Observation of NEOs within the loop of regular targets
⇒ 15 ... 45 minutes between 2 observations of the same object
 - ▶ Immediate astrometric reduction
 - ▶ Astrometry check by computing an orbit with findOrb using all available positions
 - ▶ Continuous observations until at least 3 good positions were acquired
 - ▶ Positions sent to MPC and NEOCP blog post update



NEO Observation Programs

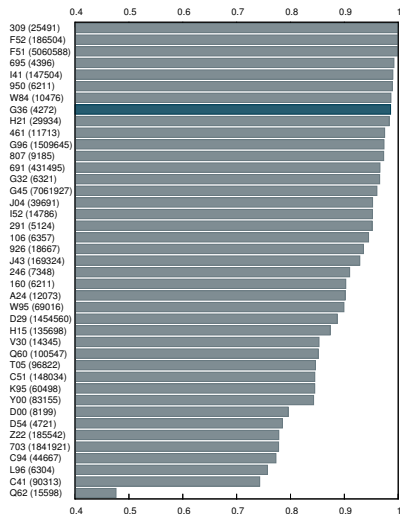
High albedo NEO observations

- ▶ Joint program managed by Michael Mommert (NAU)
- ▶ Participating telescopes
 - ▶ NAU campus telescope, VATT, CAHA 1.23
- ▶ Observation of NEOs with high albedo according to Spitzer NEOSurvey data
- ▶ Lightcurve photometry to determine G and H
- ▶ Check if higher albedo for smaller objects is rather a bias effect introduced by high lightcurve amplitudes



CASADO - Calar Alto Serendipitous Asteroid Discovery and Observation

- ▶ Extraction of astrometry of all asteroids observed
- ▶ Typical observation night covers less than 1 deg^2
- ▶ 47,058 positions sent to MPC since 2011
- ▶ 295 designations received
- ▶ Discovery of TNO 2013 SA87



Fraction of reported asteroid positions with residuals less than $1''$ reported in 2015 for stations which sent more than 4k positions

