KLENOT NEO FOLLOW-UP PROGRAM IN EUROPEAN FRAMEWORK

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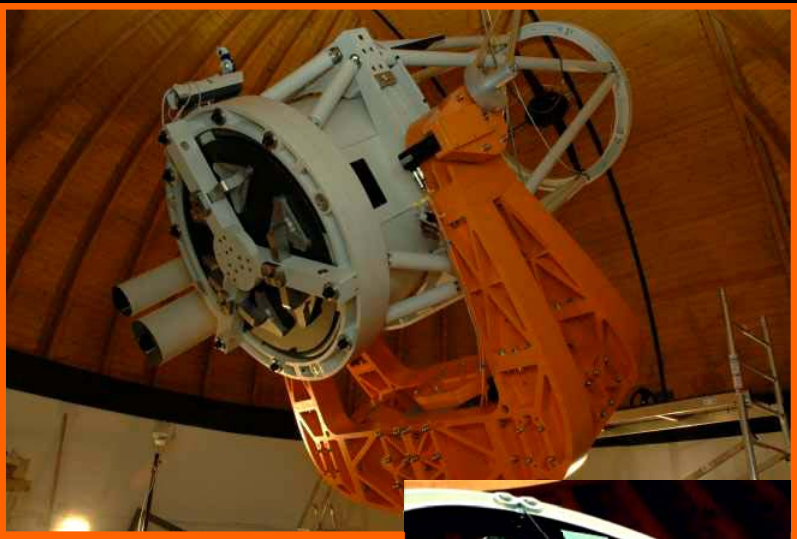


1.06-M KLENOT TELESCOPE NG

INTRODUCTION

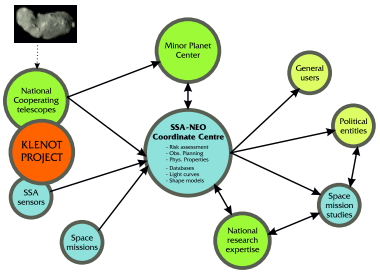
NEO research is a great challenge just now - for science, for exploration and for planetary defence. Therefore NEO discoveries, astrometric follow-up, orbit computations as well as physical studies are of high interest both to science community and humankind.

KLENOT TELESCOPE

The KLENOT Project of the Klet Observatory, South Bohemia, Czech Republic pursued the confirmation, early follow-up, long-arc follow-up and recovery of Near Earth Objects since 2002. Tens of thousands astrometric measurements helped to make inventory of NEOs as well as to understand the NEO population. It ranked among the world most prolific professional NEO follow-up programmes during its first phase from 2002 to 2008. The fundamental improvement of the 1.06-m KLENOT Telescope was started in autumn 2008. The new computer controlled paralactic mount was built to substantially increase telescope-time efficiency, the number of observations, their accuracy and limiting magnitude. The testing observations of the KLENOT Telescope Next Generation (NG) were started in October 2011. The new more efficient CCD camera FLI ProLine 230 was installed in summer 2013.

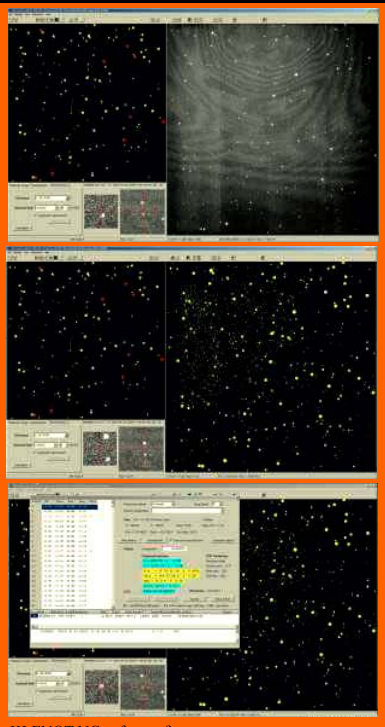
The original Klet Software Package has been continually upgraded over the past two decades of operation. Along with huge hardware changes we have decided for essential changes in software and the whole KLENOT work-flow. Using the current higher computing power available, enhancing and updating our databases and astrometry program, the core of our software package, will prove highly beneficial. Moreover, the UCAC4 as the more precise astrometric star catalog was implemented.

The modernized KLENOT System was put into full operation in September 2013. This step opens new possibilities for the KLENOT Project, the long-term European Contribution to Monitoring and Cataloging Near Earth Objects. More than 8000 of minor planet and comet astrometric positions including NEA measurements were published from September 2013 to February 2015.

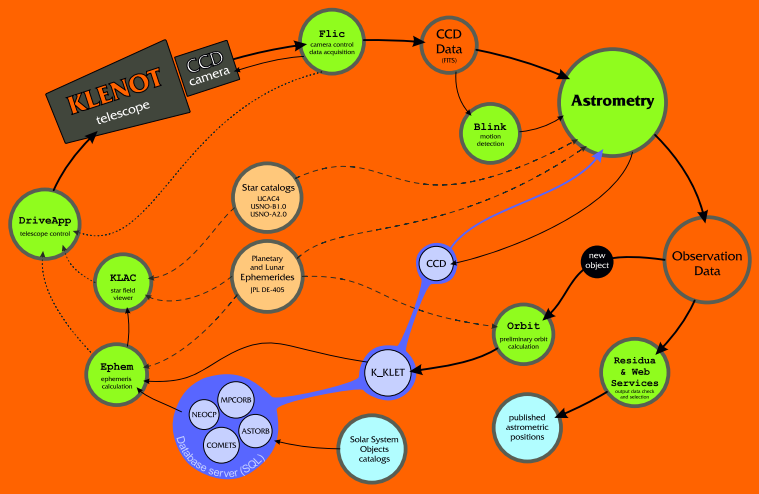


Since October 2014 is the KLENOT Project a part of ESA Space System Awareness Programme - NEO Segment - Cooperating Sensors.

CCD camera FLI ProLine 230



KLENOT NG software for astrometry



KLENOT NG work-flow

KLENOT PROJECT GOALS

- confirmatory observations of newly discovered fainter NEO candidates
- early follow-up of newly discovered NEOs
- long-arc follow-up astrometry of NEOs in need of further data
- higher priority given to Potentially Hazardous Asteroids (PHAs) and Virtual Impactors (VIs)
- recoveries of NEOs in the second opposition
- follow-up astrometry of radar/ mission targets, special follow-up requests
- follow-up astrometry of other unusual objects (comets, bright TNOs)
- analysis of cometary features of suspected bodies
- search for new asteroids, especially NEOs as well as other objects having unusual motion

KLENOT TELESCOPE LOCATION

- the Klet Observatory, South Bohemia, Czech Republic (Central Europe)
- geographical position: latitude 14°17'17" E longitude 48°51'48"N
- elevation 1068 meters above sea level
- south from the top of the Klet mountain
- a rather dark site in the middle of the Protected Landscape Area Blansky les
- IAU/MPC code 246
- average number of clear nights per year about 120

KLENOT PROJECT ADVANTAGES

- full observing time is dedicated to the KLENOT team
- quick changes in an observing plan possible, even during an observing night
- long-term NEO activities at Klet (since 1992)
- experienced observers/measurers visually validate each moving object candidate
- real-time processing of targeted objects

KLENOT NEXT GENERATION TELESCOPE technical data (since 2013):

- new computer controlled paralactic mount
- 1.06-m f/3 main mirror (Zeiss)
- four lenses primary focus corrector
- 1.06-m f/2.7 optical system
- CCD camera FLI ProLine PL230
- chip e2v 2048 × 2048 pixels, pixel size 15 microns
- Peltier cooling
- FOV 39 × 39 arcminutes
- image scale 1.2 arcseconds per pixel
- limiting magnitude m_v = 21.5 mag. for 120-sec exposure time

KLENOT PROJECT FIRST PHASE (2002-2008) RESULTS

total of 52,658 astrometric measurements of 5,867 bodies, it contains:

- 13,342 astrometric measurements of 1,369 NEAs (MPC,NEODys)
- confirmation and astrometry of 623 NEAs from NEOCP (MPECs)
- recoveries of 4 comets and 16 NEAs (including 196P/Tichý)
- astrometry of 157 Virtual Impactors (CLOMON, SENTRY)
- detection of cometary features of 34 bodies (IAUCs)
- astrometry of Centaurs, TNOs and SDOs
- discovery of splitting of comet C/2004 S1 (Van Ness)
- independent discovery of 4 fragments of comet 73P/S-W 3
- asteroid discoveries - 750 bodies
  3 NEOs - Apollo 2002 LK, Aten 2003 UT55, Apollo 2006 XR4
  1 JFA – 2004 Rt109

FIRST KLENOT PROJECT NEXT GENERATION RESULTS (since 2011)

total of 10,054 astrometric measurements of 1,298 bodies, it contains:

- 2,211 astrometric measurements of 263 NEAs (MPC,NEODys)
- confirmation and astrometry of 143 NEAs from NEOCP (MPECs)
- astrometry of 18 Virtual Impactors (CLOMON, SENTRY)
- detection of cometary features of 5 bodies (IAUCs)
- astrometry of Centaurs, TNOs and SDOs

ACKNOWLEDGEMENTS

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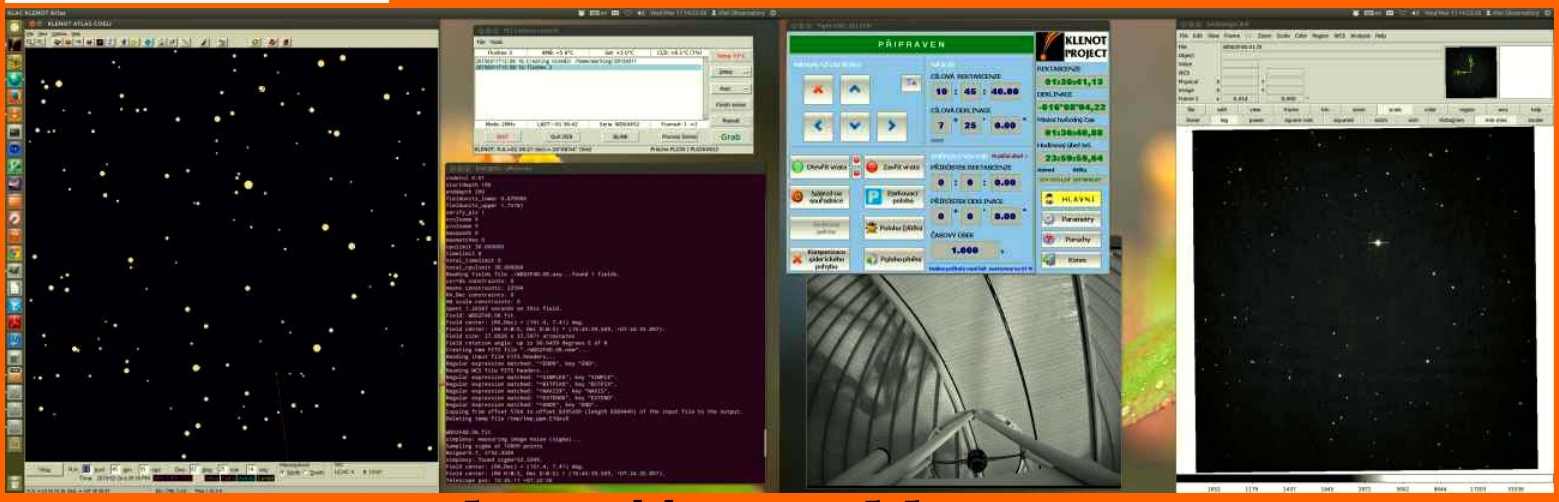
Image of the NEOCP object WD02F4D (Apollo 2015 DY198, 18.6 mag., 7 sec exp.)



http://www.klet.org