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grangeobs.net

# The MPC 476 Grange Observatory

- Established in 1993 on a private home in Bussoleno 'Grange' suburb
- The main telescope is an homemade Newton-Cassegrain 300 mm; the commercial Petzval astrograph has an aperture of 140 mm f/5.7
- The fork mount was prepared at the MPC 022 Pino Torinese Astronomic Observatory workshop, and has very precise angular compasses for an analogic sky pointing
- In May 1995 the Grange Obs. was granted by Minor Planet Center of the code MPC 476 for NEA positions within 0.5 as, the second independent MPC code in Piedmont (a region of northwestern Italy)
- In 1996/97 a campaign on NEA (433) Eros for orbit refinement was conducted prior to the 2001 NEAR-Shoemaker probe landing
- Nowadays the typical error in positional astrometry equals the star catalogues used (URAT-1 and GAIA DR1) minimum scatter over a 17x13 arcmin starfield with the 300 mm ultra-fast telescope

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The current layout of the Grange Obs. instrumentation: the main 300 mm Newton reflector is working at f/3.3 with Sloan and GAIA filters, and the piggyback 140 mm astrograph mounts a Johnson BVR photometer.

A vintage 80 mm telescope is also visible, used for spectroscopic studies.

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# LIMIT MAGNITUDE

The Grange Obs. 300 mm telescope is in service for more than 20 years, and always had CCDs at the focal plane for measuring NEAs positions then their orbits. The limit magnitude grew up in the years due to the electronic devices and the data post-processing techniques progress. Photometry is also done with Johnson, Sloan SSDS and GAIA DR1 G standards.

1993 magn. 14

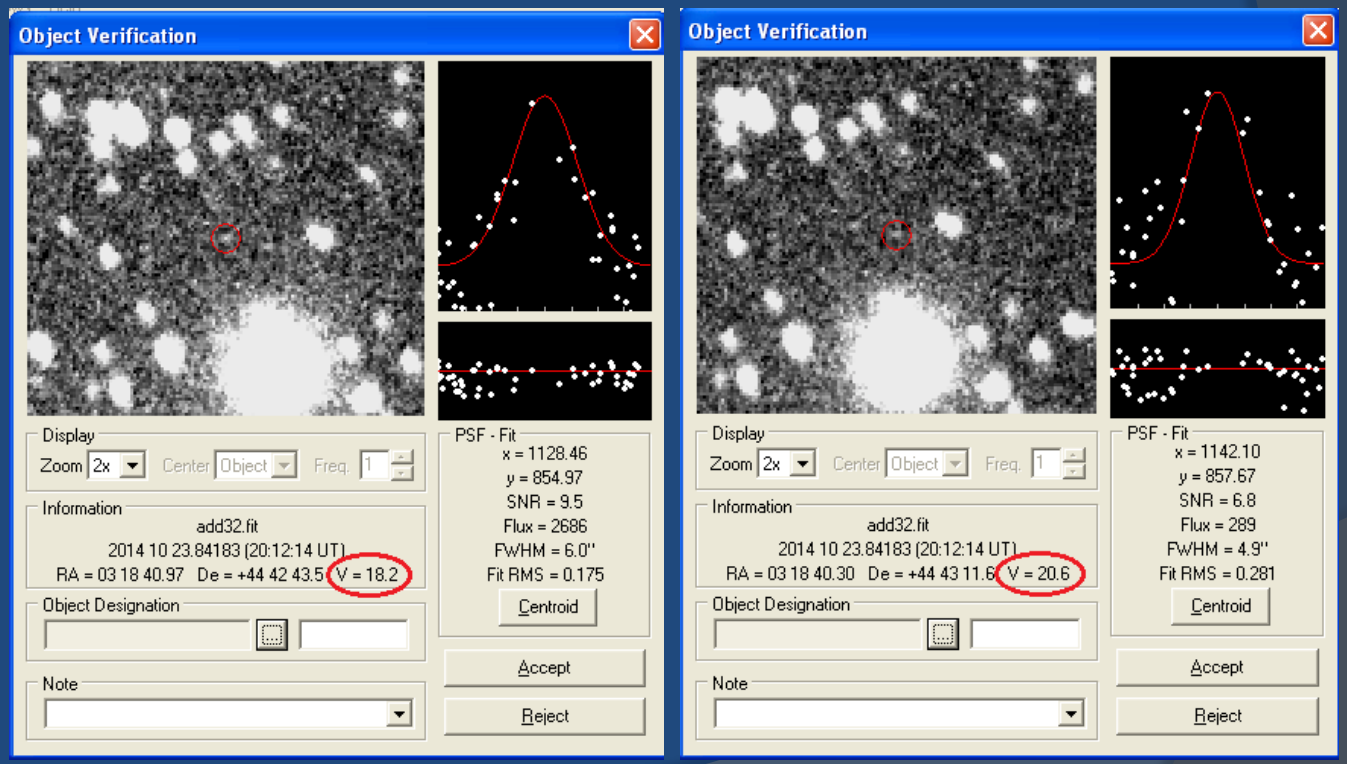
1997 magn. 16

2001 magn. 17

2009 magn. 19

2014 magn. 20+

The limit magnitude depends on seeing (typical FWHM ~5 as good for photometry)




640 s exposure of the 300 mm Newton telescope (2014)

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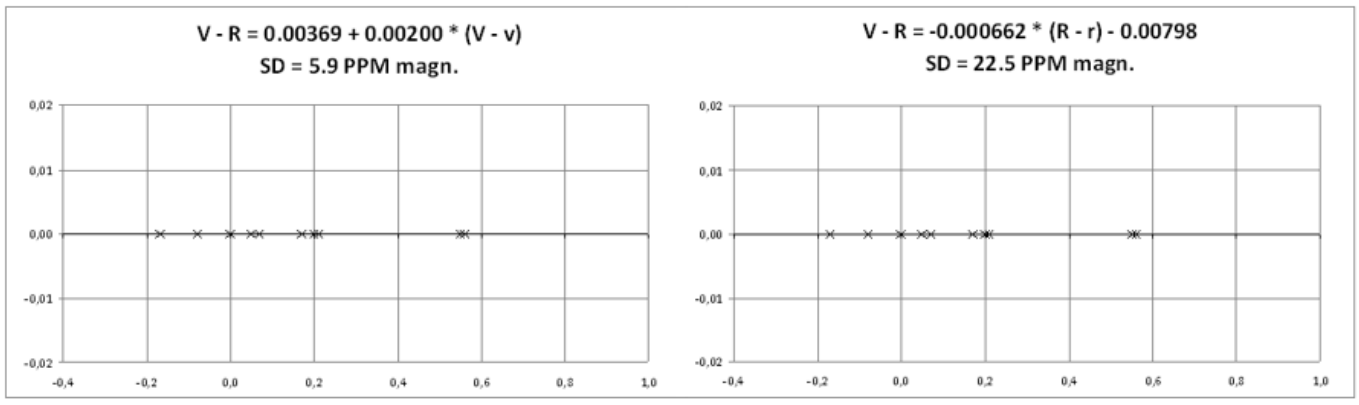
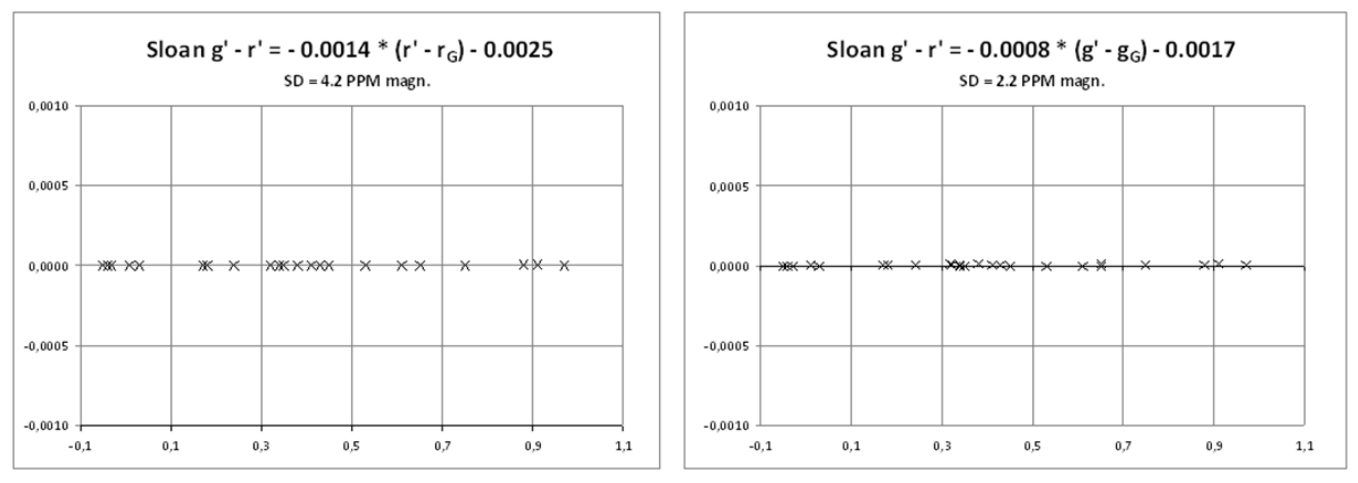
# PHOTOMETRY




The calibration graphs of the photometric filters developed at the Grange Obs.
Color indices can measure stars surface temperature and metallicity index.
The photometers can also measure exoplanet transits on stars

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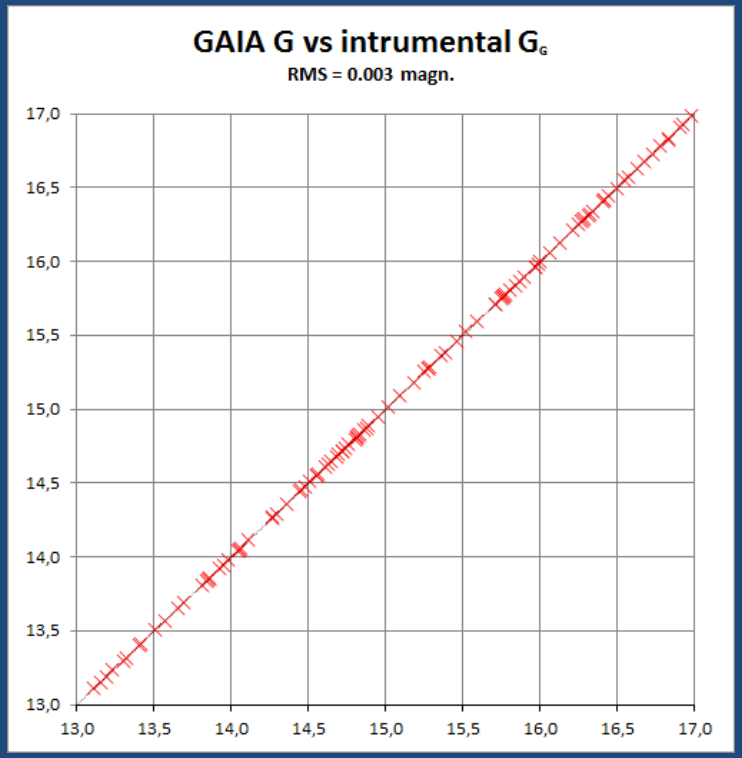
# GAIA DR1 PHOTOMETRY

The GAIA DR1 catalogue, published in November 2016, is used for faint NEA photometry with the 300 mm reflector, since it can be approximated by the Pan-STARRS w standard (accepted by MPC). The astrometric catalogue URAT-1 is currently used by Grange Obs. for the NEA positional measures.




A star of 17 magn. is measured with a 15 s exposure at the 300 mm f/3.3

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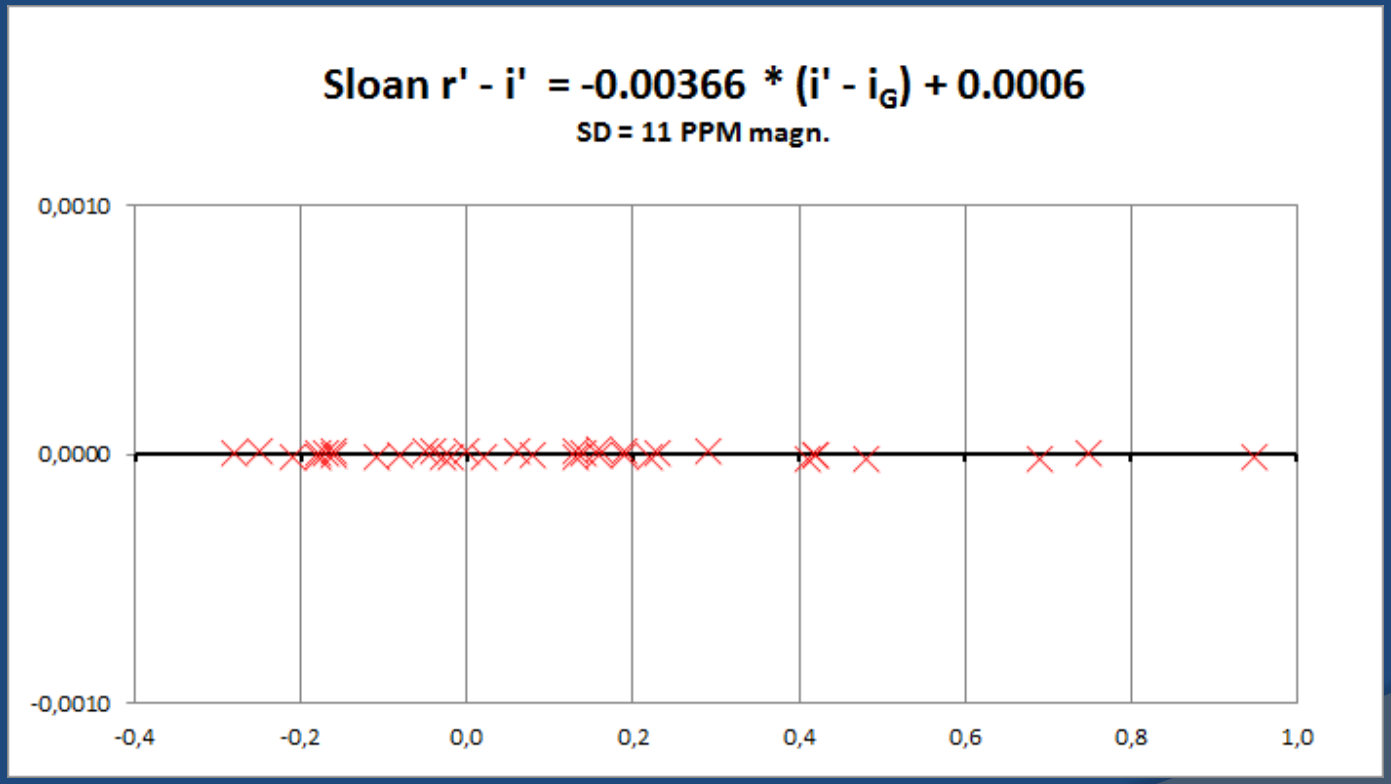
# IR PHOTOMETRY

The Sloan SSDS (Pan-STARRS) $i_G$ filter performs IR photometry with an error of 11 PPM magnitude over the Sloan r-i standard color index

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# 1995: the start of the MPC 476 NEA activities

M.P.C. 25095 1995 MAY 14

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Minor Planet Center, Smithsonian Astrophysical Observatory, Cambridge, MA 02138, U.S.A.
IAUSUBS@CFA.HARVARD.EDU or FAX 617–495–7231 (subscriptions)
Phone 617–495–7244/7440/7444 TWX 710–320–6842 ASTROGRAM CAM
BMARSDEN@CFA.HARVARD.EDU or GWILLIAMS@CFA.HARVARD.EDU (science)
Brian G. Marsden, Director Gareth V. Williams, Associate Director

## EDITORIAL NOTICE

Several new features to assist observers have been added to the Computer Service that the Minor Planet Center operates jointly with the Central Bureau for Astronomical Telegrams. The new features are available under a new menu option ("B Access observer submenu") and allow the extraction of published orbital elements in a one-line format compatible with the diskette version of the *Catalogue of High-Precision Elements of Unnumbered Minor Planets* and the generation of ephemerides using *unpublished* elements on file at and continually being updated by the Minor Planet Center. These unpublished elements, which include Väisälä orbits for new discoveries, are *not* supplied to the user. A forthcoming addition will be a capability for the generation of Väisälä ephemerides for new objects (using observations entered by the user) that have not yet received provisional designations from the Center.

The Minor Planet Center has recently inaugurated a homepage on the World Wide Web giving online information about the services offered by the Center, as well as access to various tabulated data thought to be of general interest, such as lists of close-approach and distant minor planets, the list of numbered periodic comets and a plot of the outer solar system. The Uniform Resource Locator for this homepage is `http://cfa-www.harvard.edu/cfa/ps/mpc.html`. A link is provided to allow users to `telnet` to the Computer Service, and a future enhancement of the Web service will be a full Mosaic implementation of the Computer Service. A feedback form is available to allow reporting of corrections to or suggestions for additions to the service.

## ERRATA

| *MPC* | Line | |
|---|---|---|
| 23331 | −18 | *For* Palomar *read* Cerro Tololo |
| 23776 | 22 | *For* Kushiro *read* Kitami |

## NEW OBSERVATORY CODES

The longitudes $\lambda$ are measured in degrees eastward from Greenwich, and the parallax constants $\rho\cos\phi'$ and $\rho\sin\phi'$ are the product of the geocentric distance (in earth equatorial radii) and the cosine and sine, respectively, of the geocentric latitude.

| Obs. | $\lambda$ | $\rho\cos\phi'$ | $\rho\sin\phi'$ | |
|---|---|---|---|---|
| 476 | 7.1414 | 0.70659 | +0.70535 | Grange Observatory, Bussoleno |
| 608 | 203.7420 | 0.93623 | +0.35156 | Haleakala-AMOS |

## IDENTIFICATION CHANGES

Continuation to *MPC* 24933.

| Object | Date | UT | $\alpha_{2000}$ | $\delta_{2000}$ | Originally | Mag. | Obs. |
|---|---|---|---|---|---|---|---|
| 1938 $DT_2$ | * 1938 02 25.03039 | 11 55 40.49 | +07 20 02.1 | 1938 $DK_2$ | | | 062 |
| 1938 $DT_2$ | 1938 02 25.05748 | 11 55 39.81 | +07 20 11.0 | 1938 $DK_2$ | | | 062 |
| 1995 $BX_{16}$ | * 1995 01 27.69340 | 10 49 16.75 | +10 11 15.3 | 1995 $BG_1$ | 17 | | 372 |

## COMETARY IDENTIFICATION

The following cometary identification, by R. J. Bouma, continues the list on *MPC* 23259:

D/1931 R1 = 84P/Giclas

## OBSERVATIONS OF COMETS

Observations are published here for the following observatory codes:

359 Wakayama. 0.25-m Schmidt-Cassegrain $f/6.3$ + CCD. Observer S. Yoshida.
360 Kuma Kogen. 0.60-m $f/6.0$ Ritchey-Chrétien + CCD. Observer A. Nakamura.
372 Geisei. Observer T. Seki. 0.60-m $f/3.5$ reflector. From *Orient. Astron. Assoc. Comet Bull.*
410 Sengamine. 0.20-m $f/6.0$ reflector + CCD. Observer K. Ito.
413 Siding Spring. 3.9-m Anglo-Australian telescope + CCD and 1.0-m reflector + CCD. Observers S. F. Green, N. McBride, D. I. Steel, D. J. Asher, G. J. Garradd and R. H. McNaught. Measured by R. H. McNaught.
476 Grange Observatory, Bussoleno. 0.3-m reflector + CCD. Observer

540 Linz. 0.3-m $f/5.2$ Schmidt-Cassegrain + CCD. Observer E. Meyer.
587 Sormano. 0.5-m reflector + CCD. Observers M. Cavagna, E. Galliani, P. Ghezzi and P. Sicoli.
691 Kitt Peak. 0.91-m Spacewatch telescope. Observers J. V. Scotti and R. Jedicke.
693 University of Arizona, Catalina Station. 1.5-m reflector + CCD. Observers S. M. Larson and C. W. Hergenrother. Measured by C. W. Hergenrother.
801 Oak Ridge. 1.5-m reflector + CCD. Observer R. E. McCrosky.
816 Rand Observatory, Lake Placid. 0.37-m reflector + CCD. Observer G. R. Viscome.
897 YCCO Chiyoda Observatory. 0.25-m $f/6.0$ reflector + CCD. Observer T. Kojima.

The MPC circular stating the assignement of the 476 code to Grange Obs. Bussoleno

The sponsor of the assignement was the late director Brian G. Marsden

The MPC building at Cambridge, MA USA

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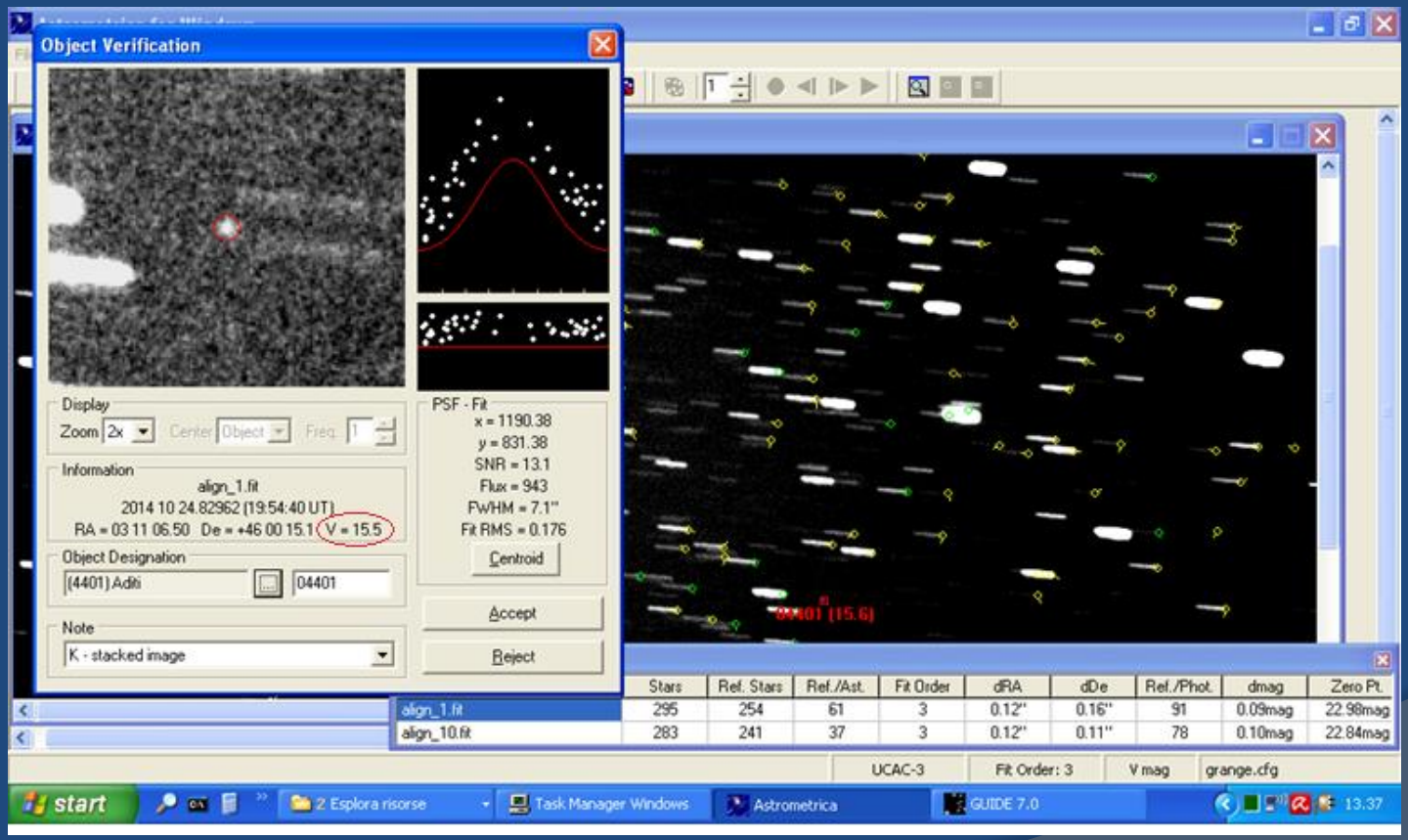
# ASTROMETRY

Example of a past UCAC-4 measure of the NEA (4401) Aditi closing to Earth; on October 24th, 2014 its speed amongst the fixed stars was equal to 4 as/minute




Screenshot of the ASTROMETRICA program

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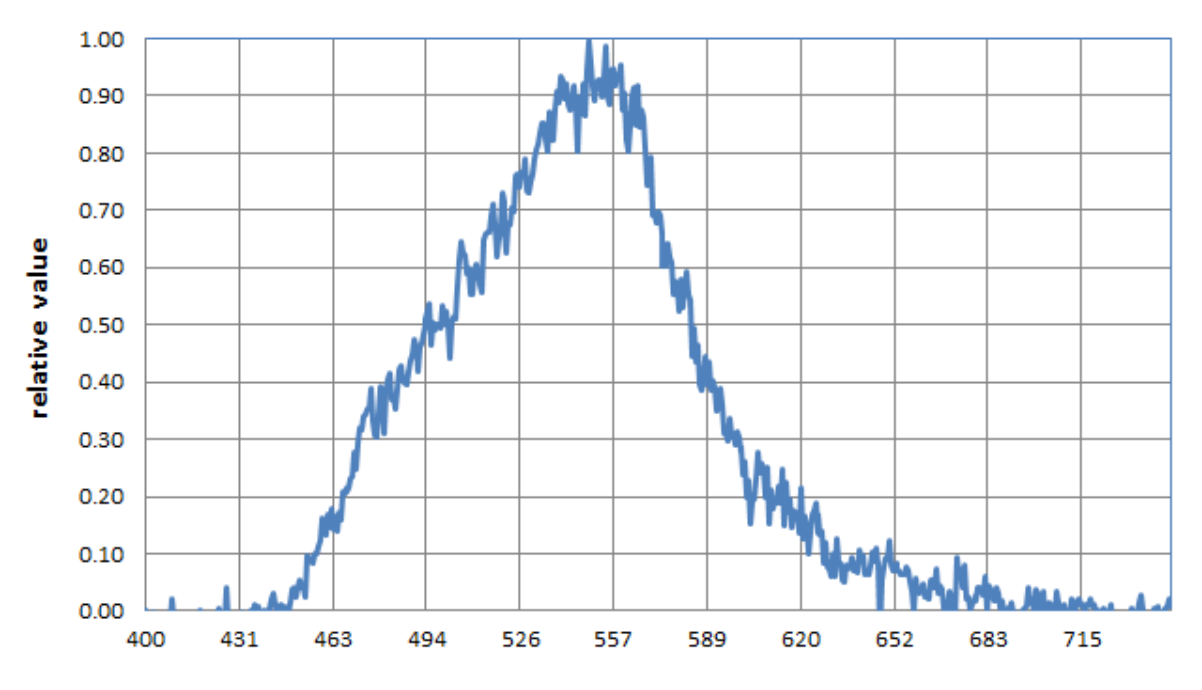
# SPECTROMETRY




Examples of the solar spectrum from the 30 micron pinhole spectrometer

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# CONCLUSIONS

The technical and scientific assets of the observatory are:

- Astrometry
- Photometry
- Spectrometry

The Grange Observatory for more than 20 years made autonomous edge researches on fundamental astronomy and contributed to scientific publications; the instruments of the observatory can measure the precise positions, the distance, the temperature, the chemical composition of the stars, and recently the presence of extra-solar planets around them.

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*info@grangeobs.net*

*info@astrofilisusa.it*