

# Photometric data around us

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# Astronomy – science based on data and their analyses

Sources of data:

- ❖ own observations (photometric, spectroscopic, interferometric, polarimetric ...)
  - the number of observers is decreasing (almost professionals ones)
  - reasons – comfortableness, robotic telescopes, surveys
- ❖ data from publications, papers
- ❖ archives of surveys – past and present

= > astronomer must know how to:

1. search data in literature and archives
2. process obtained data!



# Data from literature

- ADS

[http://adsabs.harvard.edu/abstract\\_service.html](http://adsabs.harvard.edu/abstract_service.html)

- SIMBAD

<http://simbad.u-strasbg.fr/simbad/>

- Web of Science

<http://apps.webofknowledge.com/>

- BCB

[http://www.astro.uvic.ca/~robb/bcb/comm42\\_bcb.html](http://www.astro.uvic.ca/~robb/bcb/comm42_bcb.html)

notes:

1. older papers and papers written in non-latin alphabet are usually not available in electronic form!
2. common style of given time, magnitudes, errors, filters is changing in time!
3. the time correction and the way of its computation and application maybe wrong!

Portal Simbad VizieR Aladin X-Match Other Help

## RW Com

other query Identifier Coordinate Criteria Reference Basic Script Output Help  
modes : query query query query query submission options

Object query : RW Com C.D.S. - SIMBAD4 rel 1.223 - 2014.10.03CEST15:13:54

Available data : [Basic data](#) • [Identifiers](#) • [Plot & images](#) • [Bibliography](#) • [Measurements](#) • [External archives](#) • [Notes](#) • [Annotations](#)

**Basic data :**  
**V\* RW Com -- Eclipsing binary of W UMa type (contact binary)** query around with radius 2 arcmin

Other object types: WU\* ( ), PM\* ( ), \* (HIC, HIP, NSVS, TYC, Wolf) , V\* (V\*, AN, ROTSE1) , SB\* (SBC9) , IR (2MASS) , X (RX)

ICRS coord. (ep=J2000) : 12 33 00.28388 +26 42 58.3782 ( Optical ) [ 30.80 18.35 0 ] A [2007A&A...474..653V](#)

FK5 coord. (ep=J2000 eq=2000) : 12 33 00.284 +26 42 58.38 ( Optical ) [ 30.80 18.35 0 ] A [2007A&A...474..653V](#)

FK4 coord. (ep=B1950 eq=1950) : 12 30 31.67 +26 59 32.7 ( Optical ) [ 178.18 106.10 0 ] A [2007A&A...474..653V](#)

Gal coord. (ep=J2000) : 217.6116 +85.8708 ( Optical ) [ 30.80 18.35 0 ] A [2007A&A...474..653V](#)

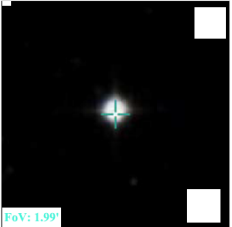
Proper motions *mas/yr* [error ellipse]: -127.00 -36.27 [3.51 2.09 0] A [2007A&A...474..653V](#)

Radial velocity / Redshift / cz : V(km/s) -53.00 [1.15] / z(~) -0.000177 [0.000004] / cz -53.00 [1.15] (-) B [2005MNRAS...357..497B](#)

Parallax *mas*: 11.71 [2.47] A [2007A&A...474..653V](#)

Spectral type: G8e D [1985AJ....90..109M](#)

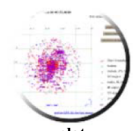

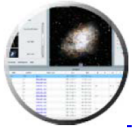

Fluxes (5) :  
B 12.33 [0.22] D [2000A&A...355L..27H](#)  
V 11.25 [0.09] D [2000A&A...355L..27H](#)  
J 9.795 [0.028] C [2003yCat.2246....0C](#)  
H 9.249 [0.034] C [2003yCat.2246....0C](#)  
K 9.177 [0.020] C [2003yCat.2246....0C](#)

Interactive [AladinLite](#) view 

Identifiers (11) :

V* RW Com	<a href="#">HIP</a> 61243	<a href="#">ROTSE1</a> J123300.30+264258.3	<a href="#">TYC</a> 1991-1724-1
<a href="#">AN</a> 33.1923	<a href="#">2MASS</a> J12330028+2642582	<a href="#">RX</a> J123301.4+264255	<a href="#">Wolf</a> 423
<a href="#">HIC</a> 61243	<a href="#">NSVS</a> 7622769	<a href="#">SBC9</a> 728	

Plots and Images

 [plot](#)  [CDS portal](#)  [CDS Simplay \(requires flash\)](#)  [Aladin applet](#)

radius 10 arcmin

References (123 between 1850 and 2014)  
*Simbad bibliographic survey began in 1950 for stars (at least bright stars) and in 1983 for all other objects (outside the solar system).*

display  
reference summary

from: 1850 to: \$currentYear

Sort reference summaries by : (not exhaustive, [explanation here](#))

[Date](#) [Title|Abstract|Keyword](#) [In table](#)

# Historical surveys

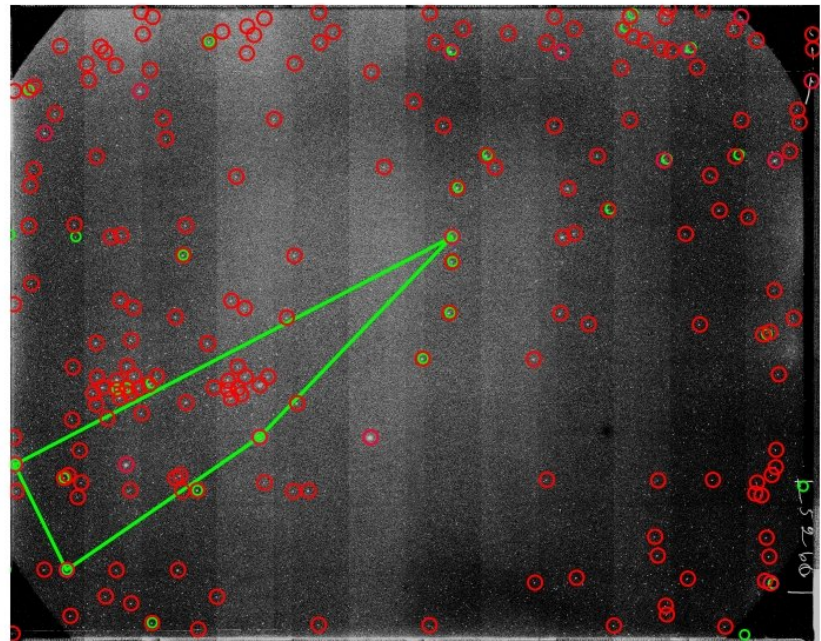
historical – photographic

- National Geographic Society
  - Palomar Observatory Sky Survey (NGS-POSS)
- Harvard Plate collection
- Moscow
- Pulkovo
- Sonneberg
- Asiago ...

today – the plates are digitalized

e.g. project DASCH

<http://dasch.rc.fas.harvard.edu/>



# Ground-based photometric surveys

- ASAS - <http://www.astrouw.edu.pl/asas/>
  - OGLE - <http://ogle.astrouw.edu.pl/>
  - MACHO - <http://wwwmacho.anu.edu.au/Data/MachoData.html>
  - EROS - <http://eros.in2p3.fr/>
  - ROTSE (NSVS) - <http://www.rotse.net/>, <http://skydot.lanl.gov/nsvs/nsvs.php>
  - SuperWASP - <http://wasp.cerit-sc.cz/form>
  - APASS - <http://www.aavso.org/apass>
  - SDSS - <http://www.sdss3.org>
  - Catalina (CRTS) - <http://crts.caltech.edu/>
  - 2MASS - <http://www.ipac.caltech.edu/2mass/>
  - LINEAR - <https://astroweb.lanl.gov/lineardb/>
  - TASS - <http://www.tass-survey.org/>
  - Stardial - <http://stardial.astro.illinois.edu/>
  - HATNet - <http://www.hatnet.org/>
  - Pi of the sky - <http://grb.fuw.edu.pl/>
  - MASCARA - <http://mascara1.strw.leidenuniv.nl/>
  - Pan-STARRS - <http://pan-starrs.ifa.hawaii.edu/>
  - ASAS-SN <http://www.astronomy.ohio-state.edu/~assassin/index.shtml>
- and other

in preparation - the size of chips over Gpx!

LSST - <http://www.lsst.org/>



# Surveys in space

- Hipparcos – all-sky ( $H_p$ ) + supporting catalogue Tycho ( $B, V$ )  
<https://www.cosmos.esa.int/web/hipparcos/catalogues>
  - OMC Integral – all-sky ( $V$ ) <https://sdc.cab.inta-csic.es/omc/index.jsp>
  - MOST – long-term monitoring selected targets (solar-type stars, subdwarves, roAp, WR stars, transiting exoplanets)  
<http://www.cadc-ccda.hia-ihp.nrc-cnrc.gc.ca/en/most/>
  - COROT - FOV  $2.7^\circ \times 3.05^\circ$ , 2 fields (Ser, Mon) <http://idoc-corot.ias.u-psud.fr/>
  - KEPLER – field Cyg-Lyr, K2 mission around ecliptic <http://kepler.nasa.gov>,  
<http://keplerscience.arc.nasa.gov>
  - Chandra – X-ray satellite, 827 variable stars  
<http://cxc.harvard.edu/vguide/index.php>
  - GAIA - <http://sci.esa.int/science-e/www/area/index.cfm?fareaid=26>
  - BRITe – Canada, Poland, Austria – 6 nano-satellites  
<http://www.brite-constellation.at/>
  - WISE (Wide-field Infrared Survey Explorer) - <http://wise.ssl.berkeley.edu/>
  - TESS (Transiting Exoplanet Survey Satellite) - <https://tess.gsfc.nasa.gov/>
- and further

Future projects: JWST, PLATO ...

# Data servers

**CDS (Centre de Données astronomiques de Strasbourg)**

<http://cdsportal.u-strasbg.fr/>

**MAST (Barbara A. Mikulski Archive for Space Telescopes)**

<http://mast.stsci.edu/portal/Mashup/Clients/Mast/Portal.html>

**IPAC, IRSA (Infrared Processing and Analysis Center, Infrared Science Archive)**

<http://www.ipac.caltech.edu/>, <http://irsa.ipac.caltech.edu/frontpage/>

**Canadian Astronomy Data Centre**

<http://www.cadc-ccda.hia-ihp.nrc-cnrc.gc.ca/en/>

...

# Importance of amateur astronomy

Several decades usage of CCD techniques => huge amount of data obtained by amateurs and small observatories!

1 observer – 10 years activity

pesimistic estimate: 50 nights/year – 100 frames/night – 100 stars/frame

=>  $5 \cdot 10^6$  photometric points

Optimistic estimate: 100 nights/year – 500 frames/night – 10000 stars/frames

=>  $5 \cdot 10^9$  points!



Huge amount of data hidden somewhere or even deleted! □



# AAVSO

<http://www.aavso.org/vsx/>

**AAVSO Home**

The International Variable Star Index

Search Submit Register Log In Account About

Current Time: 30 Nov 2014 21:37:10 UTC Welcome, Guest. You are not logged in. >> Log in

### Search VSX

Special searches Changes in last week... >> Go

Select a Special search above, or enter information in the fields below, then click Search.

Name   
Examples: SS Cyg, V456 Sgr, NSV 1009  
%And, ASAS %+%, Mis V%  
Search by AUID also available

>> Capture coordinates for object to Position field

Const. --  
Filters search results by boundaries of selected constellation


Include  V Variables  S Suspects  
 N Non-variables

Order by GCVS sequence  Descending

Click More for coordinate-based searches.

More Clear Reset Search

>> Guidelines >> Variability Types >> Passbands >> Copyright >> Acknowledgments >> Privacy >> Contact



The International Variable Star Index  
Now cataloging 324,992 variable stars

- Search
- Submit
- Register
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- Account
- About
- VizieR

Powered by MySQL  
PHP5 POWERED  
BUILT ON FUSEBOX  
©AAVSO

# Virtual observatory

[Home](#)[Astronomers](#)[Deployers](#)[Members](#)[About](#)

## INTERNATIONAL VIRTUAL OBSERVATORY ALLIANCE

### VO Applications for Astronomers

In this section, scientists can find available VO-compatible applications for their immediate use to do science. The level of maturity of the applications depends on a high degree on the level of maturity of the corresponding IVOA protocols and standards.. As a consequence of the flexibility of the standards, several of the applications might overlap in functionality. **The IVOA does not manage or guarantee these services/tools.**



promissing, but...

#### Applications (in alphabetical order)

Aladin  
AppLauncher  
CASSIS  
CDS Xmatch Service  
Data Discovery Tool  
Filter Profile Service  
Iris  
Montage  
Octet  
SkyView  
Specview  
SPLAT  
TAPHandle  
TAPsh  
TESELA  
TOPCAT/STILTS  
VisIVO  
VOConvert  
VODesktop  
VOPlot  
VOSA  
VOSED  
VOServices (Footprint,  
Spectrum, Filters, ...)  
VOSpec

#### Functionality

**Search for Images:**  
Aladin, Datascope, SkyView,  
VODesktop, Data Discovery Tool  
**Search for Spectra:**  
Aladin, CASSIS, Datascope,  
SPLAT, Specview, VOServices,  
VOSpec, Data Discovery Tool  
**Search for Catalogues:**  
Aladin, Datascope, TOPCAT,  
VODesktop, Data Discovery Tool  
**Search for Time Series Data:**  
Time Series Search Tool

#### Image visualisation:

Aladin, SkyView

#### Spectra visualisation:

CASSIS, SPLAT, Specview,  
VOServices, VOSpec

#### Catalogues visualisation:

Aladin, TOPCAT, VOPlot

#### Cross-correlation:

Aladin, STILTS, TOPCAT, CDS  
Xmatch Service, Cross  
Comparison Tool

#### Scatter, 3D plots and histograms:

TOPCAT, VOPlot

#### VO-compliant Tools & Services

DS9: Image visualisation  
GOSSIP: SED fitting  
VirGO: Search for Images and  
Spectra  
IRAF: Image Reduction &  
Analysis  
World Wide Telescope  
Gaia - Graphical Astronomy and  
Image Analysis  
SIMBAD  
TESELA  
VizieR

#### Browse the Registries

WIRR - Web Interface to the  
Relational Registry  
RSS Feed of New & Updated  
Services in the VO  
AppLauncher  
or use VODesktop

#### Manuals, Tutorials, How-tos

ADQL & TAP Tutorial  
Aladin User manual  
CASSIS documentation  
Datascope how to  
Data Discovery Tool Tutorial

# Our way to work with photometric data (at present)

We need two instruments:

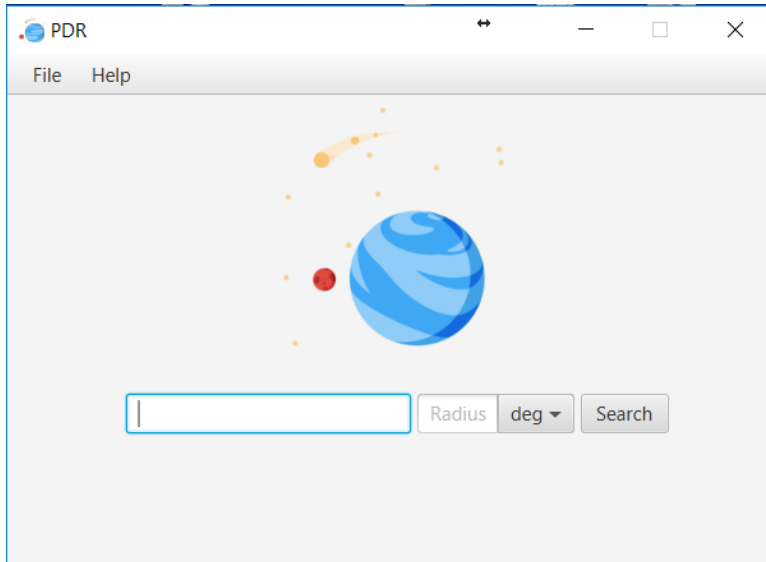
- ✓ a tool for searching data



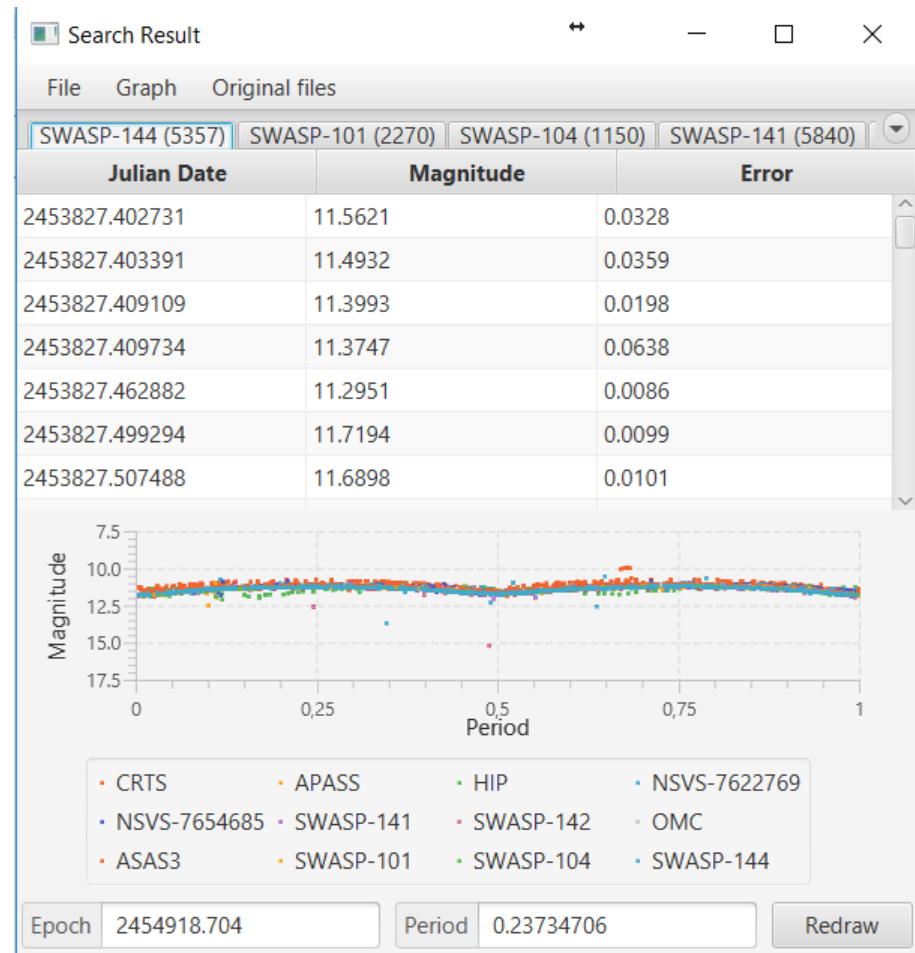
- ✓ a database where to put the data



# Photometric Data Retriever



in testing phase, not available yet



# Archiv of Measurements of PERiodic variable stars (AMPER)

<http://amper.physics.muni.cz/>



## SIGN IN

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free of charge!

# Objects

## Constellations

Andromeda (And)	15	Cygnus (Cyg)	24	Orion (Ori)	12
Antlia (Ant)	2	Delphinus (Del)	3	Pavo (Pav)	4
Apus (Aps)	0	Dorado (Dor)	0	Pegasus (Peg)	8
Aquarius (Aqr)	10	Draco (Dra)	12	Persaeus (Per)	10
Aquila (Aql)	10	Equuleus (Equ)	1	Phoenix (Phx)	1
Ara (Ara)	6	Eridanus (Eri)	4	Pictor (Pic)	2
Aries (Ari)	7	Fornax (For)	2	Pisces (Psc)	7
Auriga (Aur)	13	Gemini (Gem)	6	Piscis Austrinus (PaA)	1
Bootes (Boo)	17	Grus (Gru)	2	Puppis (Pup)	14
Caellum (Cae)	0	Hercules (Her)	20	Pyxis (Pys)	4
Camelopardalis (Cam)	25	Horologium (Hor)	2	Reticulum (Ret)	1
Cancer (Cnc)	5	Hydra (Hyd)	8	Sagitta (Sgr)	2
Canes Venatici (Cvn)	7	Hydrus (Hyd)	0	Sagittarius (Sgr)	6
Canis Major (Cma)	7	Indus (Ind)	6	Scorpius (Sco)	6
Canis Minor (Cmi)	6	Lacerta (Lac)	2	Sculptor (Scl)	3
Capricornus (Cap)	1	Leo (Leo)	11	Scutum (Sct)	0
Carina (Car)	8	Leo Minor (LMi)	2	Serpens (Ser)	6
Cassiopeia (Cas)	15	Lepus (Lep)	5	Sextans (Sex)	2
Centaurus (Cen)	12	Libra (Lib)	4	Taurus (Tau)	7
Cepheus (Cep)	15	Lupus (Lup)	5	Telescopium (Tel)	0
Cetus (Cet)	7	Lynx (Lyn)	7	Triangulum (Tri)	11
Chamaeleon (Cha)	0	Lyra (Lyr)	5	Triangulum Australe (TraA)	1
Circinus (Cir)	3	Mensa (Men)	1	Tucana (Tuc)	1
Columba (Col)	1	Microscopium (Mic)	1	Ursa Major (UMa)	10
Coma Berenices (Com)	4	Monoceros (Men)	3	Ursa Minor (UMi)	6
Corona Australis (CrA)	1	Musca (Mus)	4	Vela (Vel)	3
Corona Borealis (CrB)	6	Norma (Nor)	1	Virgo (Vir)	17
Corvus (Crv)	2	Oclans (Ocl)	1	Volans (Vol)	3
Crater (Crt)	6	Ophiuchus (Oph)	8	Vulpecula (Vul)	1
Cruce (Cru)	2				

## Clouds

Large Magellanic Cloud (LMC)	22
Small Magellanic Cloud (SMC)	43

## Objects without constellation

HD 21220	HD 77819	HD 79452	HD 83329
HD 84406	HD 100872	HD 102103	HD 112060
HD 122517	HD 139341	HD 165742	HD 175225
HD 187676	HD 188365	HD 188663	HD 190140

# BH Cen + VSX

Position	11:39:10.200 -63:25:14.988
Constellation	Centaurus
M <sub>0</sub> VSX	2431748.7478
Period VSX	0.7915852
Observations	38

## Custom values ✓

M <sub>0</sub>	Not set
Period	Not set
Note	None

## Observations Full view

Phase Curve

M<sub>0</sub> VSX: 2431748.7478 ▼ Phase range 0.00 - 2.00 Highlight value X:  Y:  Draw -

Period VSX: 0.7915852 ▼ Magnitude range  -  Highlight time (UTC)  x ≡

Show current time  Show errors  Legend by filters

Showing last 5 observations

#	Object	User Project	Filter System	Measurement Added	Note Device	Vertical shift
6537	BH Cen	Miloslav Zejda China	B Instrumental	30.11.1979 18:41 12.04.2017	normal LC	0.00 <span>👁</span> <span>🔍</span>
6536	BH Cen	Miloslav Zejda China	V Instrumental	30.11.1979 18:41 12.04.2017	normal LC	0.00 <span>👁</span> <span>🔍</span>
6535	BH Cen	Miloslav Zejda China	U Instrumental	30.11.1979 18:41 12.04.2017	normal LC	0.00 <span>👁</span> <span>🔍</span>
3526	BH Cen	Miloslav Zejda China	I Instrumental	03.05.2016 16:48 12.05.2016	SAAO   Cassegrain 1000/16000 + STE4   SITC back...	0.00 <span>👁</span> <span>🔍</span>
3525	BH Cen	Miloslav Zejda China	I Instrumental	02.05.2016 22:26 12.05.2016	SAAO   Cassegrain 1000/16000 + STE4   SITC back...	0.00 <span>👁</span> <span>🔍</span>

# Observations

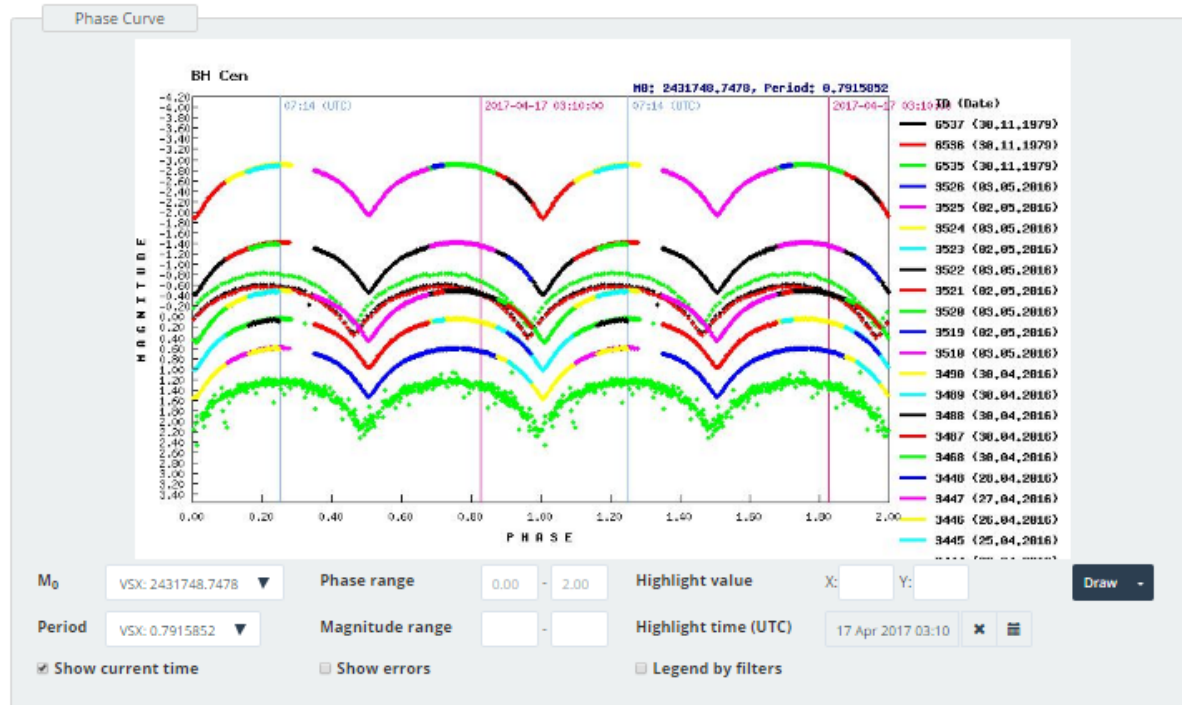
Observation Filter

Object: BH Cen  Photometric filter: <<Any>>

User: <<Any>>  Photometric system: <<Any>>

Project: <<Any>>  Measured before:

Order:   Measured after:



Export

Showing 38 of 38 results

#	Object	User	Filter System	Measurement start Added	Note	Device	Vertical shift
6537	BH Cen	Miloslav Zizka	B	30.11.1979 19:44	normal	CCD	



# Observations

Observation Filter

Object:

User:

Project:

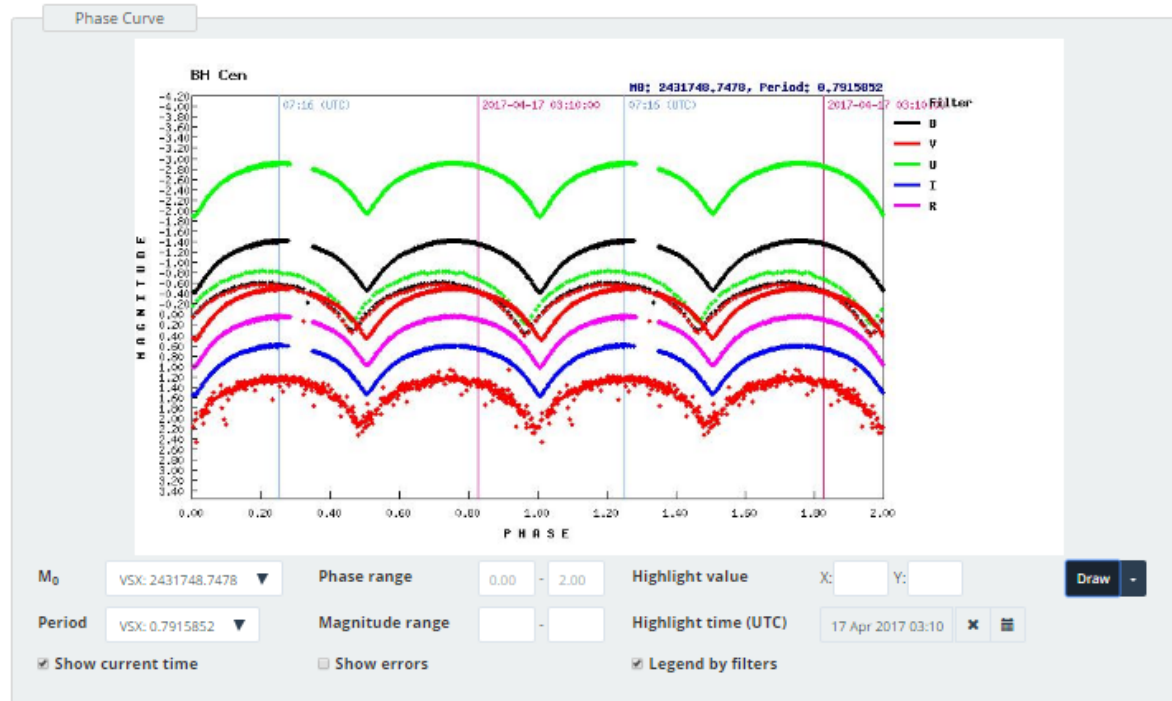
Order:

Photometric filter:

Photometric system:

Measured before:

Measured after:



Export

Showing 38 of 38 results

#	Object	User Project	Filter System	Measurement start Added	Note Device	Vertical shift
6527	BH Cen	Mileslav Zejda	R	20.11.1979.18:41	normal LC	

**Big data are coming...**

**and we need to know correct course!**



**Thanks for your attention!**