

B.R.N.O. Catalogue of Eclipsing Binaries

BRKA 2005 (Basic)

Version 1.1

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The catalogue contains basic data about eclipsing variable filed in the observational programme of B.R.N.O. – Variable Star Section of Czech Astronomical Society. Light ephemeris given here serves also for predictions of times of minima available at through web page <http://var.astro.cz>.

Introduction:

Before 1999 the catalogue contained only seven hundreds of short period eclipsing binaries with known light ephemeris. That year the main (basic) catalogue was enlarged practically twice and two new catalogues were created. The first one is devoted to eclipsing binaries without known light ephemeris. It was named (BRKA 1999) *Prospector* because observers of such type of variable stars are often in the same position as adventures prospecting gold nuggets in heaps of rubbish. The project Prospector (nowadays the project Prosper). The second new catalogue created in 1999 contained data on two hundreds eclipsing binaries with eclipses of long duration. Unfortunately, this BRKA 1999 L(ong) has not been not updated up to now and it is still waiting for a new manager.

All catalogues are available upon request at the author or free through WWW <http://var.astro.cz>

The present basic catalogue BRKA 2005 contains 1557 records of 1511 stars amplitudes of light changes of which are only rarely smaller then approximately 0.5 mag. Revised light ephemeris are based mainly on our observations. The new 37 stars were added.

Several hundreds identifications (GSC numbers) were also added in 2004.

Acknowledgement

Author of the catalogue thanks mainly to all observers. It would not be possible to create this catalogue without their works.

The following sources of data were used:

ADS (Astrophysics Data System Article Service, NASA)
http://cdsads.u-strasbg.fr/ads_articles.html

An Atlas of O-C Diagrams of Eclipsing Binary Stars (Jerzy M. Kreiner, Chun-Hwey Kim, Il-Seong Nha) <http://www.as.wsp.krakow.pl/o-c>

BAV (Bundesdeutsche Arbeitsgemeinschaft für Veränderliche Sterne e.V.)
<http://www.var-mo.de>

BBSAG (Bedeckungsveränderlichen Beobachter der Schweizerischen Astronomischen Gesellschaft)
<http://www.astroinfo.ch/bbsag/bbsag.html>

GCVS (General Catalogue of Variable Stars)
<http://www.sai.msu.su/groups/cluster/gcvs/gcvs>

Hipparcos Catalogue <http://astro.estec.esa.nl/Hipparcos>

IBVS (Information Bulletin on Variable Stars)
<http://www.konkoly.hu/IBVS/IBVS.html>

SAC (Rocznik Astronomiczny Obserwatorium Krakowskiego)
<http://www.oa.uj.edu.pl/ktt/rcznk.html>

Simbad Astronomical Database (CDS, Strasbourg, France)
<http://simbad.u-strasbg.fr/Simbad>

Photometric database at Astronomical Institute Ondřejov, CZ
<http://nyx.asu.cas.cz/~lenka/dbvar/>

Appeal

If you know from your own observation or from literature new valid pieces of information which could renew or enlarge the catalogue, please do not hesitate and send them to following address:

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Explanation:

1. Name – Name (designation) of the star. Colon in the name denotes that data concern to secondary minimum of the variable.

2. Type – The categorization of the star in B.R.N.O. observational programme. There are three categories. The first one contains stars without any letter in “type”. For these stars here edited finding charts are available (in printed form upon request at observatory or <http://var.astro.cz>). „H“ denotes the second star category representing stars, for which there are no edited B.R.N.O. finding charts. The sign “C” belongs to the third category – the stars, which were chosen especially for CCD observers. The C-stars have amplitudes of light variations smaller than 1 mag but larger than approximately 0,5 mag.

All stars were divided to groups according to their average brightness. For example: The star with average brightness between 8,5 and 9,5 belongs to group nine; the star “ten” is a star with average brightness in an interval (9,5; 10,5) etc. In predictions of times of minima are the stars divided into four larger groups: very bright (groups 8, 7, 6 and brighter), bright (groups 9, 10, 11), faint (groups 12, 13), very faint (groups 14, 15 and fainter).

3. Rating – Given ratings are measures of usefulness of mainly visual observations. The criterion of monitoring of the stars is based only on the total number of known times of minima of brightness obtained during last 10 years.

Number of observation	Rating	Number of observation	Rating
0-2	10	24-33	5
3-5	9	34-48	4
6-10	8	49-74	3
11-16	7	75-138	2
17-23	6	139 and more	1

Actual rating values are based on information from BAV database to the 4th March 2002 (kindly offered to us by Mr. F. Agerer) and observations from BBSAG (Bulletin 126 and 127), IBVS No. 5050 – 5262 and B.R.N.O. – Variable Stars Section, which will be published in Contributions of N. Copernicus Observatory and Planetarium Brno No. 32.

4, 5. RA, DE - Equatorial co-ordinates in equinox 2000.0 - right ascension (^{h m s}) and declination (° ' "). The co-ordinates have been undertaken from electronic

version of GCVS (2001), NSV Catalogue (1982) or from other sources in case of need. If co-ordinates only for equinox 1950.0 were not available, given values were recalculated to 2000.0 using procedure of Dr. V. Znojil.

6. The basic minimum - M₀. One of light elements represented by the Julian date of the basic light minimum (epoch $E = 0$) with the front-end figures 24... omitted.

7. Period - Period P of light changes in days

8. Max - Brightness of variable star in maximum (in magnitudes)

9. Prim - Brightness of variable star in primary light minimum (in magnitudes)

10. Sec - Brightness of variable star in secondary light minimum (in magnitudes)

11. Branch – The photometric system in which Max, Min and Sec are reported. The main codes are P (photographic magnitudes), V (visual, photovisual, or Johnson's V), “Rc” (R magnitudes in Cousins' I system), “Hp” (Hipparcos magnitudes) and C (unfiltered CCD observations).

12. D – Duration of eclipse in hours (for Algol like stars); the letter “B” or “W” is given for β Lyrae stars or W UMa stars, respectively. The sign “*” means variability of given value (see Notes). The sign “.” indicates possible uncertainty in given value.

13. d – Duration of constant phase in minimum light in hours. The sign “.” indicates potential uncertainty in given value.

14. Source of elements of light changes. The annotation “computed” in this column means that light elements for secondary minima have been derived supposing the secondary minimum to be in the phase 0.5. Abbreviation “est” means estimated time of minimum elicited from incomplete observations or imperfect information from literature. The small “v” added to reference means a visual observation used as a new basic minimum.

Abbreviations used:

AA - Acta Astronomica

AASMet. - American Astronomical Society Meeting

AJ - The Astronomical Journal

ApJ - The Astrophysical Journal

AsAp - Astronomy and Astrophysics

AsApS - Astronomy and Astrophysics. Supplement Series.
 ASS - Astrophysics and Space Science
 Atlas O-C – An Atlas of O-C Diagrams of Eclipsing Binaries
 BAVM - Mitteilungen der Berliner Arbeitsgemeinschaft für Veränderliche Sterne
 BAVR - Mitteilungsblatt der Berliner Arbeitsgemeinschaft für Veränderliche Sterne. Rundbrief.
 (BAV Rundbrief).
 BAVW - WWW stránky BAV („NEWS Homepage der Beobachter kurzperiodischer Veränderlicher“ <http://www.var-mo.de>)
 BB - Bedeckungsveränderlichen Beobachter der Schweizerischen Astronomischen Gesellschaft. Bulletin (BBSAG Bulletin).
 Bor – dr. Jiří Borovička - private communication
 Brat – Luboš Brát - private communication
 BRNO – Contributions of N. Copernicus Observatory and Planetarium Brno
 Coska – Contributions of the Astronomical Observatory Skalnaté Pleso
 dbvar – photometric database at Astronomical Institute Ondřejov, Czech Republic
 GCVSe – electronic reedition of General Catalogue of Variable Stars (version 2001)
 Haj – Petr Hájek private communication
 Haltuf – Michal Haltuf - private communication
 Han – Dalibor Hanžl - private communication
 HarthaMit - Mitteilungen der Bruno H. Bürgel Sternwarte Hartha
 Hipparcos (Hip) – results from Hipparcos mission
 (<http://astro.estec.esa.nl/Hipparcos/HIPcatalogueSearch.html>)
 IBVS - Information Bulletin on Variable Stars. Commission 27 of the IAU, Budapest, Konkoly Observatory.
 JBAA - The Journal of the British Astronomical Association
 JAAVSO - The Journal of the American Association of Variable Star Observers.
 Koss (Kos) – Karel Koss - private communication
 Kud – Jitka Kudmáčová – private communication
 Kral – Lukáš Král - private communication
 KVBB - Kleinere Veröffentlichungen der Universitäts Sternwarte zu Berlin-Babelsberg
 Lutcha – Petr Luřcha - private communication
 MNRAS - Monthly Notices of the Royal Astronomical Society
 Motl (Mot) – David Motl – private communication
 MVS - Mitteilungen über veränderliche Sterne, Berlin-Babelsberg und Sonneberg.

Paschke (Pas) – Anton Paschke - private communication
 PASP - Publications of the Astronomical Society of the Pacific
 PAZh – Pisma v Astronomiceskij Zhurnal
 Pej – Ondřej Pejcha – private communication
 PZ - Peremennyye zvezdy
 RomanAJ – Romanian Astronomical Journal
 SAC - Supplemento Annuario Cracoviense (Rocznik Astronomiczny. Observatorium Krakowskiego - dodatek miedzynarodowy)
 Sbornik – Proceedings of Conference on Variable Star Research, Brno (27th in 1996, 28th in 1997)
 Safar (Saf) - Jan Šafář - private communication
 VSS - Veröffentlichungen der Universitäts Sternwarte zu Berlin-Babelsberg
 Wolf – dr. Marek Wolf - private communication
 Zah – Jan Zahajský - private communication
 Zejda (Zej) – preliminary light elements given by author.

15. Chart. Information given in this column refers to the situation at N. Copernicus Observatory and Planetarium. All mentioned (finding) charts are available at the observatory, especially charts published here, upon request. The charts edited in Brno are also available through Internet <http://var.astro.cz>.

1 – set Brno I (Contributions of N. Copernicus Observatory and Planetarium Brno No. 18, 1975)
 2 – set Brno II (1978)
 3 - set Brno III (1982)
 4 - set Brno IV (Contributions of N. Copernicus Observatory and Planetarium Brno No. 25, 1984)
 5 - set Brno V (1992)
 6 - set Brno VI (Slatinský, Borovička, Mánek: Contributions of N. Copernicus Observatory and Planetarium Brno No. 29, 1988)
 A - AAVSO chart
 B - BAV chart
 C - preliminary chart edited as an appendix in the journal Perseus
 G - GEOS chart
 g - close surrounding of published in GEOS publications
 K – carton chart (first charts edited in Brno before the first set Brno I)

M – chart designed by programme GUIDE or from USNO catalogue using software developed by J. Mánek. There are such charts for most of stars observed in Brno using CCD. This is not recorded in the catalogue.

O - close surrounding from literature

P – preliminary charts

S – charts made by A. Slatinský

U - Atlas Uranometria 2000.0

V – photo of close surrounding from Vehrenberg's Atlas Stellarum 1950.0 (1970).

X - CCD frame of close surrounding made at observatory in Brno or Vyškov station. Correct identification of variable star is confirmed not only from a literature but also especially from our observations.

x - CCD frame of close surrounding made at observatory in Brno or Vyškov station without confirmed identification.

16. Astrophysical attractiveness of system (evaluated by dr. Vojtěch Šimon).

Three symptoms of astrophysical activity are assessed: period changes, distortions of light curves (mainly during eclipse) and symptoms of circumstellar matter observed especially spectroscopically. Every symptom is recorded the same way – single-letter abbreviation and number, which means importance of symptom mentioned (1 – faint, but detectable, 2 – clear, 3 – distinct, 4 – strong).

Designation of symptom:

P – change of orbital period, K – distortion (asymmetry) of light curve of eclipse, E – spectroscopic exposure of circumstellar matter (mainly emission in hydrogen lines)

17. Notes.

List of used abbreviations:

ACV – alfa2 Canum Venaticorum type star,

CST – constant star,

d – duration of the phase of constant light in minimum,

DSCT – delta Scuti type star,

el. – light elements,

„el-“ - light elements are not given,

excentr. sec. – secondary minimum is not placed on light curve in the phase 0.5,

GC – GCVS (General Catalogue of Variable Stars),

GC85 – printed version General Catalogue of Variable Stars, 4th edition, Moscow 1985-7,

wrong – new observations do not conform to evidently wrong published light elements,

also quadr. – there is also quadratic solution of light elements,

inaccur. (inaccurate) – light elements are designated as inaccurate in case of incomplete or disputable in time of predicted minimum,

in binary – variable star is a companion of visual binary,

IS – IS type star (rapid irregular variables),

Ic – light curve,

LTE – light time effect,

max – maximum brightness,

M0 – epoch (basic time of minimum of brightness),

nonlin. (nonlinear) – time behaviour of (O-C) values is not linear,

P – period of light changes,

poss. – possible,

puls. comp. – a companion in binary is pulsating variable star,

quadr. – quadratic term in light elements,

RR, RRAB – RR Lyrae type star,

sek. - secondary minimum of brightness,

sin – sinusoidal course of time behaviour of (O-C) values, uncert. – uncertain,

wrong – new observations do not conform to evidently wrong published light elements,

18. GSC. The Guide Star Catalogue identification number is given in form XXXXX.XXXXX. There are partly new unpublished identifications.

19. Change. The sign “*” means change in light elements relative to previous catalogue BRKA 2004 Z and “N” means the new added star.

Brno, CZ, 28 March 2005