Binary Stars as Critical Tools & Tests
in Contemporary Astrophysics
Proceedings IAU Symposium No. 240, 2006
W.I. Hartkopf, E.F. Guinan & P. Harmanec, eds.

doi:10.1017/S1743921307004450

Poster Abstracts (Session 8)

(Full Posters are available at http://www.journals.cambridge.org/jid_IAU)

Possible Distortion Effect on the Pulsation of Eclipsing Binary Components

Burak Ulas and Osman Demircan

Canakkale Onsekiz Mart University, Physics Department, Canakkale, Turkey

Possible effect of tidal and rotational oblateness of a star on the pulsational period in pulsating components of eclipsing binaries is investigated. The angle of foreshortening on the surface of the pulsating component becomes important on account of estimating local pulsating periods. By assuming the linear adiabatic radial oscillation, the pulsation period change was found between $0.947\,P_0$ and $1.048\,P_0$ from equator to the pole for a triaxial ellipsoid star having the axis as a=0.46, b=0.43, c=0.45 as fractional radii. This effect may not be observed due to experimental errors. It was also noted that in the $P_{pulse} \cdot \rho^{1/2}$ equation, the factor of Q changes from equator to pole.

EUVE J0825−16.3 and EUVE J1501−43.6: Two dMe Double-Lined Spectroscopic Binaries

D. Montes, I. Crespo-Chacón, M.C. Gálvez, and M.J. Fernández-Figueroa

Dpto. Astrofísica, Universidad Complutense de Madrid, Madrid, Spain

High-resolution echelle spectroscopic observations taken with the FEROS spectrograph at the ESO 2.2-m telescope confirm the binary nature of the dMe stars EUVE J0825−16.3 and EUVE J1501−43.6, previously reported by Christian & Mathioudakis (2002).

In these binary systems, emission of similar intensity from both components is detected in the Na I D_1 & D_2, He I D_3, Ca II H & K, Ca II IRT and Balmer lines. We have determined precise radial velocities by cross-correlation with radial velocity standard stars, which have allowed us to obtain for the first time the orbital solution of these systems. Both binaries consist of two near-equal M0V components with an orbital period shorter than 3 days. We have analyzed the behaviour of the chromospheric activity indicators (variability and possible flares). In addition, we have determined its rotational velocity and kinematics.

A Hunt for Binaries with Pulsating Components

O. Latković

Astronomical Observatory of Belgrade, Yugoslavia

In the context of the collaboration of several European observatories, we are examining a number of eclipsing binary systems in search for evidence of pulsation phenomena. We hope our candidate systems will be suitable for subsequent asteroseismological studies.

As a first step towards this end, we are analyzing spectroscopic observations of several such binary stars; these observations have been made at National Astronomical Observatory Rozhen, Bulgaria, in the period from 2002 to 2005, and the reduction was done recently at Astronomical Observatory of Belgrade, Serbia. Measurments of radial velocities and RV curve analysis are in preparation.

Only Binary Stars Can Help Us Actually SEE a Stellar Chromosphere

R.E.M. Griffin

Herzberg Institute for Astrophysics, Victoria, Canada

Binary stars of the ζ Aurigae-type (eclipsing systems containing a cool giant plus a hot main-sequence star) offer our only method of probing a stellar chromosphere. Close to occultation, the dwarf acts as a light probe behind the giant's chromosphere, enabling an observer to detect changing conditions in that chromosphere along the line of sight. The technique is powerful, the effects dramatic (as will be illustrated).

However, presently known eclipsing systems number only about 10, and a much greater sample is required for meaningful statistics of the properties of stellar chromospheres. New surveys of fainter binaries should be investigated for eclipses in order to extend the sample size and gain more information on chromospheres in general. Such information is clearly vital for modelling stellar photospheres, from which abundances are derived. The paper describes the very different behaviour of chromospheric material in two 3^{rd}-magnitude binaries.

https://doi.org/10.1017/S1743921307004450 Published online by Cambridge University Press

Orbital Period Variation in the Chromospherically Active Binary FF UMa (2RE J0933+624)

M.C. Gálvez, D. Montes, M.J. Fernández-Figueroa, E. De Castro, and M. Cornide

Depto. Astrofísica, Universidad Complutense de Madrid, Madrid, Spain

We present here a detailed study of FF UMa (2RE J0933+624), a recently discovered, X-ray/EUV selected, active binary system with strong Hα emission. By using high resolution echelle spectroscopic observations taken during five observing runs from 1998 to 2004, we have derived precise radial velocities that allowed us to determine the orbital solution of the system at different epochs.

Analyzing these orbital solutions and a previous one in 1993, determined by other authors, we have found a change in the heliocentric Julian date of conjunction (T_{conj}) that can be explained by a change with time in the orbital period of the system. The relative amplitude of the orbital period variation derived from these data was $\Delta P/P \approx 5 \times 10^{-4}$, which results to be larger than the variations found in other similar chromospherically active binaries like AR Lac and HR 1099. This orbital period variation can be related (Applegate 1992; Lanza *et al.* 1998, 2006) with the modulation of the gravitational quadrupole moment of its magnetically active secondary star produced by angular momentum exchanges within its convective envelope. In addition, using these observations, we have determined the stellar parameters of the components and we have carried out a study of the chromospheric activity using all the optical indicators from Ca II H & K to Ca II IRT lines.

Starspot activity of V711 Tau from November to December, 2005

Sheng-hong Gu[1], A.C. Cameron[2], J.R. Barnes[3], and Jia-yan Yang[1]

[1]*National Astronomical Observatories/Yunnan Observatory, CAS, Kunming, Yunnan Province, China,*
[2]*SUPA, School of Physics and Astronomy, University of St. Andrews, North Haugh, St. Andrews, Fife, United Kingdom,*
[3]*School of Physics, Astronomy and Mathematics, University of Hertfordshire, Hatfield, United Kingdom*

The active binary V711 Tau was observed using the high-resolution echelle spectrograph of the 2.16-m telescope at Xinglong station of NAOC during November 18-24 and December 17-22, 2005. Based on the least-squares deconvolution method, we have derived high signal-to-noise ratio profiles for V711 Tau, which have been used to reconstruct the starspot patterns for the two datasets by means of Doppler imaging code DoTS. Finally, we discuss the starspot feature and evolution in this observing season.

https://doi.org/10.1017/S1743921307004450 Published online by Cambridge University Press

Surface Imaging of Late-Type Contact Binaries: Hα Emission in AE Phoenicis and YY Eridani

O. Vilhu and C. Maceroni

[1] *Observatory, Helsinki University, Helsinki, Finland,*
[2] *INAF, Rome Astronomical Observatory, Monteporzio C., Italy*

We present and discuss the Hα observations of the contact (W UMa type) binaries AE Phoenicis and YY Eridani, obtained in 1989, 1990 and 1995 with the CAT/CES telescope of the Southern European Observatory (ESO). In particular, we compare the intrinsic equivalent widths of both components with the NextGen theoretical models and the saturation limit. We find that the average Hα equivalent widths are close to the saturation border and that the primary components have excess Hα emission, indicating enhanced chromospheric activity. This is compatible with both theoretical and observational suggestions that the primary is the more magnetically active component and is filled with (mostly unresolvable) dark spots and associated chromospheric plages.

Non-Linear Resonance Model of High-Frequency Quasiperiodic Oscillations (QPO) in X-ray Sources: Theory vs. Observation

G. Török, M.A. Abramowicz, Z. Stuchlik, and E. Sramkova

Silesian University in Opava, Opava, Czech Republic

There is an impressive agreement between theoretical prediction of the high frequency twin peak QPO resonance model and the black-hole as well as neutron-star observational data.

The model explains QPOs as two modes of accretion disk oscillations that are weakly coupled, non-linear and resonant. It predicts that there should be 1/mass scalling of frequencies, that the two frequencies $\nu_{\rm high}$, $\nu_{\rm low}$ should be nearly linearly correlated for one source, $\nu_{\rm high} = A\nu_{\rm low} + B$, that the A, B coefficients should be anti correlated in a sample of neutron star sources, and that the difference of amplitudes in the two modes should vanish close to the resonance. All these predictions are confirmed by observations. No any other QPO model is able to explain all these observations.

https://doi.org/10.1017/S1743921307004450 Published online by Cambridge University Press