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YOUNG STARS IN THE CAMELOPARDALIS DUST AND MOLECULAR CLOUDS. III. THE GL 490 REGION

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Abstract. Using the infrared photometry data extracted from the 2MASS, IRAS and MSX databases, 50 suspected young stellar objects (YSOs) are selected from about 37 500 infrared objects in the 3×3 deg area with the center at ℓ, $b = 142.5$ deg, $+1.0$ deg, in the vicinity of the young stellar object GL 490 in the dark cloud T 942 (Dobashi et al. 2005). The spectral energy distributions between 700 nm and 100 μm suggest that most of the selected objects may be YSOs of classes I and II. In the color-magnitude diagram K_s vs. H–K_s the suspected YSOs occupy an area right of the main sequence what can be interpreted as being caused by the effects of luminosity, interstellar and circumstellar reddening and infrared thermal emission in circumstellar envelopes and disks.

Key words: stars: formation – stars: pre-main-sequence – infrared: stars – ISM: dust, extinction, clouds – Galaxy: open clusters and associations: individual (Cam OB1)

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YOUNG STARS IN THE CAMELOPARDALIS DUST AND MOLECULAR CLOUDS. IV. SPECTRAL OBSERVATIONS OF THE SUSPECTED YSOs

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Abstract. In the first three papers of this series, about 200 objects in Camelopardalis and the nearby areas of Cassiopeia, Perseus and Auriga were suspected of being pre-main-sequence stars in different stages of evolution. To confirm the evolutionary status of the 15 brightest objects, their far-red range (600–950 nm) spectra were obtained. Almost all these objects are young stars with emissions in Hα, O I, Ca II and P9 lines. The equivalent widths of emission lines and approximate spectral classes of the objects are determined.

Key words: stars: pre-main-sequence – stars: emission-line

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NEAR INFRARED SPECTRA OF GALACTIC WOLF-RAYET STARS

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Abstract. Spectra of 37 Galactic WR stars were observed and reduced in the spectral range 790–895 nm. The main spectral features are identified and the equivalent widths and FWHMs of the strongest emission lines are measured. The equivalent width of the diffuse interstellar band at 862 nm is also measured and the new estimates of color excesses $E_(B-V)$ are derived by using an empirical relationship between the equivalent width and the color excess. The equivalent width ratios for the lines C III 850 nm, C IV 886 nm and C II 880 nm were found to correlate well with the WC subtype.

Key words: stars: Wolf-Rayet – stars: fundamental parameters (classification) – near infrared: stars – techniques: spectroscopic

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PHOTOMETRIC STUDY OF OPEN CLUSTERS NGC 2266 AND NGC 7762

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Abstract. The results of photometric UBV monitoring of open clusters NGC 2266 and NGC 7762 are presented. 2MASS JH photometry is additionally used to determine the parameters of both clusters. For NGC 2266 the following parameters are obtained: the limiting radius 6.2 arcmin, log (age [yr]) $= 9.08 \pm 0.04$, metallicity $Z = 0.004$ ([Fe/H] = – 0.68), interstellar reddening $E_{B-V} = 0.17$ and a distance of 2.80 ± 0.15 kpc. No evidence for the existence of an extended corona was found. As a result of 45 hour monitoring of 7200 stars in the cluster field, 12 were found to be variable. All of them are located outside the cluster radius. For NGC 7762 the following parameters are obtained: limiting radius 23.5 arcmin (including an extended corona), log (age [yr]) $= 9.38 \pm 0.04$, interstellar reddening $E_{B-V} = 0.59$ and a distance of 0.8 ± 0.25 kpc; solar metallicity is accepted. The near-IR data suggest $E_{J-H} = 0.11$ and a peculiar interstellar reddening law. As a result of 55 hour monitoring of 5500 stars in the cluster field, 16 stars are found to be variable. Two of them, a short-period contact or semi-detached eclipsing system and a pulsating star of γ Dor type – are likely members of NGC 7762.

Key words: open clusters: individual (NGC 2266, NGC 7762) – stars: variables: general

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RUPRECHT 1: A SMALL, MODERATELY YOUNG OPEN CLUSTER IN THE THIRD GALACTIC QUADRANT

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Abstract. We present CCD observations in the Washington system C and T_1 passbands down to $T_1 \sim 18.5$ in the field of Ruprecht 1, a poorly studied open cluster located in the third Galactic quadrant. We measured T_1 magnitudes and $C - T_1$ colors for a total of 862 stars distributed throughout an area of 13.6 × 13.6 arcmin. The cluster turned out to be very small; its linear radius being 2.6 ± 0.2 pc, as estimated from star counts in appropriate-sized boxes distributed throughout the entire field observed. By fitting the zero-age main sequence to the T_1 vs. $C - T_1$ color-magnitude diagram, we derive $E_{B-V} = 0.25 \pm 0.05$, independently from the cluster's metallicity. Our analysis suggests that Ruprecht 1 is moderately young. In fact, adopting the theoretical metal contents $Z = 0.02$ and 0.008, which provide the best global fits, we derive heliocentric distances of $d = 1.9 \pm 0.4$ kpc and 1.5 ± 0.3 kpc and ages of 200 ± 47 Myr and 251 ± 58 Myr in each case.

Key words: open clusters: individual (Ruprecht 1) – open clusters: general – techniques: photometric: Washington system

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THE CONTACT BINARY GSC 04778–00152 WITH A VISUAL COMPANION

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Abstract. Photometric and spectroscopic observations of the unstudied 12th-magnitude eclipsing binary GSC 04778–00152 are presented. We report the discovery of a visual companion about 1 mag fainter and 2 arcsec away from the binary. By subtracting the light contribution of the visual companion, we obtain the UBVRI light curves of the binary system alone. The shape of the light curve indicates that GSC 04778–00152 is an A-type W UMa contact binary. From light-curve modeling, we derive parameters of the binary system.

Key words: binaries: close – stars: individual (GSC 04778–00152)

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OPTICAL SPECTROSCOPY OF A POST-AGB STAR HD 179821 (V1427 Aql)

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Abstract. High resolution spectra of HD 179821 (V1427 Aql), a supergiant with a detached dust shell, are analyzed. The atmospheric parameters estimated are $T_{\rm eff} = 6750 \pm 200$ K, $\log g = 0.50$ (+0.25–0.50) and $\xi_{\rm t} = 6.5 \pm 1.0$ km s^{-1}. The abundances of elements suggest that the star is a low-mass post-AGB star evolving towards a planetary nebula phase. The other characteristics – high spatial velocity $v_\odot = 84 \pm 2$ km s^{-1}, high macroturbulent velocity $v_{\rm macro} = 23 \pm 4$ km s^{-1}, high and variable with the height microturbulent velocity, and large [Na/Fe] ~ 1.0 indicate a very high luminosity (and mass). Thus, the star needs further investigation.

Key words: stars: atmospheres, abundances, fundamental parameters – stars: AGB and post-AGB: individual (HD 179821, V1427 Aql)

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HIGH VELOCITY SPECTROSCOPIC BINARY ORBITS FROM PHOTOELECTRIC RADIAL VELOCITIES: A TRIPLE SYSTEM BD+39 1828

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Abstract. Spectroscopic orbit of the component A of the orbital visual binary BD+39 1828 is calculated using 27 CORAVEL-type radial velocity measurements. A circular orbit with the period $P = 5.28$ days is obtained. The primary component of the spectroscopic binary is a K4 V star and the secondary is an M dwarf. The component B of the visual pair is a K5 V star. The binary has the solar chemical composition and kinematically belongs to the old thin disk population of the Galaxy.

Key words: stars: binaries: spectroscopic, visual, individual (BD+39 1828)

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ORBIT OF THE SPECTROSCOPIC BINARY HD 107346 CONTAINING A VERY HOT COMPONENT

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Abstract. The orbit of the spectroscopic binary system HD 107346 is calculated from 50 CORAVEL-type radial velocity measurements. An orbit with a period $P = 1024.2$ days is obtained. The spectral type of the primary, G8 IV, has been estimated from the spectrum analyzed by Straižys (1984). The spectral type and absolute magnitude of the secondary, sdO, is estimated by modeling the spectral energy distribution of the binary constructed from measurements in the FAUST, GALEX, UBV, Vilnius, I Cousins and JHK photometric systems. The subdwarf component of the binary system exhibits a very high temperature. We do not exclude that the hot component is a close interacting binary.

Key words: stars: binaries: spectroscopic, individual (HD 107346)

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2MASS TWO-COLOR INTERSTELLAR REDDENING LINE IN THE DIRECTION OF THE NORTH AMERICA AND PELICAN NEBULAE AND THE CYG OB2 ASSOCIATION

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Abstract. The slope of the interstellar reddening line in the J–H vs. H–K_s diagram of the 2MASS survey in the direction of the North America and Pelican nebulae, the L 935 dust cloud and the Cyg OB2 association is determined. The MK types were either classified by C. J. Corbally or collected from the literature. The ratio $E_{J-H}/E_{H-K_s} = 2.0$ is obtained by taking the average for the four groups of spectral classes: O3–B1, B2–B6, B7–B9.5 and red clump giants. The obtained ratio is among the largest values of E_{J-H}/E_{H-K_s} determined till now.

Key words: ISM: extinction, clouds: individual (L 935) – ISM: H II regions: individual (North America Nebula, Pelican Nebula) – associations: individual (Cyg OB2) – stars: fundamental parameters

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O-LIKE STARS IN THE DIRECTION OF THE NORTH AMERICA AND PELICAN NEBULAE

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Abstract. In the area covering the complex of the North America and Pelican nebulae we identified 13 faint stars with J–H and H–K_s color indices which simulate heavily reddened O-type stars. One of these stars is CP05-4 classified as O5 V by Comerón and Pasquali (2005). Combining magnitudes of these stars in the passbands I_C, J, H, K_s and [8.3] we were able to suspect that two of them are carbon stars and five are late M-type AGB stars. Interstellar extinction in the direction of these stars was estimated from the background red clump giants in the J–H vs. H–K_s diagram and from star counts in the K_s passband. Four or five stars are found to have a considerable probability of being O-type stars, contributing to the ionization of North America and Pelican. If they really are O-type stars, their interstellar extinction A_V should be from 16 to 35 mag. Two of them seem to be responsible for bright E and J radio rims discovered by Matthews & Goss (1980).

Key words: ISM: dust clouds: individual (L 935) – H II regions: individual (W80) – stars: early-type – stars: fundamental parameters (classification, colors)

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PHOTOMETRY AND CLASSIFICATION OF STARS AROUND THE REFLECTION NEBULA NGC 7023 IN CEPHEUS. I. A CATALOG OF MAGNITUDES, COLOR INDICES AND SPECTRAL TYPES OF 1240 STARS

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Abstract. The catalog contains magnitudes and color indices of 1240 stars down to ~ 16.7 mag in V measured in the seven-color *Vilnius* photometric system in the area of 1.5 square degrees around the reflection nebula NGC 7023 in Cepheus. For most of the stars spectral types determined from the photometric data are given. A large number of visual binaries with separations between $3''$ and $10''$ are identified using the DSS2 images.

Key words: stars: fundamental parameters, classification – Galaxy: Cepheus Flare, NGC 7023

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IMPROVED PARAMETERS OF THE HYDROGEN-DEFICIENT BINARY STAR KS PER

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Abstract. Using the high resolution spectra obtained with the Nasmyth Echelle Spectrograph of the 6 m telescope the hydrogen-deficient single-line binary system KS Per is analyzed. The atmospheric parameters derived are: $T_{\rm eff}$ = 9500±300 K, $\log g = 2.0 \pm 0.5$ and $\xi_{\rm t} = 9.5 \pm 0.5$ km s^{-1}. The hydrogen deficiency is H/He = 3×10^{-5}, the iron abundance is reduced by 0.8 dex, the nitrogen abundance is very high [N/Fe] = 1.4, but carbon and oxygen abundances are low. The star luminosity is $\log L/L_{\odot} = 3.3$. A complex absorption and emission structure of the Na I D doublet was revealed. We suggest that the emission component is formed in the circumbinary gaseous envelope. The early B-type less luminous companion influences the spectrum of the system for the wavelengths shorter than 180 nm.

Key words: stars: atmospheres, abundances – stars: individual (KS Per)

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EMPIRICAL RELATION BETWEEN THE SEMI-MAJOR AXES AND THE ANGULAR SEPARATIONS FOR VISUAL BINARY STELLAR SYSTEMS

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Abstract. Using the angular semi-major axes a from the Washington Sixth Catalog of Orbits of Visual Binary Stars (WDSO6, Hartkopf & Mason 2007) and the angular separations ρ between the components both from the WDS06 and the Washington Double Star Catalog (WDS, Mason et al. 2007), the mean difference $\log a'' - \log \rho''$ is determined. Analyzing the results obtained and the results by other authors, the best value of the difference, 0.10, is estimated.

Key words: stars: binaries: visual, orbital parameters, statistics

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IRC−10443: A MULTI-PERIODIC SRa VARIABLE AND THE NATURE OF LONG SECONDARY PERIODS IN AGB STARS

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Abstract. We obtained $BVI_{\rm C}$ photometry of IRC−10443 on 85 different nights distributed over two years, and low resolution absolute spectrophotometry and high resolution Echelle spectroscopy. Our data show that IRC−10443, which was never studied before in detail, is an SRa variable, characterized by ΔB = 1.27, ΔV = 1.14 and ΔI = 0.70 mag amplitudes and mean values $< B >$ = 13.75, $< V >$ = 11.33 and $< I_{\rm C} >$ = 6.18 mag. Two strong periodicities are simultaneously present: a principal one of 85.5 (±0.2) days, and a secondary one of 620 (±15) days, both sinusoidal in shape, and with semi-amplitudes ΔV = 0.41 and 0.20 mag, respectively. We find that IRC−10443 is an M7 III star, with a mean heliocentric radial velocity −28 km/s and reddened by E_{B-V} = 0.87, a 1/3 of which of circumstellar origin. The same 0.5 kpc distance is derived from application of the appropriate period-luminosity relations to both the principal and the secondary periods. The long secondary period causes a sinusoidal variation of 0.13 mag semi-amplitude in the $V - I_{\rm C}$ color, with the star being bluest at maximum and reddest at minimum, and with the associated changes in effective temperature and radius of 85 K and 6%, respectively. This behavior of colors argues in favor of a pulsation nature of the still mysterious long secondary periods in AGB stars.

Key words: stars: pulsations – stars: AGB – stars: variables: individual (IRC–10443)

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DISCOVERY, OBSERVATIONAL DATA AND THE ORBIT OF THE ATEN GROUP ASTEROID 2006 SF77

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Abstract. A project devoted to astrometric and photometric observations of asteroids at the Molėtai Observatory is described. One of the most important results of the project is the discovery of 2006 SF77, a high-inclination asteroid belonging to the NEO Aten group. New astrometric and photometric data on the asteroid are presented. The brightness variations of the asteroid are not larger than 0.1 mag in R. A possible rotation period of 34 min is estimated.

Key words: asteroids: astrometry, photometry, orbits – asteroids: NEO: individual (2006 SF77)

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2MASS TWO-COLOR INTERSTELLAR REDDENING LINES IN THE INNER GALAXY

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Abstract. The slopes of interstellar reddening lines in the 2MASS J–H vs. H–K_s diagram for 26 areas in the inner Galaxy (from Vulpecula to Centaurus) are determined. For this aim we use the red-clump giants located inside and behind spiral arms, or behind dense dust clouds of the Local arm. In most of the investigated directions the ratio E_{J-H}/E_{H-K_s} is found to be between 1.9 and 2.0, taking the stars with the extinction $A_V < 12$ mag. The stars with larger extinction deviate down from the reddening lines corresponding to less reddened stars. Probably, this is related to the curvature of reddening lines due to the band-width effect. However, some of the deviating stars may be heavily reddened oxygen- and carbon-rich AGB stars (giants of the latest M subclasses or N-type carbon stars), and pre-main-sequence objects (YSOs).

Key words: ISM: extinction, clouds – stars: fundamental parameters – photometric systems: infrared, 2MASS

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2MASS TWO-COLOR INTERSTELLAR REDDENING LINES: THE BAND-WIDTH EFFECT

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Abstract. The band-width effect on interstellar reddening lines in the J–H vs. H–K_s diagram of the 2MASS survey is investigated using synthetic color indices and color excesses based on the Kurucz model atmospheres. At large interstellar reddenings ($E_{H-K_s} \geq 1.0$) reddening lines deviate considerably from a straight line. The lines can be approximated by a parabolic equation: $E_{J-H} = rE_{H-K_s} + sE^2_{H-K_s}$ where the slope coefficient, r, and the curvature coefficient, s, depend slightly on the intrinsic energy distribution of the source. The curvature of the reddening lines is confirmed by the J–H vs. H–K_s diagrams plotted by Straižys and Laugalys (2008) from 2MASS observations.

Key words: ISM: extinction – stars: fundamental parameters – photometric systems: infrared, 2MASS

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MAGNITUDE AND COLOR TRANSFORMATIONS BETWEEN SIRIUS AND 2MASS PHOTOMETRIC SYSTEMS

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Abstract. We provide magnitude and color transformations between two near-infrared photometric systems, 2MASS and SIRIUS, the latter currently implemented with the three-channel SIRIUS camera on 1.4 m Infrared Survey Facility telescope at the South African Astronomical Observatory. The transformation equations are derived using a carefully selected sample of 32 770 stars in the Large and Small Magellanic Clouds that have high quality observations available in both photometric systems. The derived transformations are valid in the color range $-0.1 < (J-H)_{\rm SIRIUS} < 1.15$, $-0.05 < (H-K_s)_{\rm SIRIUS} < 0.7$ and $-0.1 < (J-K_s)_{\rm SIRIUS} < 1.7$.

Key words: infrared: stars – techniques: photometric – methods: data analysis – catalogs – surveys

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MULTI-EPOCH UBVRcIc PHOTOMETRIC CATALOG OF SYMBIOTIC STARS

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Abstract. We present a multi-epoch, accurate $UBVR_{\rm C}I_{\rm C}$ photometric catalog of 83 symbiotic stars and related objects, measured while calibrating the Henden & Munari (2000, 2001, 2006) photometric sequences around these objects. The vast majority of the observations were collected in the time interval between 1998 October 19 to 2002 April 21 with the 1.0 m Ritchey-Chrétien telescope of the U.S. Naval Observatory, Flagstaff Station (Arizona). On average, $UBVR_{\rm C}I_{\rm C}$ data are given on 3.6 epochs for each program star. The overall error budget of the data is usually better than 0.02 mag.

Key words: stars: pulsations – stars: variables – stars: AGB

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StHα-55: A CARBON MIRA, NOT A SYMBIOTIC BINARY

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Abstract. We carried out a VR_CI_C photometric monitoring of StHα 55. In addition, we obtained low resolution absolute spectrophotometry and high resolution Echelle spectroscopy of the star. Our data show that StHα 55 is a carbon Mira, pulsating with a 395 day period, with $<V>$ = 13.1 mean brightness and ΔV = 2.8 mag amplitude. It has a low reddening of E_{B-V} = 0.15, lies at a distance of 5 kpc from the Sun and 1 kpc from the Galactic plane, and its heliocentric systemic velocity is close to +22 km s^{-1}. The difference between the radial velocity of the optical absorption spectrum and that of the Hα emission is unusually small for a carbon Mira. The spectrum of StHα 55 can be classified as C-N5 $C_2 6^-$. Its $^{13}C/^{12}C$ isotopic ratio is normal, and the lines of Ba II and other s-type elements, as well as Li I, have the same intensity as in field carbon stars of similar spectral type. The Balmer emission lines are very sharp and unlike those seen in symbiotic binaries. Their intensity changes in phase with the pulsation cycles in the same way as seen in field carbon Miras. We therefore conclude that StHα 55 is a bona fide, normal carbon Mira showing no feature supporting a symbiotic binary classification, which has been suggested previously.

Key words: stars: pulsations – stars: variables – stars: AGB

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OPTICAL SPECTRUM OF THE YELLOW SUPERGIANT HD 159378

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Abstract. Using high resolution spectra from the ELODIE database the atmosphere of the yellow supergiant HD 159378 was analyzed. Its effective temperature of 7500 K, much higher than previously considered, was found. The star seems to be a young F-supergiant with slightly enhanced metallicity, not a post-AGB star or a long-period Cepheid as was thought before. The metallicity of HD 159378 is in accordance with its 6 kpc galactocentric position in the Galactic disk.

Key words: stars: supergiants, atmospheres, fundamental parameters – stars: individual: HD 159378

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CHEMICAL EVOLUTION OF THE GALACTIC BULGE: SINGLE AND DOUBLE INFALL MODELS

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Abstract. Recent work has produced a wealth of data concerning the chemical evolution of the Galactic bulge, both for stars and nebulae. Present theoretical models generally adopt a limited range of such constraints, frequently using a single chemical element (usually iron), which is not enough to describe it unambiguously. In this work, we take into account constraints involving as many chemical elements as possible, basically obtained from bulge nebulae and stars. Our main goal is to show that different scenarios can describe, at least partially, the abundance distribution and several distance-independent correlations for these objects. Three classes of models were developed. The first is a one-zone, single-infall model, the second is a one-zone, double-infall model and the third is a multizone, double-infall model. We show that a one-zone model with a single infall episode is able to reproduce some of the observational data, but the best results are achieved using a multizone, double-infall model.

Key words: Galaxy: chemical evolution – Galaxy: bulge – planetary nebulae

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ACCURACY OF STAR CLUSTER PARAMETERS FROM INTEGRATED UBVRIJHK PHOTOMETRY

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Abstract. We investigate the capability of the *UBVRIJHK* photometric system to quantify star clusters in terms of age, metallicity and color excess by their integrated photometry in the framework of PÉGASE single stellar population (SSP) models. The age-metallicity-extinction degeneracy was analyzed for various parameter combinations, assuming different levels of photometric accuracy. We conclude, that most of the parameter degeneracies, typical to the *UBVRI* photometric system, are broken in the case when the photometry data are supplemented with at least one infrared magnitude of the *JHK* passbands, with an accuracy better than ~ 0.05 mag. The presented analysis with no preassumptions on the distribution of photometric errors of star cluster models, provides estimate of the intrinsic capability of any photometric system to determine star cluster parameters from integrated photometry.

Key words: techniques: photometric – methods: data analysis – galaxies: star clusters

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SIMCLUST – A PROGRAM TO SIMULATE STAR CLUSTERS

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Abstract. We present a program tool, SimClust, designed for Monte-Carlo modeling of star clusters. It populates the available stellar isochrones with stars according to the initial mass function and distributes stars randomly following the analytical surface number density profile. The tool is aimed at simulating realistic images of extragalactic star clusters and can be used to: (i) optimize object detection algorithms, (ii) perform artificial cluster tests for the analysis of star cluster surveys, and (iii) assess the stochastic effects introduced into photometric and structural parameters of clusters due to random distribution of luminous stars and non-uniform interstellar extinction. The source code and examples are available at the SimClust website. By applying SimClust, we have demonstrated a significant influence of stochastic effects on the determined photometric and structural parameters of low-mass star clusters in the M 31 galaxy disk.

Key words: galaxies: star clusters – galaxies: individual (M31) – methods: numerical – techniques: photometric

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PROPERTIES OF RED GIANT BRANCHES OF STAR CLUSTERS IN THE MAGELLANIC CLOUDS AND THEIR RELATION WITH CLUSTER METALLICITY

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Abstract. We derive a new calibration that relates the observed cluster RGB slope in the K_s vs. J–K_s color-magnitude diagram with cluster metallicity. The new calibration is derived using a sample of intermediate age (1–8 Gyr) clusters in the Large and Small Magellanic Clouds with precise JHK_s photometry available from the SIRIUS photometric survey of the Magellanic Clouds. Cluster metallicities are literature data obtained either from high resolution or infrared calcium triplet spectroscopy of individual cluster RGB stars. We find systematic differences between the RGB slope vs. metallicity relation derived in this work and that of Valenti et al. (2004), the latter obtained using a sample of old Galactic globular clusters. The possible origin of the discrepancies is discussed briefly.

Key words: galaxies: Magellanic Clouds – galaxies: star clusters – star clusters: abundances – infrared: stars – techniques: photometric

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ACCURACY OF EFFECTIVE TEMPERATURES OF STARS THROUGH INTERCOMPARISON OF CATALOGS

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Abstract. A technique of estimating the accuracy of catalogs of stellar physical parameters developed earlier at the Tartu Observatory is described in detail. The technique is applied to a set of selected stellar catalogs of effective temperatures. The external errors of the sets are estimated with the aim to use them in future in producing a homogenized catalog of merged data.

Key words: catalogs – stars: fundamental parameters (temperatures)

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KARHUNEN-LOÈVE BASIS FUNCTIONS OF KOLMOGOROV TURBULENCE IN THE SPHERE

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Abstract. In support of modeling atmospheric turbulence, the statistically independent Karhunen-Loève modes of refractive indices with isotropic Kolmogorov spectrum of the covariance are calculated inside a sphere of fixed radius, rendered as series of 3D Zernike functions. Many of the symmetry arguments of the well-known associated 2D problem for the circular input pupil remain valid. The technique of efficient diagonalization of the eigenvalue problem in wavenumber space is founded on the Fourier representation of the 3D Zernike basis, and extensible to the von-Kármán power spectrum.

Key words: turbulence – atmospheric effects – methods: numerical

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SOME STATISTICAL CHARACTERISTICS OF THE ORBITAL PARAMETERS OF ASTROMETRIC BINARIES FROM THE WDS ORBIT CATALOG

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Abstract. Using the data for 358 astrometric binary stars with the calculated photocentric orbits, presented in the Washington Sixth Catalog of Orbits of Visual Binary Stars (2006), the distributions of semi-major axes, periods, and eccentricities are presented and compared with such distributions for orbital visual and spectroscopic binaries. The mean value of the differences between the semi-major axes of the photocentric orbits and the photocenter distances, $\log a_0 - \log \rho = 0.117 \pm 0.006$, is very close to the mean difference between the semi-major axes and the angular separations for visual binaries, $\log a - \log \rho = 0.112$.

Key words: stars: binaries: astrometric - orbital parameters - statistics

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DIGITAL PLATE ARCHIVE FOR SUPERNOVA SEARCH AT KONKOLY OBSERVATORY

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Abstract. Digital archives of representative plates obtained with the 0.60/0.90 m Schmidt telescope of the Konkoly Observatory major observing programs are in progress. Here we present the digital archive of plates obtained according to the supernova search program, which has been run since 1962 for more than a 30-year period. The selected plates with a limiting magnitude of $B \approx 19$ mag are scanned with the Konkoly Observatory UMAX PowerLook scanner and are available at the WFPDB, installed in Sofia.

Key words: astronomical databases – surveys – stars: supernovae: general

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ON THE TRANSMITTANCE NONUNIFORMITY OF LARGE INTERFERENCE FILTERS

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Abstract. Transmittance functions of the four interference filters of the 7-color Vilnius photometric system are investigated by measuring spectral transmittances at different positions within the filter area. Shifts in the mean wavelengths between 0.3 amd 1.5 nm are found, and the magnitude errors due to such passband shifts are calculated. We conclude that shifts less than 0.3, 1.2, 0.4 and 1.5 nm for X, Y, Z and S passbands, respectively, are tolerated if magnitude errors less than 1 % are allowed. For larger passband shifts, color-dependent corrections must be applied.

Key words: instrumentation: filters – techniques: photometric

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VISIBLE STARS AS APPARENT OBSERVATIONAL EVIDENCE IN FAVOR OF THE COPERNICAN PRINCIPLE IN THE EARLY 17TH CENTURY

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Abstract. The Copernican Principle (which says the Earth and Sun are not unique) should have observational consequences and thus be testable. Galileo Galilei thought he could measure the true angular diameters of stars with his telescope; according to him, stars visible to the naked eye range in diameter from a fraction of a second to several seconds of arc. He used this and the Copernican Principle assumption that stars are suns as a method of determining stellar distances. The expected numbers of naked eye stars brighter than a given magnitude can be calculated via Galileo's methods; the results are consistent with data obtained from counting naked eye stars. Thus the total number of stars visible to the naked eye as a function of magnitude would appear to Galileo to be data supporting the Copernican Principle.

Key words: history of astronomy: Copernicus, Galileo Galilei