Session:	**[B3A-3] S3 : Stars, Exoplanets and Stellar Systems**
Date:	August 20, 2014 (Wednesday)
Time:	11:00~12:30
Room:	Room C (Room 104)
Chair:	Se-Hyung Cho (Korea Astronomy and Space Science Institute)

[B3A-3-1] **11:00~11:15**

Photometric Study of The Magnetic Cataclysmic Variable RXSJ1803

Young Hee Kim (Chungbuk National University, Korea), Joh-Na Yoon, Yonggi Kim, and Ivan L. Andronov

The University Observatory of Chungbuk National University are monitoring some magnetic cataclysmic variables with 1m telescope at Mt. Lemmon, 1.8m telescope at Mt. Bohyun, and 0.6m telescope at the Jincheon station, former 2 telescopes of which belong to KASI(Korea Astronomy and Space Institute). The time series data of RXSJ1803 from the program stars are reduced and analysed and some results will be presented in this paper. The VR photometric data from 2010 to 2013 are used for RXSJ1803. In additiion to results from the photomtric studies, we also present results of the newly discovered W-UMa type eclipsing binary VSX J180243.9+400331 in the field of RXSJ1803. This star shows a nearly identical depths of the primary and secondary minima. We tried to find the statistically optimal degree of the trigonometric polynomial and the ephemeries in compared with the results by Andronov et al. (2012). Figure 1. shows the light curve of this star with the period of 0.3348837±0.0000002 day. The statistically optimal phenomenological modeling has been carried out with the NAV(New Algol Variable) algorithm and the corresponding parameters have been determined in this paper.

[B3A-3-2] **11:15~11:30**

Mid-Infrared Period-Metallicity-Luminosity Relations and Kinematics of RR Lyrae Variables

A. K. Dambis (Sternberg Astronomical Institute, Russia), L. N. Berdnikov, A. Y. Kniazev, V. V. Kravtsov, A. S. Rastorguev, R. Sefako, O. V. Vozyakova, and M. V. Zabolotskikh

We use ALLWISE data release W1- and W2-band epoch photometry collected by Wide-Field Infrared Survey Explorer (WISE) to determine the slopes of the period-luminosity relations for RR Lyrae stars in 15 globular clusters in the corresponding bands. We further combine these results with V- and K-band photometry of Galactic field RR Lyrae stars to determine the metallicity slopes of the log P_F - [Fe/H]-M_K, log P_F - [Fe/H]-M_{W1}, and log P_F - [Fe/H]-M_{W2} period-metallicity-luminosity relations. We infer the zero points of these relations and determine the kinematical parameters of thick-disk and halo RR Lyraes via statistical parallax, and estimate the RR Lyrae-based distances to 19 Local-Group galaxies.

[B3A-3-3] **11:30~11:45**

V5584 Sgr: A Moderately Fast Nova of Fe II Class with CO Bands in Emission

Ashish Raj (Korea Astronomy and Space Science Institute, Korea), N. M. Ashok, D. P. K. Banerjee, and Sang Chul Kim

The near-infrared spectroscopic and photometric observations of nova V5584 Sgr will be presented. The observations were taken during the first 12 days following its discovery on 2009 October 26.439 UT. It is clearly evident from the JHK spectra of the nova that the nova belongs to the Fe II class. The spectra show first-overtone CO bands in emission between 2.29-2.40 μm together with H I, C I, N I and O I emission lines. The H I, Pa β and Br γ spectral lines show deep P Cygni profiles having FWHM of 550-650 km s−1. The distance for the nova have been estimated as d = 6.3 ± 0.5 kpc using the MMRD relation and with an estimated value of t2 = 25 ± 1 days from the optical light curve. The observed t2 value places V5584 Sgr in the class of moderately fast novae. Using WISE and other publicly available data, we found that the nova

underwent a pronounced dust formation phase during February - April 2010. We have also estimated the range for the upper limit of the CO mass for V5584 Sgr.

[B3A-3-4] **11:45~12:00**

Existence of Non-planar Triangular Equilibrium Points in Elliptic Restricted Three-Body Problem under the Effects of Radiation and Oblateness

Budi Dermawan (Bandung Institute of Technology, Indonesia), I. N. Huda, R. W. Wibowo, T. Hidayat, J. A. Utama, D. Mandey, and I. Tampubolon

This work considers the elliptic restricted three-body problem with non point-mass primaries. We include effects of radiation of the bigger primary and an oblate smaller primary to mimic an exoplanetary system with a gas giant planet. Under the influences of both effects we look for the existence of the triangular equilibrium points. We set the system in a normalized rotating coordinate system and derive equations of motion of the third infinitesimal object. Our study shows that the triangular equilibrium points are existent such as in classical case of point-mass primaries. Both effects dislocate the triangular equilibrium points and modify their equilateral/isosceles triangle shape with respect to the primaries. The oblateness also induces vertical region about the triangular equilibrium points and this causes the points can exist in non-planar. This result suggests that, if stable, an infinitesimal object may reside in the triangular region away from the exoplanet's orbital plane.

[B3A-3-5] **12:00~12:15**

Hidden Secrets in Stellar Loci: Metallicity Dependences, Intrinsic Widths and Binaries

Haibo Yuan (Peking University, China), Xiaowei Liu, Maosheng Xiang, Yang Huang, and Bingqiu Chen

Stellar loci are widely used in selecting interesting outliers, reddening determinations and calibrations, recently. However, hitherto no dependence of stellar loci on metallicity has been considered and their intrinsic widths are unclear. Yuan et al. (2014a, to be submitted) have re-calibrated the SDSS stripe 82 imaging data using a spectroscopy based Stellar Color Regression (SCR) method and achieved an unprecedented accuracy of 5, 3, 2 and 2 mmag in the u-g, g-r, r-i and i-z colors, respectively. By combining the re-calibrated imaging and spectroscopic data in the stripe 82, we have built a large, clean sample of dwarf stars with extremely accurate colors and well determined metallicities. In the first part of this talk, we investigate the metallicity dependence and intrinsic widths of the SDSS color loci (Yuan et al. 2014b, to be submitted). Typically, one dex decrease in metallicity causes 0.20 and 0.02 mag decrease in u-g and g-r colors, and 0.02 and 0.02 mag increase in r-i and i-z colors, respectively. The variations are larger for metal-rich stars than for metal-poor ones and for F/G/K stars than for A/M stars. Using the sample, we have performed two dimensional polynomial fitting to the u-g, g-r, r-i and i-z colors as a function of the g-i color and metallicity. The residuals, at the level of 0.029, 0.008, 0.008 and 0.011 mag respectively for the u-g, g-r, r-i and i-z colors, can be fully accounted by the photometric errors and metallicity uncertainties, suggesting that the intrinsic widths of the loci are at maximum of a few mmag if not zero. The residual distributions are asymmetric, revealing that a significant fraction of stars are binaries. Binaries play a key role in understanding star formation and evolution. Previous techniques in searching for binaries are biased to close (or wide) binaries of similar masses and limited to the solar neighborhood. In the second part of this talk, we propose a Stellar Locus OuTlier (SLOT) method and apply it to the stripe 82 to determine binary fraction for field FGK stars (Yuan et al. 2014c, to be submitted). The method is insensitive to neither the orbital period nor the mass-ratio distributions. With modern photometric and spectroscopic surveys, it will provide an unbiased estimate of binary fraction for a large sample of stars. It can also constrain mass ratio distribution when applying the method to star clusters, and orbital period distribution when applying to stars of repeated spectroscopic observations. We have applied the SLOT method to the re-calibrated stripe82 imaging data using spectroscopic data from both the SDSS and LAMOST. We find that the average binary fraction for field FGK stars are 41±2%, and the fraction decreases toward later spectral types. The binary fractions for the Galactic thin, thick disk stars are very close. However, there is some indication that the halo contains a larger fraction of binary stars contrary to expected. In the end, other implications of the metallicity dependent stellar loci and future work with the SLOT method are discussed.

[B3A-3-6] **12:15~12:30**

Search for Stellar Substructures of Four Metal-Poor Globular Clusters in the Galactic Bulge Region

Sang-Hyun Chun (Yonsei University, Korea), Minhee Kang, DooSeok Jung, and Young-Jong Sohn

We present the stellar density distribution around four metal-poor globular clusters (NGC 6266, NGC 6626, NGC 6642, and NGC 6723) in the Galactic bulge region. Based on near-infrared JHK observations obtained with WFCAM detector on United Kingdom Infrared Telescope, we secured homogeneous and wide-field photometric images in the vicinity of the clusters. In order to reduce the field star contamination and trace cluster member stars, a statistical weighted filtering method was applied on the color-magnitude diagram. Two-dimensional isodensity contour maps of clusters indicate that all four globular clusters show strong evidence of tidally stripping stellar features beyond the tidal radius in the form of a tidal tail or small density lobes/chunk. The extending stellar substructures are likely associated with the effect of the dynamical interaction with the Galaxy and the cluster's space motion. The radial density profiles of clusters accurately describe observed stellar substructures as overdensity features. These overdensity features have a break in slope and depart from the theoretical King and Wilson models at the outer region of the clusters. These observed results imply that four globular clusters in the Galactic bulge region experienced a strong environmental effect, such as tidal force or bulge/disk shock of the Galaxy in the dynamical evolution of the globular clusters. These observational results provide us further constraints for understanding the evolution of clusters in the Galactic bulge region as well as the mass assembly history of the Galaxy.