

² Instituto de Ciências Exatas, Universidade Federal de Itajubá.

³ Instituto Astronômico, Geofísico e de Ciências Atmosféricas, Universidade de São Paulo.

⁴ Instituto Carlos Chagas Filho de Biofísica, Universidade Federal do Rio de Janeiro.

A CONTINUED SEARCH FOR CEMP RR LYRAE STARS

H. M. Reggiani¹, C. R. Kennedy², S. Rossi¹, and T. C. Beers³

Among the stellar populations of the Galactic halo there is a class of stars known as carbon-enhanced metal-poor (CEMP) stars. These are metal-poor ($[Fe/H] < 1.0$) stars whose atmospheres exhibit large overabundances of carbon ($[C/Fe] \geq +0.7$). The frequency of these stars increases with decreasing metallicity, and so by studying their abundance patterns, one can begin to uncover details of the origins of the elements. There exist a number of different classes of CEMP stars (Beers & Christlieb 2005) with specific abundance characteristics; one of them is the CEMP-s class, which exhibit evidence of s-process element enrichment, widely believed to be resultant of mass transfer from a companion low-metallicity asymptotic giant branch (AGB) star, where the production of carbon and s-process elements occurs. Recent spectroscopic observations of metal-poor RR Lyrae stars have revealed that their typical abundance patterns are consistent with very metal-poor (VMP) and extremely metal-poor (EMP) giants and dwarfs studied in the halo system of the Milky Way. Of particular interest is the recent discovery of a VMP RR Lyrae that has large overabundances of carbon and the s-process elements. In this work, we showed results obtained with WiFeS observations 2.3m Siding Spring Observatory telescope of a set of newly-identified CEMP stars that are known RR Lyr stars. We confirmed these stars as CEMP stars (Kennedy et. al., in prep) and will, eventually, test their abundances against new stellar evolution simulations of CEMP stars.

¹ Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Universidade de São Paulo.

² Research School of Astronomy & Astrophysics, Australian National University.

³ National Optical Astronomy Observatory.

TOWARDS THE DEVELOPMENT OF A SEMIAUTOMATIC PIPELINE FOR INVESTIGATING THE VISCOSITY PARAMETER OF DISKS OF BE STARS BY THE ANALYSIS OF LIGHT CURVES

L. R. Rímulo¹, A. C. Carciofi¹, X. Haubois², and T. Rivinius³

In “Viscous Decretion Disk” (VDD) model for circumstellar disks Be stars, material is dynamically ejected near the equator of the star and diffuses outwards by means of viscous forces. Following the α -disk approach for the VDD, we show that dynamical disk models coupled with the radiative transfer code **HDUST** can be used for constraining fundamental disk parameters, such as the α viscosity parameter, the base density, the orientation angle i of the disk and the mass injection rate, only through the analysis of two-color light curves of Be stars that cover a few years and show “bump-like” magnitude excesses. The form of the bump depends on the dynamical state of the disk during the whole process of construction and dissipation. We show that the state of the disk can be extracted from two-color light curves by fitting theoretical curves, derived from a grid of dynamical models that we computed, to the observed light curves. The α viscosity parameter works as a time scaling parameter, and is also obtained in the process of fitting, for each Be star.

¹ Departamento de Astronomia, Universidade de São Paulo, Rua do Matão, 1226 - Cidade Universitária, São Paulo-SP - Brazil - 05508-090.

² Observatoire de Paris /LESIA, 5 place Jules Janssen, 92190 Meudon, France.

³ ESO, Alonso de Cordova, 3107 - Vitacura, Santiago de Chile - Chile.

PROBING ACCRETION ON THE HIGH-MAGNETIZED POLAR RX J1007.5-2017

C. V. Rodrigues¹, D. Cieslinski¹, T. Ribeiro², K. M. G. Silva³, R. Baptista⁴, A. S. Oliveira³, J. E. R. Costa¹, and R. Campbell⁵

RX J1007.5-2017 is a polar: a compact binary system in which matter flows from a low-mass main-sequence star to a magnetized white dwarf without the formation of an accretion disk. RX J1007.5-2017 has some observational peculiarities (conspicuous optical cyclotron harmonics, a very soft X-ray spectrum, and no polarization in R and I bands), which may be related to extreme conditions at the accretion flow: a very strong white-dwarf magnetic

field (around 100 MG on surface) and a low accretion rate. To study the accretion, from the mass-donor star to the white dwarf, we obtained time-resolved spectroscopy using the Goodman spectrograph at the SOAR telescope in observing runs distributed around the first semester of 2012. We found the object in different brightness states. In the low state, we gathered data with two spectral resolutions (219 km/s and 170 km/s). In a brighter state, the spectral resolution was ≈ 170 km/s. The low (high) spectral resolution data cover the spectral region from 360 to 760 nm (435 to 700 nm). The continuum varies in both states and the cyclotron humps are visible at some orbital phases. The low-state spectra show Balmer emission lines superimposed on absorption features from the mass-donor star. The bright-state spectra show strong Balmer, HeI, and HeII emission lines. The Balmer and HeII lines are not single Gaussians: in bright state the lines are broader and have three components; in low state, the lines are narrower and two components are distinguished in some phases. Doppler tomography of the low state reveals that line emission arises mainly from a region near the white dwarf. The orbital dependence of the cyclotron emission was modeled using the Cyclops code, which adopts a 3D representation of the accretion column.

¹ Divisão de Astrofísica, Instituto Nacional de Pesquisas Espaciais, Brazil (claudia.rodrigues@inpe.br).

² Universidade Federal de Sergipe, Brazil.

³ Universidade do Vale do Paraíba, Brazil.

⁴ Universidade Federal de Santa Catarina, Brazil.

⁵ Humboldt State University, USA.

HIGH-RESOLUTION SPECTROSCOPIC OF RED GIANTS STARS IN NGC 2360

J. V. Sales Silva¹ and C. B. Pereira¹

Open clusters are excellent laboratories to test our knowledge of the formation and evolution of the two components of the disk (thick and thin disk), and stellar structure and evolution, since the stars present the same age and distance reducing the uncertainties associated with field stars of the Galaxy. NGC 2360 is an open cluster with 0.85 Gyr, with galactocentric distance equal to 9.28 Kpc and height equal to -30 pc. We determine to 15 stars in the NGC 2360 using high resolution spectroscopy the atmospheric parameters and the chemical composition for Fe, Ni, Cr, Ca, Mg, Si, Ti, Na, Al, Ba, Y, Zr, La,

Ce and Nd with measures of equivalent widths of absorption lines, and spectral synthesis for C, O and N. The spectra of 14 stars were obtained with FEROS at the 2.2m ESO telescopes at La Silla (Chile). Only one star was observed with UVES/VLT at Paranal Observatory. Atmospheric parameters and abundances were determined using the LTE atmosphere models of Kurucz and the spectral analysis code MOOG. The abundance of alpha and iron-peak elements of NGC 2360 are typical disk abundances. We also observed a slight overabundance of the elements generated by the s-process in NGC 2360 with respect to field stars of the disk. The overabundance of the elements generated by the s-process occurs in young open clusters and may be linked to high-efficiency of these nucleosynthesis in low-mass stars ($< 1.5M_{\odot}$). However, this high-efficiency has not been explained by the stellar evolutionary models. Additional observations and high resolution spectroscopic analysis of intermediate-age open clusters (like NGC 2360) are necessary to confirm the slight overabundances of s-process elements with relation to field stars of the disk and old open clusters.

¹ Observatório Nacional, Rua José Cristino, 77. 20921-400, São Cristóvão, Rio de Janeiro-RJ, Brazil (joaovictor, claudio@on.br).

DISCRIMINATING LOCAL GROUP EMBEDDED STAR CLUSTERS FROM OLDER ONES USING NEAR-IR PHOTOMETRIC INDEXES

J. F. C. Santos Jr.¹, H. Dottori², and P. Grosbøl³

Several grand-design spiral galaxies show a bimodal distribution of their system of star clusters and star forming complexes in JHK diagrams. The $(J - H)$ vs $(H - K_s)$ diagram revealed that embedded clusters, still immersed in their parental clouds of gas and dust, have in general a redder $(H - K_s)$ colour than older clusters, whose gas and dust have already been ejected. In addition, the reddening-free index $Q_d = (H - K_s) - 0.884 (J - H)$ was shown to correlate with age for the young clusters and thus provided an effective way to differentiate the embedded clusters from the older ones. In the present work, the aforementioned photometric indices were explored for star cluster systems in the Local Group. In particular, we investigate the effectiveness of the Q_d index in sorting out clusters of different ages at their early evolutionary stages. Surface photometry