tic dynamics discipline, passing by the most successful predictions and models, finishing with an integral vision of what is known from the Milky Way structure from it dynamics and the prospects with the new large scale surveys to understand it in the next decades.

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USING MASSCLEAN TO DESCRIBE STELLAR CLUSTERS FOUND IN THE VISTA VARIABLES IN THE VIA LACTEA (VVV) SURVEY

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The important parameters: age, mass and distance of resolved or partially resolved stellar clusters are better accurately determined by using color-magnitude diagrams (CMD). However, when the main sequence turnoff is not available or clearly identifiable, large errors in all parameters result when using simple isochrone fitting, particularly when observations are limited to near-infrared bands. We used the MASSCLEAN package to perform 5 million Monte Carlo simulations of stochastically sampled stellar clusters in order to generate CMD templates for a variety of cluster masses and ages and which mimic the observational photometric errors. This results in the creation of tens of thousands of n-dimensional stellar density maps (templates) in numerous color planes as a function of age and mass. We use these MASSCLEAN CMD templates to refine and sharpen traditional isochrone fitting to analyze the newly discovered stellar clusters/cluster candidates from the Vista Variables in the Via Lactea (VVV) Survey. Our MASSCLEAN templates are also being used to design and optimize search algorithms for stellar clusters in broad-band surveys.

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MASS EXTINCTIONS, GALACTIC ORBITS IN THE SOLAR NEIGHBORHOOD AND THE SUN: A CONNECTION?

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The orbits of the stars in the disk of the Galaxy, and their passages through the Galactic spiral arms, are a rarely mentioned factor of biosphere stability which might be important for long-term planetary climate evolution, with a possible bearing on mass extinctions. The Sun lies very near the co-rotation radius, where stars revolve around the Galaxy in the same period as the density wave perturbations of the spiral arms. Conventional wisdom generally considers that this status makes for few passages through the spiral arms. Controversy still surrounds whether time spent inside or around spiral arms is dangerous to biospheres and conducive to mass extinctions. Possible threats include giant molecular clouds disturbing the Oort comet cloud and provoking heavy bombardment; a higher exposure to cosmic rays near star forming regions triggering increased cloudiness in Earth's atmosphere and ice ages; and the destruction of Earth's ozone layer posed by supernova explosions. We present detailed calculations of the history of spiral arm passages for all 212 solar-type stars nearer than 20 parsecs, including the total time spent inside the spiral arms in the last 500 Myr, when the spiral arm position can be traced with good accuracy. We found that there is a large diversity of stellar orbits in the solar neighborhood, and the time fraction spent inside spiral arms can vary from a few percent to nearly half the time. The Sun, despite its proximity to the galactic co-rotation radius, has exceptionally low eccentricity and a low vertical velocity component, and therefore spends 30% of its lifetime crossing the spiral arms, more than most nearby stars. We discuss the possible implications of this fact to the long-term habitability of the Earth, and possible correlations of the Sun's passage through the spiral arms with the five great mass extinctions of the Earth's biosphere from the Late Ordovician to the Cretaceous-Tertiary.

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A CONTINUED SEARCH FOR CEMP RR LYRAE STARS

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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 theses stars as CEMP stars (Kennedy et. al., in prep) and will, eventually, test their abundances against new stellar evolution simulations of CEMP stars.

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

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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.

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

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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

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