XIV Latin American Regional IAU Meeting (Florianópolis/SC, Brazil, 25-30 November 2013)
Editors: A. Mateus, J. Gregorio-Hetem & R. Cid Fernandes

STRENGTHS USEFUL FOR ASTROPHYSICS APPLICATIONS

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The goal of this work is to obtain oscillator strengths (gf) of spectral lines of astrophysical interest. In addition, we aim to estimate the effects of the uncertainties associated with obtaining gf values in the calculation of stellar abundances. In the atmospheres of chemically peculiar stars, it is critical the accurate determination of the abundance of some chemical elements, as well as their possible variations with the time. With this in mind, we intend to analyze spectral lines observed in the spectrum of He-weak, He-strong, HgMn, and Ap stars. In this work we present some preliminary results we have obtained for XeII lines. We compare the gf values theoretically obtained, by adopting the Hartree-Fock (HF) method and the Least Square Fitting (LSF) approach, with the gf values empirically obtained. The astrophysical oscillator strengths for XeII lines obtained by Yuce et al (2011), by fitting observed spectra of xenon-overabundant stars with synthetic spectra, are considered as the empirical gf values in the present work.

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A NEW METHOD TO DISENTANGLE THE ROTATIONAL VELOCITIES OF STARS: APPLICATION TO MAIN–SEQUENCE FIELD STARS

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The projected rotational velocity $v \sin i$ is a fundamental observable quantity. In order to obtain the rotational velocity distribution of a sample of $v \sin i$, Chandrasekhar & Münch (1950) developed a formalism to obtain this distribution under the assumption that rotational axes are uniformly distributed, but this method is not usually applied due to an intrinsic numerical problem associated to the derivative of an Abel's integral. An alternative iterative method was developed by Lucy (1974) to disentangle the distribution function of this kind of inverse problem, but this method has no convergence criteria.

Here we present a new method to disentangle the distribution of rotational velocities, based on Chandrasekhar & Münch (1950) formalism. We obtain the cumulative distribution function (CDF) of the rotational velocities from projected velocities ($v \sin i$) under the standard assumption of uniform distributed rotational axes. Through simulations the method is tested using a) theoretical Maxwellian distribution functions for the rotational velocity distribution and b) with a sample of about 12.500 main-sequence field stars.

Our main results are:
The method is robust and in just one step gives the cumulative distribution function of rotational velocities.
When applied to theoretical distributions it recovers the CDF with very high confidence.
When applied to *real* data, we recover the results from Carvalho et al. (2009) proving that the velocity distribution function of main–sequence field stars is *non–Maxwellian* and are better described by Tsallis or Kaniadakis distribution functions.

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THE GENERAL CATALOG OF VISTA VARIABLES IN THE VIA LACTEA

I. Dekany[1], J. Pullen, D. Minniti, and M. Catelan

The VISTA Variables in the Via Lactea (VVV) ESO Public Survey is providing deep, long-baseline time-series photometry in the near-infrared for hundreds of millions of objects in the bulge and the southern disk. The scientific potential of these data is manifold, and its global exploration requires homogeneous and high-level data products. In my talk, I will expound on the details of a massive computational effort to produce a general variability database and a catalog of periodic and transient variables in

the bulge, using photometry provided by the VISTA Data Flow System. The goal of this project is to duly provide science-ready data products in the form of a simple on-line database which may serve as the basis for various specific studies from stellar pulsation to microlensing, conducted by the VVV community. I will discuss the main steps of the procedure, the characteristics and possible uses of the database, the current status of the project, and will conclude by highlighting selected results.

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PARAMETERS FOR SMC CLUSTERS FROM CMD MODELING

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Stellar clusters in the Small Magellanic Cloud are fundamental pieces to study the chemical and dynamical evolution of this neighbouring dwarf galaxy, enabling inspection of a large period covering ∼10 Gyr. The main goals of this work are the derivation of age, metallicity, distance modulus, reddening, core radius and central density profile for each cluster, and place them in the context of the Small Cloud evolution. The studied clusters are: AM 3, HW 1, HW 34, HW 40, Lindsay 2, and Lindsay 3, where HW 1, HW 34, and Lindsay 2 are studied for the first time. Optical colour-magnitude diagrams (V, B-V CMDs) and radial density profiles were built from images obtained with the 4.1m SOAR telescope, reaching V ∼ 23. The determination of structural parameters were carried out applying King profile fitting. The other parameters were derived in a self-consistent way by means of isochrone fitting, which uses the likelihood statistics to identify the synthetic CMDs that best reproduce the observed ones. Membership probabilities were determined comparing the cluster and control field CMDs. Completeness and photometric uncertainties were obtained performing artificial star tests. The results confirm that these clusters (except HW 34, identified as a field fluctuation) are intermediate-age clusters, with ages between ∼1 and ∼5 Gyr. Their metallicities follow the age-metallicity relation by Pagel & Tautvaisiene (1998), with some spread as described by Parisi (2009) and Piatti (2011). In particular HW 1, Lindsay 2, and Lindsay 3 are located in a region that we called West Halo. (Based on paper by Dias et al. 2013, A&A, accepted; arXiv: 1311.4579).

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A PSF-FITTING PIPELINE FOR VVV-ESO: THE STAR CLUSTER PISMIS 24

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Este trabalho apresenta um algoritmo para a extração de dados fotométricos do catálogo *"VISTA Variables in the Via Láctea"* (VVV) do ESO. A principal característica do algoritmo é evitar a interação com o usuário mantendo precisão e profundidade fotométrica, de fato o algoritmo foi capaz de gerar dados mais precisos para as estrelas menos brilhantes (J $\gtrsim$ 16, H $\gtrsim$ 15,5 e H $\gtrsim$ 15) e confiável fotometria para estrelas mais de uma magnitude mais fracas do que as detectáveis com outras técnicas. Embora o algoritmo obtenha resultados menos precisos para as estrelas mais brilhantes, este provou ser o método mais adequado, uma vez que queremos trabalhar com aglomerados abertos jovens, onde a pré-sequência principal é de maior importância. Além disso, podemos combinar 2MASS e VVV para substituir as estrelas saturadas do VVV.

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PROPER MOTIONS OF PRE-MAIN SEQUENCE STARS

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The kinematic study of young stars is an important tool to discuss the early stages of star formation. In this context, proper motions allow us to detect moving group structures of young stars to which they belong. Individual distances to moving group members can be inferred from proper motion and radial velocity data using the convergent point strategy. The main objective of this work is to determine proper motions of pre-main sequence stars in nearby star-forming regions. This work represents an improvement of an existing database by including more pre-main sequence stars and refining the astrometry for