STRENGTHS USEFUL FOR ASTROPHYSICS APPLICATIONS

A. Cruzado[1,2], O. H. Di Rocco[3,4], and P. E. Marchiano[1]

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.

[1] Facultad de Ciencias Astonómicas y Geofísicas, Universidad Nacional de La Plata (UNLP), Paseo del Bosque s/n, 1900 La Plata, Pcia. de Buenos Aires, Argentina (acruzado@fcaglp.unlp.edu.ar).
[2] Instituto de Astrofísica de La Plata, Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), UNLP, Paseo del Bosque s/n, 1900 La Plata, Pcia. de Buenos Aires, Argentina.
[3] Instituto de Física de Arroyo Seco, Universidad Nacional del Centro de la Pcia. de Buenos Aires, Pinto 399, 7000 Tandil, Pcia. de Buenos Aires, Argentina.
[4] CONICET, Av. Rivadavia 1917 (C1033AAJ), Ciudad Autónoma de Buenos Aires, Argentina.

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

M. Curé[1], D. F. Rial[2], J. Cassetti[3], and A. Christen[4]

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.

[1] Instituto de Física y Astronomía, Universidad de Valparaíso, Chile (michel.cure@uv.cl).
[2] Departamento de Matemáticas, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Argentina.
[3] Universidad Nacional de General Sarmiento, Argentina.
[4] Instituto de Estadística, Pontificia Universidad Católica de Valparaíso, Chile.

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