

Measurement of radial velocities and velocity dispersions in Python using MEGARA data.

S. Zamora^{1,2}, Ángeles I. Díaz^{1,2}, D. Mayya³

¹ Departamento de Física Teórica, Universidad Autónoma de Madrid (UAM), Spain

² Centro de Investigación Avanzada en Física Fundamental (CIAFF), Spain

³ Instituto de Astrofísica, Óptica y Electrónica, 72840 Puebla, México

Abstract

Cross-correlation techniques have been applied since 1974 (see Simkin, S.M.: A&A, 31, 129) in order to calculate objects' redshift and velocity dispersions from the center and the width of the cross-correlation peak respectively. In 1979, Tonry and Davis (ApJ 84, 1511) developed a correlation analysis based in the Fourier Method. It provides a determination of a cross correlation function operationally straightforward and with an internal error measure of the correlation peak. In this work, we have adapted this method to implement it in very high spectral resolution data at red wavelengths and have written a Python package that can be used to perform the calculations automatically. We present an example of the correlation function using observations from the MEGARA instrument attached to the 10.4-m GTC. We have used the HR-I setup (VPH863-HR grating) that covers a wavelength range between 8380 and 8882 angstroms and provides a velocity dispersion limit around 14.6 km/s (FWHM). The algorithms developed in this work will be published soon and will be available in the standard Python distribution channels.

My poster is available at <https://zenodo.org/record/7043332#.Y1pXv0xBxJU>