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THE INCIDENCE OF SHORT TIME SCALE VARIABILITY ON DIFFERENT TYPES OF BLAZARS

I. Andruchow[1,2], S. A. Cellone[1,2], and G. E. Romero[1,3]

Active Galactic Nuclei (AGNs) have an extreme behavior at almost all wavelengths. In particular, the kind of AGNs know as blazars are one of the most extreme. With their jets pointing near to our direction, those object show a variety of distinctive features from radio to very high energies. We present the results of an extended campaign to study the behavior of the optical emission of blazars. This work is centered on variability at short scales of total flux. We took special care in data treatment, e.g. considering the influence of the host galaxies, the good choice of the field stars used for differential photometry, the statistical test used to study the variability, etc. Over the last years, we followed blazars that were detected at very high energies (TeV). We found differences in the incidence of variability at short time-scales between blazars that have the peak of their synchrotron flux low frequencies from those that have it at high energies.

Blazars are classified as FSRQ and BL Lac according to the present and strength of their emission lines. With respect to the SED (Spectral Energy Distribution), it is typically bimodal, with two humps: one at low energies (Synchrotron) and the other at more high energies (Inverse Compton). According to the frequency of the low energy peak, these objects are divided in LSP, ISP and HSP (Low, Intermediate and High-Synchrotron Peak, respectively) (Abdo et al. 2010).

Our aim is to look at optical wavelengths for common features in each of this classes trying to better understand the nature of the different process that occurs in the inner most part of this kind of AGNs. We used the study of the microvariability phenomena (variation in hours scales). We have optical photometric data from different telescopes and in, at least, to filters. The sample was partially published in Romero et al. (1999) and Romero et al. (2002). We present here the new statistical analysis (including new photometry, new differential light curves and the new classification) of the published data and results for new data that we collected over the last decade.

We used the C statistical test with the Γ weight factor (Howell et al., 1988) to study the 52 differential light curves we obtain from the data. Our sample is divided in 19 LSPs and 6 HSPs. Using the *Dutty Cycle* (see Romero et al., 1999 for a definition) as a measurement of the variability activity of each class, we found that: $DC_{LSP} = 40.4\%$ (with $\langle\Delta m\rangle$=0.15mag in $\langle\Delta t\rangle$=4.4 hs) and $DC_{HSP} = 11.6\%$. This last number have to be taking with caution, since the small number of the sample. Despite of that, it is clear that the LSP are more microvariables that the HSP.

This last characteristic is confirmed with the data taking from the TeV Blazars (all HSP in our case). Our observations were carried out after the high energy detection, and none of the 6 object that we followed show any variation at all, as in the case of PG1553+113 (Andruchow et al. 2011).

Finally, the most reasonable explanation for the microvariability behaviour presents in blazars seems to be the variation in the distribution of the seed e^- responsible for the synchrotron emission.

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[1]Facultad de Ciencias Astronómicas y Geofísicas, Universidad Nacional de La Plata, Paseo del Bosque s/n, 1900, La Plata, Buenos Aires, Argentina. (andru@fcaglp.unlp.edu.ar).

[2]Instituto de Astrofísica de La Plata (IALP), CCT La Plata, CONICET.

[3]Instituto de Radioastronomía (IAR), CCT La Plata. CONICET.