Galaxy Evolution: Theory and Observations (Cozumel, Quintana Roo, México, 8-12 April 2002)
Editors: Vladimir Avila-Reese, Claudio Firmani, Carlos S. Frenk & Christine Allen

SPECTRAL CHRACTERIZATION OF MICROVARIABILITY IN QUASARS

A. Ramírez,[1] J.A. de Diego,[1] D. Dultzin-Hacyan,[1] and E. Benítez[1]

These are the preliminary results of our BVR photometric study. The quasar 1628.5+3808 is shown here only for the sake of illustration of our research. This object showed variations in the three bands. It was observed with a 1.5-meter telecope from the Observatorio Astrónomico Nacional at San Pedro Mártir, México. Only non-variable field stars were taken into account to carry out the differential photometry. Problems with standard stars did not allow the calibration process.

BACKGROUND: A BVR photometric study of a selected sample of radio-loud quasars (RLQs) and radio-quiet quasars (RQQs) has been conducted. Two samples of 23 RLQs and 23 RQQs were observed with six different telescopes. Each RLQ object matches an RQQ object by brightness and redshift. Great care was taken to avoid selection effects and spurious biases (de Diego et al. 1998). The observational procedure was conducted by taking a five exposure set in every band for each couple of objects. The ANOVA statistical test is applied for searching flux variability. The aim was twofold: to distinguish the microvariability origin (jet perturbations, disk accretion instabilities or gravitational microlensing) and to compare both quasars types. We expected that the quasar spectra would show breaks for disk instabilities and a power law spectral variation for jet perturbations. The microvariability studies indicate that the phenomenon is present both in radio-loud (Wagner & Witzel 1995) and radio-quiet (de Diego et al. 1998; Jang & Miller 1997) quasars. No differences between RLQs and RQQs were found in a previous work (de Diego et al. 1998), although they were found by other research teams (see Jang & Miller 1997; Gopal-Krishna et al. 2000).

CONCLUSIONS: Figure 1 shows variations in three bands supported by ANOVA analysis. Figure 2 shows flux differences between two object data sets. We can see in Figure 2 that the flux microvariability of 1628.5+3808 features characteristics of a non-thermal origin. However, a deeper analysis of this object is necessary. Our broader study results will be given in future work.

[1]Instituto de Astronomía, Universidad Nacional Autónoma de México, México (aramirez,jdo,deborah,erika @astroscu. unam.mx).

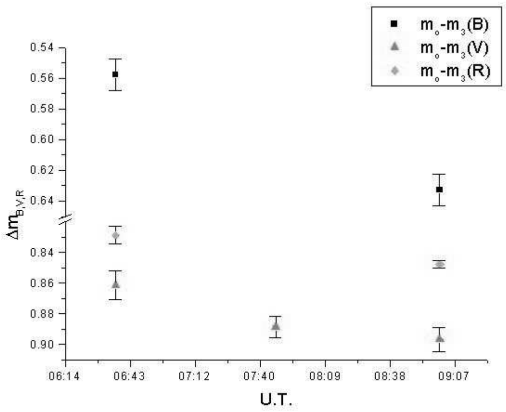

Fig. 1. This RQQs was observed on June 16th. The variations were detected in the three bands during 2 hours. the brightness changes were aprox. 7% in B, 3.5% in V and 2% in R. Unfortunately, the quality of mid point results in B and R bands is bad and not shown here. The subindex in "m" refers to object (o) and our field star (3)

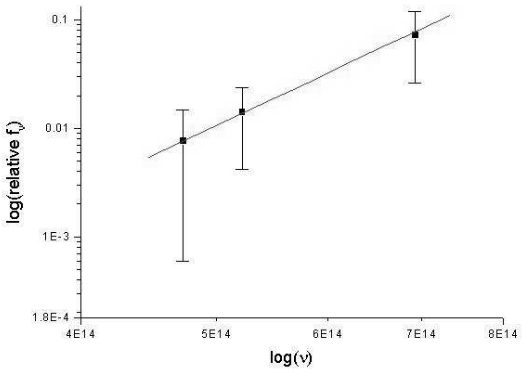

Fig. 2. Brightest and least data sets difference in each band. A power law can fit the observations, well suggesting that a non-thermal process was responsible for the variation.

REFERENCES

de Diego, J.A., Ramírez, A., Dultzin-Hacyan, D., Benítez, E., 1998, Ap. J., 500, 60
Gopal-Krishna et al. 2000, MNRAS, 314, 815
Jang & Miller, 1997, A.J., 114, 565
Wagner & Witzel, 1995, ARA&A, 33, 163