THE ENVIRONMENT OF OJ 287: NEARBY GALAXIES AND A LONG OPTICAL JET?

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1. Introduction

A widely accepted model for BL Lac objects is that they are radio galaxies with a relativistic jet pointing almost directly towards us. But we need a clear trigger mechanism for these jets. One possibility is the close interaction between the BL Lac host and the closeby galaxies (e.g. Heckman et al. 1986). This interaction has been seen many times in the case of quasars (Hutchings et al. 1989) but not so much is known about the close surroundings of the BL Lac objects although there has been some pioneer work like Stickel et al. (1993). The problem has usually been that the images are not deep enough and that the seeing has not been so good. To clarify the situation we have started an observing program to get very deep images in the subarcsecond seeing conditions from the whole 1 Jy sample (Stickel et al. 1991) of BL Lac objects. The aims of this study are: 1. to search for very close companions to the BL Lacs, 2. to study the large scale galaxy clustering around the BL Lacs and 3. to study the BL Lac hosts themselves.

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2. Observations and Results

We have taken deep CCD images of OJ 287 in the very wide frequency range from B to K. The V-band images were taken with the 2.1m telescope on San Pedro Mártir, Mexico; B and I-images with the 2.56m NOT-telescope on La Palma, Canary Islands; R and K-images with the 2.2m telescope on Calar Alto, Spain. The main results of our OJ 287 study can be summarized as follows:

1. We have found at least six objects closer than 10 arcseconds from OJ 287. If these objects are really connected to OJ 287 their projected distances are smaller than 60 Kpc. The closest companion is only 3.4 arcsecs from OJ 287.

2. There is a "jet"-like feature to the south-west from the object. We can see at least six "knots" in almost perfect chain starting from the object. The projected length of this feature is about 25 arcsecs.

3. There is also another "jet"-like feature to the west of the object. The length of this feature is only ten arcsecs and it coincides with the beginning of the radio jet observed with the VLA (Perlman and Stocke 1994).

4. There are quite many galaxies close to OJ 287 which are possibly seen also in the VLA image (Kollgaard et al. 1992). If this is true it means that there are many active galaxies around OJ 287.

5. From our R- and K-band images we have calculated that in the 2'x2' area around OJ 287 there is a galaxy overdensity by a factor of two (Metcalfe et al. 1991 and Cowie et al. 1990). The R-K colours for the brightest of these galaxies are about 3.6. These values are typical for galaxies at z=0.3 which means that they may be associated with OJ 287.

References

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