Short Term Scientific Mission, COST Action MP0905

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Scientific report

1) Description of the work carried out and of the main results achieved during the STSM

The main aim of the work-plan for my STSM at the Max-Planck-Institut fuer Radioatronomie, Bonn (MPIfR), was to increase the knowledge of the extreme class of AGN named blazars. In the radio band, blazars are core-dominated objects with apparent superluminal speeds along relativistic jets pointed close to the observer's line of sight. Blazars have flat spectral indices and include flat-spectrum radio quasars and BL Lacertae objects, the counterparts of high- and low-luminosity radio galaxies.

I'm presently investigating a deep, large flux-limited sample of faint blazars, which has nearly complete optical identifications, through both single-dish and interferometry radio observations. The sample is formed by 87 objects. They were observed with the Effelsberg 100-m radio telescope at various frequencies to measure the emitted flux density. Further data were extracted from NVSS at 1.4 GHz. The data analysis of these observations was completed during the STMS, with consultation with expert people at the MPIfR for flux density and polarized emission calibration.

At the same time, 42 objects in the sample have been observed with the European VLBI Network at 5GHz. One part of the data have been processed by the new advanced DiFX software correlator of the MPIfR in Bonn. A second part of the objects were observed with e-VLBI and correlated in real-time at JIVE. All the 42 objects have been detected. Data analysis of part of the data set was done during the STSM. The main results are:

a) 16 sources show a core-jet structure; 26 are point-like at the achieved milli-arcsecond resolution;

b) the EVN to Effelsberg flux density ratio is 0.5-0.6 on average;

c) the brightness temperature is in the range (0.1-28) 10^10 K.

It is reasonable to expect that the objects under investigation are the counterparts of gamma-ray sources detected by the Fermi Gamma-ray Observatory. In fact, about 10% of them are the possible counterpart of gamma-ray sources detected by Fermi after 11 months of observations (Abdo et al., 2010).



Figure 1: EVN images at 5GHz of the detected DXRBS core-jet sources



Figure 2 - Color image of the source 1507.9+6214