

COST action MP1104 STSM 2014

STSM visitor: Talvikki Hovatta

Home institute: Aalto University, Metsähovi Radio Observatory, Finland

Host institute: University of Crete, Greece, contacts: Prof. Pavlidou & Dr. Blinov

Time period: April 20 – 30, 2014

Title: Optical polarization of blazars and the effect of host galaxy dilution

Scientific report, May 4 2014

The main purpose of the trip was to plan and initiate a project to study the effect of unpolarized host galaxy emission on the polarimetric measurements of blazars obtained with the RoboPol instrument. In our analysis of the June 2013 observations of blazar polarization, we noticed a deficit of sources that are both bright and highly polarized (Pavlidou et al. 2014, MNRAS in press). We suspect this could be due to dilution of the polarization due to the unpolarized host galaxy emission (Heidt & Nilsson 2011, A&A, 529, 162).

Before the visit we had identified from the literature 49 objects in our full sample of 202 blazars that had a host galaxy magnitude estimate or limit available. During this visit we established a plan to obtain estimates for all the remaining 51 blazars in our sample at redshift less than $z = 0.7$ that did not have an estimate or limit available. At higher redshifts the host galaxy contribution to our images should be minimal.

During the first half of the visit, we selected the low redshift blazars that can be observed using the imaging camera at the Skinakas 1.3 telescope, where RoboPol is also mounted. We found 6 objects in the RoboPol sample at $z < 0.15$ that had no estimate of the host galaxy available in the literature. We further fit the profiles of all the sources without redshift estimates to find potential candidates where a host galaxy could be detected and found 8 of them. Of these 14 objects, 7 were visible during the visit.

We identified objects at redshift range $0.15 < z < 0.4$ for which we wrote an observing proposal to image them with the Nordic Optical Telescope (NOT). During the visit we finalized the sample, the observing strategy, and wrote the science justification for the proposal. For sources at redshifts $0.4 < z < 0.7$ we will submit a proposal to observe them with the Palomar 4-m telescope (deadline in September).

The latter half of the visit was spent at Skinakas Observatory observing with the RoboPol instrument, with the goal of switching to imaging if the weather was suitable for the host galaxy observations that require very good seeing conditions. We developed a scheme based on the 2013 observations to monitor the observing conditions in real time (due to the design of the RoboPol instrument, it is less straightforward to estimate the seeing from the images) to switch if the seeing is below the mode of the conditions throughout the season. We also selected the standard stars to calibrate the observations and established the observing strategy.

Unfortunately, the weather was not good enough for the host galaxy observations over the 4 nights that we spent on the mountain. However, the observing nights were still extremely useful for Dr. Hovatta to obtain experience in operating the RoboPol instrument, as the plan is for her to return to Crete to observe again with the RoboPol instrument and continue the collaboration.

In the next weeks and months, Dr. Blinov from University of Crete will observe all the host galaxy objects we identified for Skinakas when the weather is more suitable. Once we obtain the data, we will continue our collaboration and estimate the host galaxy magnitudes. These will be used in a publication interpreting the RoboPol 2013 season observations and in a separate publication that concentrates on the host galaxy contamination alone. Both of these papers are to be submitted by the fall of 2014. A further publication is expected if the NOT and Palomar proposals are successful.