COST *Short Term Scientific Mission*
Scientific report

STSM DETAILS:

Applicant: Pablo Reig
COST STSM Reference Number: COST-STSM-ECOST-STSM-MP1104-310815-056439
***Home Institute*:** Foundation-for Research & Technology-Hellas, Greece (FORTH)
***Host Institute*:** Astronomical Observatory of the University of Valencia (AOUV)
***Contact Scientist in host institute*:** Prof. Juan Fabregat
Period: 31-08-2015 to 07-09-2015

TITLE: Multicolour polarimetry of Be stars in open clusters

Be stars are non-supergiant fast-rotating B-type and luminosity class III-V stars which at some point of their lives have shown spectral lines in emission. They also show an amount of IR radiation than is larger than that expected from an absorption-line B star of the same spectral type. This extra long-wavelength emission is known as infrared excess. More importantly, the light from a Be star is polarized and the degree of polarization is variable with typical timescales of months to years. The origin of all these three observational properties is attributed to the presence of a circumstellar disk around the equator of the Be star. This disk is fed from material expelled from the rapidly rotating Be star in a manner that it is not yet understood. The linearly polarized light results from the Thomson scattering of stellar radiation off of free electrons in the disk.

Be stars may exist as isolated systems (classical Be stars) or take part in a binary system with a neutron star companion, the so called Be/X-ray binaries (BeXB). There is growing evidence that the disks in BeXB are smaller and denser than in classical Be stars due to tidal truncation by the neutron star. One of the main issues that I have been investigating during the last years is to search for observational evidence of disk truncation in BeXB. One way to do this is by comparing the variability patterns of parameters directly related to the disk. Traditionally, the prime indicator of the state of the disk has been the Hα line (strenght and shape). If polarization results from the disk, then the polarimetric parameters can also provide information on the state of the disk.

The purpose of his visit was to set up a new project to observe a large number of Be stars in open clusters. The advantage of studying of Be stars in open clusters is that important astrophysical parameters, such as, ages, intrinsic colours, extinction and distance are well constrained. Thus, the contribution of the Interstellar Medium to the total measured polarization can be accounted for. With this data set plus the on-going monitoring of BeXB, we aim at performing a comparative study between the polarimetric properties of classical Be stars and Be stars in X-ray binaries. During my stay, Prof. Fabregat and I assessed the preliminary data already obtained in two campaigns in June and July 2015, planned the Autumn (September-November 2015) observations and discussed the observation strategy. Due to the large number of stars, this project will require several more campaigns during 2016. We estimate that by the end of October 2016, we will have completed the observations. Nevertheless, by the end of 2015, we expect to have observed ~40% of the sample. Hence preliminary results are expected sooner.

The observations were made and will continue using the 1.3m telescope and Robopol polarimeter available at the Skinakas observatory.