STSM Scientific Report Template

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Visited scientist and host institution : Dr. Pablo Reig, Foundation for Researchand Technology - Hellas / University of Crete, Heraklion, Greece

Dates of STSM : 07.06.2014 – 14.06.2014

Explain briefly below how your STSM matched one of these key-points :

1. strengthen current collaborative projects
2. establish new collaborations
3. obtain necessary knowledge for the application of new techniques
4. use host infrastructures that are not available at the home institute.

During this STSM I strengthened the collaboration with Dr. Pablo Reig and Dr. Dmitry Blinov (University of Crete/Foundation for Research and Technology - Hellas) which was started two and one year ago, respectively. The visit's main topic was the polarisation of High Mass X-ray Binaries with Be stars (BeXBs) with respect to their orbital phase. We discussed both observational and theoretical approaches. I also learned new analysis techniques that I was able to apply to my current research.

Describe below the activities carried out during the STSM and the main results obtained.

There were three main purposes of this STSM:
- discuss and finish the n-polariser algorithm software for polarimetric images analysis,

- analyse the High Mass X-ray Binaries with Be stars (BeXBs) polarimetric images from Liverpool Telescope,
- prepare a polarimteric observational proposal for the Northern Optical Telescope (NOT) of BeXBs based on the results of our analysis.

During the first part of this STSM I finished the Sparks & Axon (1999) n-polariser algorithm for polarimetric images analysis. The algorithm is in a form of a Python script. The software was then used to analyse polarimetric data from fully robotic optical telescope Liverpool Telescope (LT) located on La Palma. There are two sets of data: one of polarisation standards monitored with LT for over a year and data of five BeXBs that were observed within our OL13B08 LT observational project: 4U 0115+634, RX J0240.4+6112, V 0332+53, KS 1947+300 and SAX J2103.5+4545. Both datasets are in the process of analysis and at least two papers will be published within upcoming months.

During this STSM we were granted an additional observing time of our targets. Therefore, we have to perform the observations, analyse the data and only then we will be able to decide our strategy for follow-up observations on NOT.

Apart the main goals of this STSM I took the oportunity to study the method of derivation of orbital parameters of binarys systems based on polarimetric position angle and polarisation degree with respect of system's orbital phase. For this purpose I written a fitting software based on Markov Chain Monte Carlo which will be used to derive orbital parameters of our five BeXBs and any other systems that might be observed in future.