



STSM Scientific Report

Applicant and home institution : STANISLAV GUNÁR, Astronomical Institute of the Academy of Sciences of Czech Republic, Ondřejov, Czech Republic

Visited scientist and host institution : Prof. JAVIER TRUJILLO BUENO, Instituto de Astrofisica de Canarias, La Laguna, Tenerife, Spain

Dates of STSM : June 22, 2013 – June 29, 2013

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

1. establish new collaborations

We have fulfilled the primary goal of the present COST Short Term Scientific Mission which was to initiate the collaboration of Dr. S. Gunár with Prof J. Trujillo Bueno and his research group of Solar Magnetism and Astrophysical Spectropolarimetry.

During his first visit at the Instituto de Astrofisika de Canarias, S. Gunár presented his expertise on the complex modelling of the prominence fine structures developed in collaboration with Prof. P. Heinzel from the Astronomical Institute of the Academy of Sciences of Czech Republic and with Dr. U. Anzer from the Max-Planck-Institut für Astrophysik. Within the subsequent scientific discussions with Prof. J. Trujillo Bueno and members of his research group, notably Dr. D. Orozco Suarez, and with Dr. J. Štěpán from Astronomical Institute of the Academy of Sciences of Czech Republic we have discussed the initial stages of joint development of the prominence fine structure models coupling the established modelling of the prominence plasma and radiative transfer of S. Gunár with the multi-dimensional modelling of the polarized radiative transfer developed at the Instituto de Astrofisika de Canarias.

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

Within the present COST STSM Dr. S. Gunár during his visit at the Insituto de Astrofisica de Canarias presented a lecture on the Complex modelling of the quiescent prominence fine structures where he described the details of the structure and capabilities of the 2D multi-thread prominence fine structure models and shown the most important results.

During the scientific discussions with Prof. J. Trujillo Bueno and Dr. J. Štěpán we have initiated a collaboration on the joint project of coupling of the prominence fine structure plasma models provided by S. Gunár and the polarized light radiative transfer modelling which is the expertize of J. Trujillo Bueno and J. Štěpán. In the initial stage of this collaboration we will use the realistic prominence magnetic field and plasma structure produced by the 2D model of S. Gunár and incorporate it into the multi-dimensional polarized light radiative transfer code PORTA developed by J. Štěpán and J. Trujillo Bueno. This will allow us to synthesize not only the hydrogen spectra (using 2D model of S. Gunár) but also the polarization spectra represented by the Stokes parameters Q, U, and V. During the present COST STSM we have defined the interfaces between the existing models and we will in the following stage use PORTA to synthesize the polarized radiative output in the Lyman alpha line. The results of this synthesis will be presented at major international scientific conferences and published in a major scientific journal.

We have also discussed the possibility of synthesis of the polarized output in the H-alpha line, which we intend to perform in the following stages of this collaboration.

Moreover, we have discussed together with Dr. D. Orozco Suarez the possibility to use the magnetic field and plasma structure produced by the 2D prominence fine structure models of S. Gunár for the synthesis of the helium line 1083.0 nm. Results of such effort can be used for testing of the inversion method used for the analysis of the prominence magnetic field observations. We will continue this work during the future stages of our collaboration.