



NLTE calculation of the Solar spectrum with Cross-influence of solar Atmospheric structures

Cassandra Bolduc (1), Werner Schmutz (1), Alexander Shapiro (2), Rinat Tagirov (1), Margit Haberreiter (1), and Nuno Guerreiro (1)

(1) PMOD/WRC, Solar Physics, Davos Dorf, Switzerland (cassandra.bolduc@pmodwrc.ch), (2) Max Planck Institut für Sonnensystemforschung, Göttingen, Germany (shapiroa@mps.mpg.de)

The Code for Solar Irradiance (COSI) is a radiative transfer and spectral synthesis code developed at PMOD/WRC, which calculates the radiative transfer in the solar atmosphere in NLTE. We present the implementation of the cross-influence between different atmospheric structures representing different substructures of the quiet Sun. These interactions will influence the statistical populations at each height level in the solar atmosphere with photons coming from neighboring structures. The purpose of this work is to simulate the effects of time and space variations in the radiative transfer. As such, the new schemes will provide a closer approximation to a more realistic overall-average of the tridimensional and time varying MHD radiative transfer calculations, which is currently computationally too expensive to be performed in NLTE for the whole solar atmosphere. We will also discuss the intended comparison with other simulations aiming at approximating 3-D and time effects through simplified calculations, namely the calculations of the radiative transfer with COSI along different rays across a cube of atmosphere obtained from MHD simulations. Finally, we will discuss the possibility of effects of the new implementation on the CNO abundances in the context of the oxygen crisis.