

EUV synthesis project for the Solar-C (EUVST) mission

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In the Solar-C (EUVST) mission, the Science Task Team (STT) develops strategies for achieving the science objectives, particularly through a coordination between the theory and observation. In 2020, the STT held a series of workshops and discussed, for each science objective, what observational and theoretical studies have achieved so far; what the remaining technical issues are in both theoretical and observational points of view; what we need for theoretically solving the science objectives; and what Solar-C (EUVST) would achieve observationally.

As a next step, we started a new project, where we synthesize EUV line emissions in the wavelength range covered by Solar-C (EUVST) from numerical simulation results. The purpose in this project is to study quantitative feasibility of EUVST for extraction of physical information from the observations. By employing the CHIANTI IDL package and assuming that the spectral lines are optically thin, we synthesize the EUV lines that form in the solar corona. We perform the line synthesis on the 3D model atmosphere produced from the magnetohydrodynamic simulation. For each snapshot of the model atmosphere, we extract the temperature, density, and velocity over lines of sight (LOS), and generate spectral line profiles across the field view, which can be directly compared with the observations. Then, we derive a LOS velocity and line width from each synthesized line profile, which can be utilized to discuss the origin of nonthermal width and dynamics.

At the moment, we adopt the above method to the 3D model atmosphere computed with the MPS/University of Chicago Radiative MHD (MURaM) code. In the presentation, we show the latest updates of our EUV synthesis project, with addressing the future outlook for the STT activities.

Keywords: Solar-C (EUVST), synthesis, CHIANTI