Model of the Si IV emission at the loop footpoints heated by an electron beam

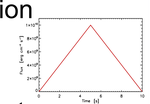
Astronomical Institute of the Czech Academy of Sciences

Elena Dzifčáková, Jana Kašparová, Jaroslav Dudík, Alena Zemanová

Astronomical Institute, Czech Academy of Sciences, Fričova 298, 25165 Ondřejov, Czech Republic

Model

- goal is to model observed spectral characteristic of Si IV line during impulsive phase of solar flare
- radiative-hydrodynamic code FLARIX is used to obtain temporally dependent plasma parameters in the flaring loop – temperature, electron density, velocity, energy deposition…
- FLARIX allows us to model the time evolution of a 1D atmosphere heated by a specified process, e.g. by electron beams propagating from the injection site in the corona down to the lower atmosphere
- triangle time modulation of energy deposition function is used



- electron beam parameters: maximum beam energy flux E = 1-10x10^{10} erg cm^{-2} s^{-1}, power-law index of electron beam is -3, low energy cut-off is 20 keV, total deposition time is 2-10 s
- for selected beam parameters, time dependent ionization states and relative abundances of Si IV ion are calculated.
- contribution of the electron beam to the ionization and excitation rates is included
- Si IV emissivity (1402.77 A) together with temporal and integrated line profiles are showed

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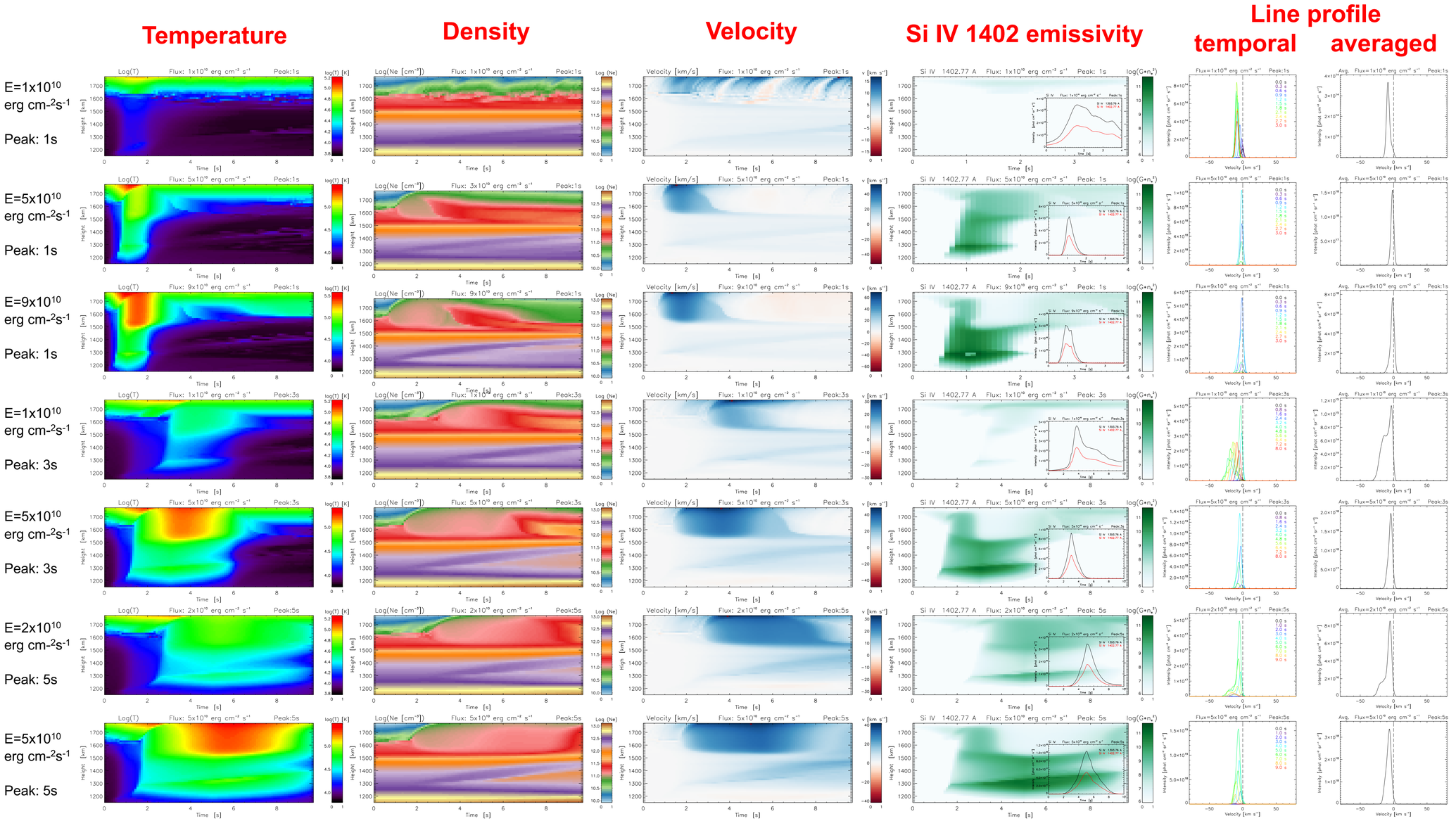

- Si IV is formed in two main regions – in the beginning chromosphere at the height about 1300 km and about 1500 km. Their locations correlate with temperature structure and Log(T/K) about 4.8
- time dependence of total line intensity copies more or less time modulation of energy deposition function
- time behavior of line Doppler shift is similar to observations, however, its amplitude is much lower then observed values
- modeled plasma velocities (a few of tens of km/s) and widths of the modeled lines are too low
- wider range of input parameters for FLARIX code is needed to model observed velocities
- line width should be widened by micro-turbulence