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## **Thermal non-equilibrium : its importance for the energy and mass cycles in the atmosphere and its possible solar wind implications**

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Thermal non-equilibrium (TNE) is a thermodynamical state set by a stratified (mainly at the footpoints) and quasi-steady heating. It is believed to play a major role in producing a variety of very common solar phenomena, in particular: prominences, coronal rain, and long-period EUV pulsations. These two later phenomena are the two faces of the same coin: the EUV pulsations results of the temperature and density variations in the cooling phases of TNE cycles, while coronal rain is produced by a thermal instability leading to the dramatic condensation of the plasma in the final phases of these cycles.

I will review the current state of knowledge about TNE, the latest developments on TNE observations and modeling in the solar atmosphere, and the remaining puzzles on the topic.

In particular, its recent detection in open-closed topologies lead to many questions on the interplay of TNE with interchange reconnection at coronal null-points and draw interesting perspectives on linking mass and energy transport in the solar atmosphere to solar wind release mechanisms.

Finally, I will talk about future observations with Solar Orbiter and upcoming missions such as MUSE and Solar-C.

**Primary author:** Dr FROMENT, Clara (CNRS/LPC2E)

**Presenter:** Dr FROMENT, Clara (CNRS/LPC2E)

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