

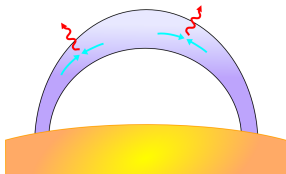
Heating and cooling of the solar corona

Proposed Hinode observations

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Hinode data analysis workshop, Orsay, 14 Nov 2007



Loop model

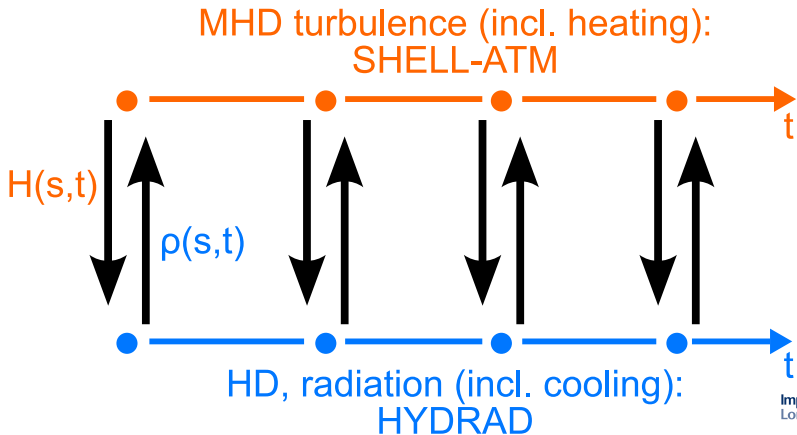
1 *Loop model*

2 *Proposed observations*

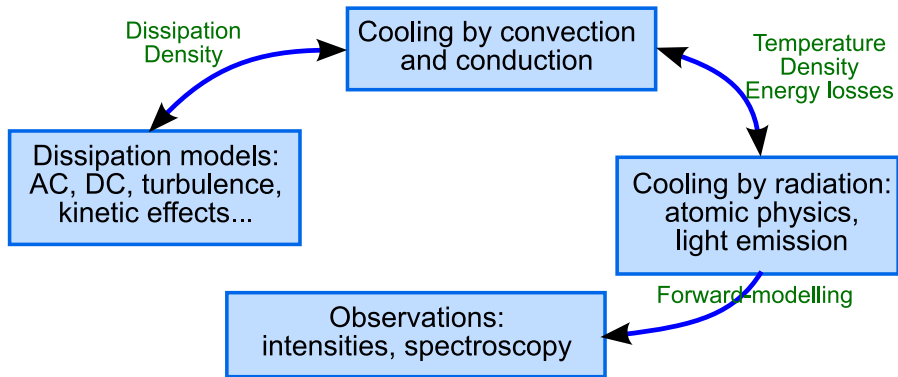
New coronal loop model

In the framework of the coronal heating problem

- ▶ SHELLATM (Buchlin & Velli): MHD turbulence in loop
- ▶ HYDRAD (Bradshaw & Mason): 1D hydrodynamics, incl. radiation



What does the model do?

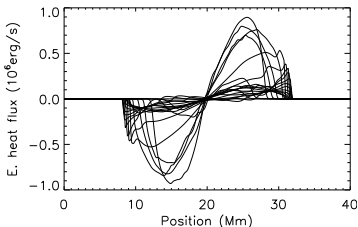
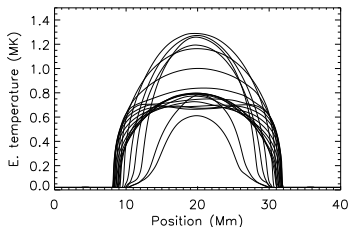
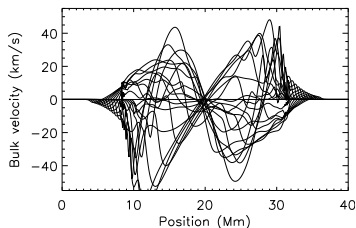
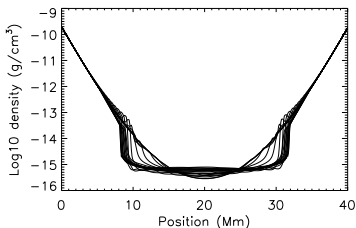


Forward-modelling of loop properties and spectroscopic emission, with:

- ▶ Loop footpoint motions, Alfvén waves, turbulent heating
- ▶ 1D hydrodynamics (including thermodynamics and ion populations)

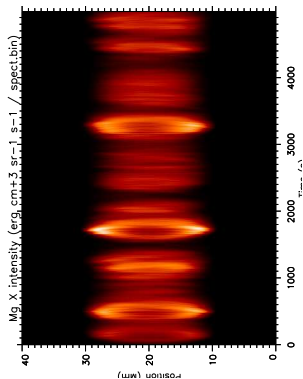
Formation of a hot corona

- ▶ Heating everywhere, but most effective in low-density corona
- ▶ Corona becomes hot, large scale-height
- ▶ Evaporation from chromosphere, transition region



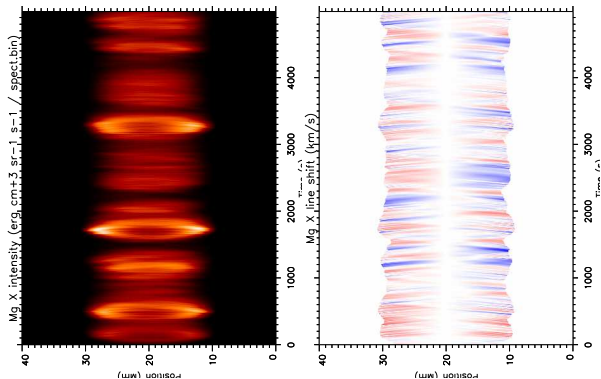
Emission in UV

- ▶ *Line intensity* from atomic physics (CHIANTI)
- ▶ Line shift from HYDRAD
- ▶ Line width from SHELLATM (turb.) + HYDRAD (thermal)



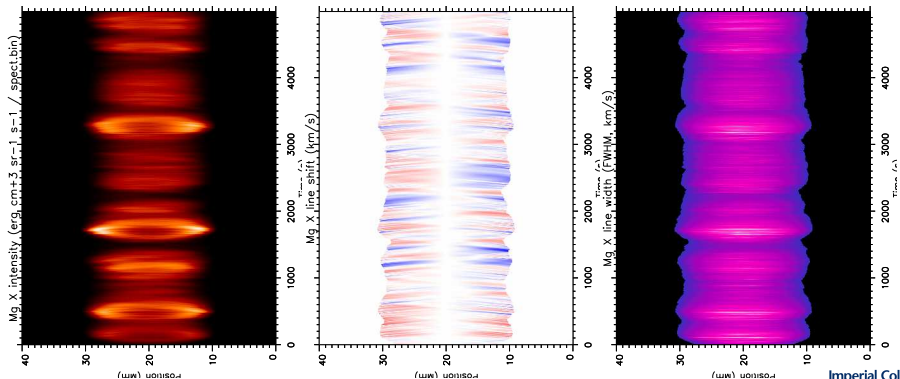
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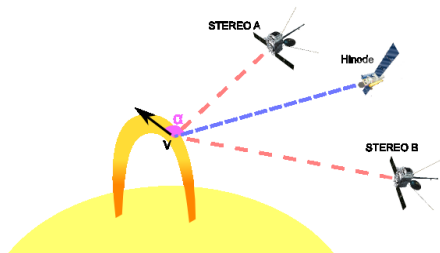
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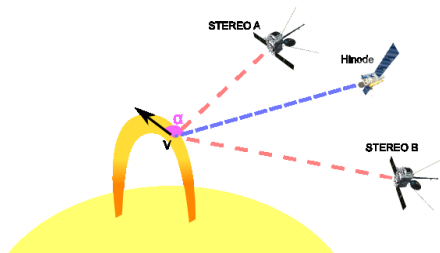
Proposed observations

- ▶ Compare flows, temperature evolution, DEM, T-EM, T-Doppler, T-width distributions... with model
 - use STEREO to take loop geometry into account
- ▶ Get spectra of turbulence (in the corona: velocity field)
- ▶ Get structure functions \rightarrow intermittency: how does turbulence (and turbulent heating) fill the corona, the loops (strands)...?



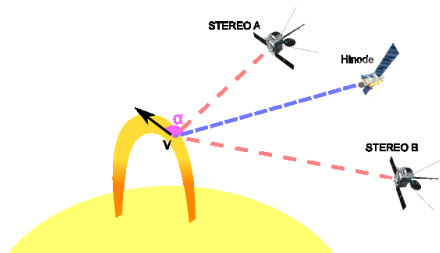
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Data needed:

- ▶ intensity and velocity fields in different lines (XRT+EIS)
- ▶ extrapolated magnetic field and 3D loop geometry would be useful (SOT+SECCHI/STEREO)

