

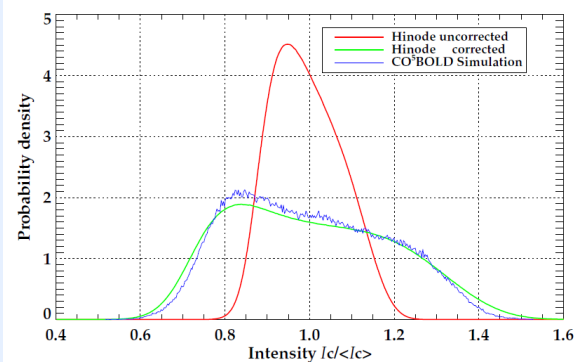
3D Views on Cool Stellar Atmospheres

Theory meets observation

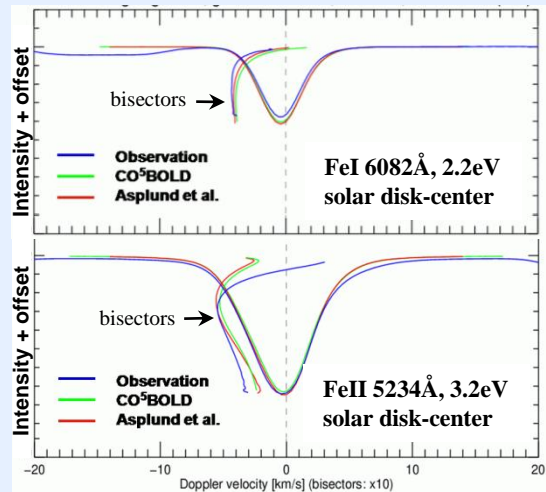


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3D time-dependent radiation-magneto-hydrodynamics simulations constitute a rapidly evolving branch in the field of modeling cool stellar atmospheres. Observations of high fidelity and resolution have posed new challenges to our understanding of solar-type stellar atmospheres. Clearly, the full information content of high-resolution stellar spectra can only be exploited with a refined understanding of the physical processes shaping stellar atmospheres and their spectral lines. The Japanese HINODE satellite provides us with a fresh, panchromatic view of the solar atmosphere at high spatial resolution. This allows to study dynamical phenomena like magneto-hydrodynamic waves considered to be the dominant heating agent of stellar chromospheres and coronae.

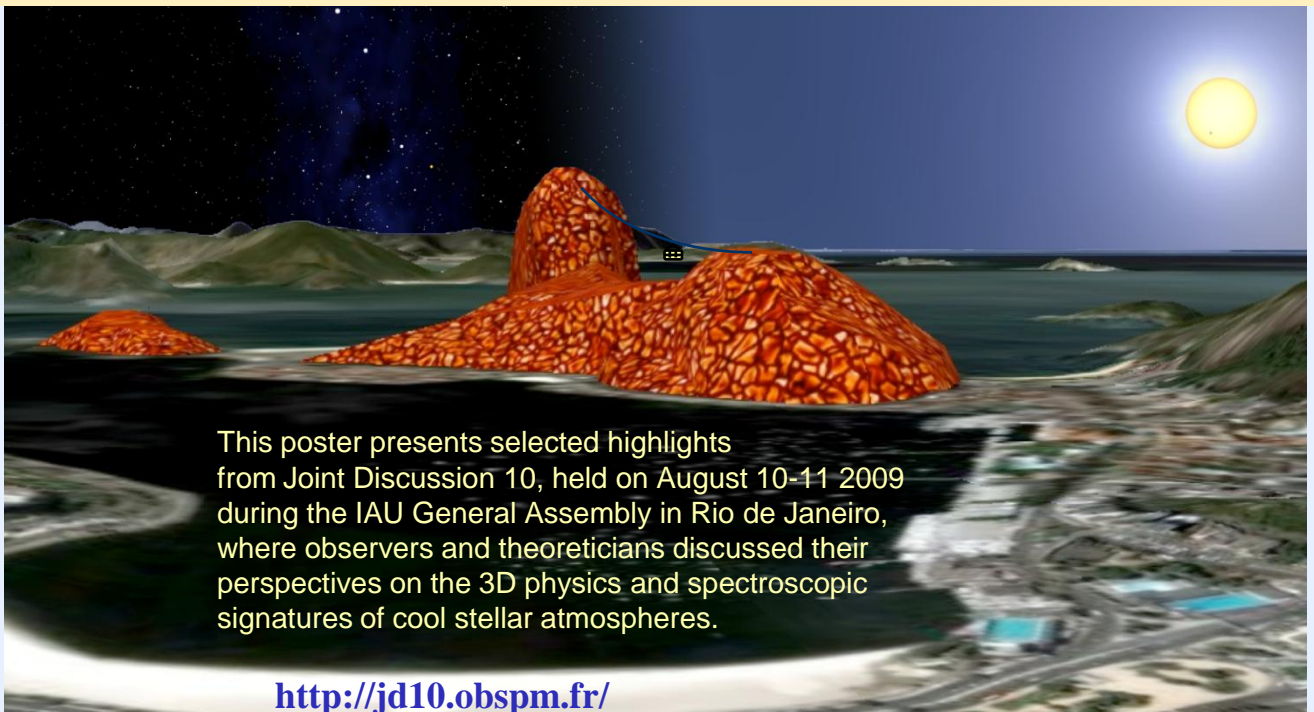


Intensity distribution of the solar granulation as observed by Hinode, compared with the results of a high-resolution CO5BOLD numerical simulation.



Comparison of observed and theoretical line profiles predicted by two independent 3D solar models. Agreement with observed line shift and asymmetry is excellent.

Testing the present generation of 3D models against observational constraints is vital since it serves to identify necessary steps for their future development. The validation process relates to both "classical" atmospheric properties like stellar limb-darkening, and to specifically multi-D properties like the intensity distribution of the solar granulation, and the detailed shape of spectral lines.



This poster presents selected highlights from Joint Discussion 10, held on August 10-11 2009 during the IAU General Assembly in Rio de Janeiro, where observers and theoreticians discussed their perspectives on the 3D physics and spectroscopic signatures of cool stellar atmospheres.