Group #1

Analysis of Lyman lines profiles in prominences as diagnostics of the existence of PCTR.

Schmieder B., Vial J.C., Heinzel P.

After few campaigns coordinated observations with SOHO (SUMER and CDS) and GBOs, we are able to show a large variety of profiles.
With a non LTE approach, it is possible to diagnose the existence of a PCTR, the inclination of the filament towards the line-of-sight and its temperature gradient.

Theoretical Lines Profiles of Metallic Elements with Macroscopic Velocities

D. Cirigliano, A. Costa and M. Rovira.

The purpose on this work is to establish -with the modeling of line profiles of different species- patrons of observational comparison which allow us to characterize the physical phenomena that is present in

the observed structures.
For this, we resolve the ionization equations for an atom and an

atmosphere of determinate parameters. From this point we define the populations for the different states of ionization. Considering several configuration of flux mass, we deduce the optical depth, the source function and the line profiles of C II, CIV and O IV for inflow, outflow

and passing flows.
The line profile's shape and relative intensities between different fluxes and the Doppler shift give us a theoretical characterization of the studied lines in order to compare them with the observations.

Different Models of Solar Prominences

D. Cirigliano, M. Rovira and P. Mauas.

We present He I, Ca II and Mg II lines profiles computed by a numerical code which gives the populations of the energy levels of the helium atom by solving simultaneously the radiative transfer and statistical equilibrium equations, for different models of solar prominences. The atmosphere models used as input for the calculations of

the line profiles were computed self-consistently by solving the radiative
transfer, statistical equilibrium and energy equations for the hydrogen atom.
The computed profiles are compared with observations in order to

constrain the physical conditions of the prominence material. We also study the parameters that give structure to the prominence models and their influence on the shape of the line profile.

FULL STOKES SPECTROPOLARIMETRY OF PROMINENCES WITH THEMIS

F. PALETOU & M. SEMEL

The solar telescope THEMIS (http://www.obs-nice.fr/themis) allow for full stokes spectropolarimetry in several spectral domains simultaneously. In June 2000, we have observed several prominences in both the He\,{\sc i} D$_3$ and Halpha of H\,{\sc i} domains. We shall describe the instrument and finally, present our current analysis of these new data.

JOINT EUV/RADIO OBSERVATIONS OF A FILAMENT

(F. CHIUDERI DRAGO, C.E ALISSANDRAKIS, T. BASTIAN, K. BOCCHIALINI and R. HARRISON)

Simultaneous EUV and microwave observations of a filament on the disk are compared. The EUV line intensities were observed by the CDS and SUMER instruments on board SOHO and the radio data by the Very Large Array and the Nobeyama Radioheliograph. The main results of this study are the following:

The Lyman continuum absorption is responsible for the lower intensity observed above the filament in the EUV lines formed in the transition region (TR) at short wavelengths. In the TR lines at long wavelengths (above 1000 Angstrom) the filament is not visible.
This indicates that the proper emission of the TR at the filament top is negligible.

The lower intensity of coronal lines and at radio-wavelengths is due to the lack of coronal emission: the radio data supply the height of the prominence, while EUV coronal lines supply the missing hot matter emission measure.

Our observations support a prominence model of cool threads embedded in the hot coronal plasma, with a sheath-like TR around them. From the missing EM we deduce the sheat thickness and from the neutral hydrogen column density, derived from the Lyman continuum absorption, we estimate the hydrogen density in the cool threads.
In this latter calculation also the HeI ionization absorption was taken into account for lines at wavelengths below 504 Angstrom.

Plasma diagnostics of quiescent solar prominences, observed by SUMER and CDS on board SOHO

M. S. Madjarska, J. G. Doyle, K. Bocchialini and J.-C. Vial

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SUMER data reduction and prominence material identification during temporal series of observations in optically thin lines are discussed. Particular attention is given to the blending of second order O III to the lines belonging to the O IV multiplet. Results are given for both Doppler velocities and electron density in the prominence coronal-transition region interface.

EUV LINE EMISSION DURING THE DYNAMIC FORMATION OF PROMINENCE CONDENSATIONS

D. SPADARO, A.F. LANZA, A.C. LANZAFAME, S.K. ANTIOCHOS, M.G. O'MULLANE

This contribution is a short summary of a paper recently accepted for publication
in The Astrophysical Journal.
We calculated the emission expected in EUV transition region lines during the process of dynamic formation of prominence condensations in coronal loops, as predicetd by the thermal non-equilibrium model proposed by Antiochos et al.
We present and discuss the principal characteristics of the line intensities and profiles synthesized from the hydrodynamic model at different times during the loop evolution.

Group #2

Physical conditions of a filament in its preeruptive phase

Schmieder B., Delannee C., Vial J.C., Madjarska M.

During a Campaign of observations we have
follow the evolution of an eruptive filament during few hours
before the CME in Halpha, in Lyman lines (SUMER) and with EIT, CDS and LASCO.
We obtain quantitative results on the Doppler velocity of the filament
on the twist and on its microturbulence .

On the Accuracy of Doppler shifts determined from H-alpha filter observations of filaments.

Wiik, J.E., Engvold, O., and Zirker, J.B.

How accurately can we measure the H alpha line shift of filaments
using narrow-band filtergrams?
In our data, the filter band-width, as well as the wavelength
location in the H-alpha line wings (0, +/-0.3A) may critically
influence the determination of the Doppler shifts of the filament
absorption. We use nearly simultaneous, high-resolution
spectrographic observations to simulate observations
through a narrow-band filter in H-alpha. The results indicate
possibilities and limitations.

Preliminary results from studies of large-scale flows in dark filaments

Engvold, O., Wiik, J.E., Yong Lin, Zirker, J.B., and Martin, S.F.

A large number of dark filaments were observed with the UBF at the
Richard Dunn Solar Tower in May this year. In addition, we
observed a large polar crown filament on 19 June, 1998 with the
Swedish Vacuum Solar Tower at La Palma. The combined use of Doppler
shifts to measure the line-of-sight velocity, and local correlation
tracking for the transverse velocity component will be discussed.

Large-scale streaming of mass along thin channels is commonly seen in these data. Also, the flows are often oppositely directed in adjacent flow channels, i.e counterstreaming, is frequently noticed.

Motions of EUV blobs in prominences.

T.A. Kucera, S.K. Antiochos, J. Karpen, G. Aulanier

We study velocities and trajectories of blobs visible in emission from He I and O V lines observed by SOHO/CDS with the aim of comparing these results to prominence models, in particular the siphon flow condensation models of Antiochos et al. The data used are produced by CDS using the wide slit, allowing us to obtain 50x240" movies with 25 s cadence at the expense of spectral resolution. With the wide slit we can successfully observe in He I at 584 A, O V at 630 A ,and Mg IX 368 A. The He I and O V bands show substantial motion in prominence structures.

Group #3

Comparison of Theory and Observations of the Chirality of Filaments.

D.H. Mackay, V. Gaizauskas and A.A. van Ballegooijen

We investigate the origin of the hemispheric pattern of filaments and filament channels by comparing theoretical predictions with observations of the chirality of filament channels within a dispersing activity complex. Our aim is to determine how the chirality of each specific channel arises so that general principles underlying the hemispheric pattern can be recognized. We simulate the field lines representing the filaments in an activity complex by applying a model of global flux transport to an initial magnetic configuration. The model combines the surface effects of differential rotation, meridional flows and supergranular diffusion along with a magneto-frictional relaxation method in the overlying corona. The simulations are run with and without injecting axial magnetic fields at polarity inversion lines over 4 rotations.

When the initial magnetic configuration, based on synoptic magnetic maps, is set to a potential field at the beginning of each rotation, the simulations poorly predict the chirality of the filament channels and filaments. Results improve when field-line connectivities at low latitudes are retained and allowed to propagate to higher latitudes without resetting the field to a potential configuration between each rotation. When axial flux emergence exceeding 1×10^{19}Mx/day is included at the location of each filament, an excellent agreement is obtained

between the
theory and observations. As well as predicting the correct chirality in all
cases, axial flux emergence allows more readily the production of inverse
polarity dipped field lines needed to support filamentary mass. An origin for
the hemispheric pattern as a result of the combined effects of flux transport,
axial flux emergence and magnetic helicity is then discussed.

Evolution of a Density Enhancement in a Stratified Atmosphere with Uniform Magnetic Field

Klaus Galsgaard

In this paper the evolution of a density enhancement under the effect of

gravity in a stratified atmosphere is considered in a 2D simulation. The

stratified atmosphere is chosen with a high density photosphere, transition
region and low density corona where the enhancement is added in
non-equilibrium to the corona. The atmosphere is also threaded with an
initially uniform vertical magnetic field. If
sufficiently strong, the magnetic field plays an important role in the
evolution of the density enhancement as it tries to gain equilibrium. It

not
only enables the density enhancement to maintain its shape as it falls, but if
strong enough results in the density enhancement rebounding a number of times.
Therefore both upward and downward velocities of the enhancement are
obtained. In all cases the density enhancement is found to fall with speeds
much less than the free fall speed and can remain in the corona at least

11
times longer than a free-fall particle. The relevance of the simulations

to
the solar atmosphere is then discussed.

OSCILLATORY PHENOMENA AND BRIGHTNESS EFFECTS IN QUIESCENT PROMINENCES

M. Tz. Detchev1, V. N. Dermendjiev1, B. Rompolt2

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Plasma flows are observed in essentially all parts of the solar atmosphere where there
are structured magnetic fields. As a rule, the velocities of these flows are different inside and

outside the magnetic structures, i.e. there are always shear flows along their magnetic flux tubes. Some plasma - magnetic field structures, like quiescent prominences, demonstrate large variety of global motions and oscillations. It is quite possible that oscillations - shear flows interactions in such structures give rise to generation of negative energy wave.

In this work we study the necessary conditions in oscillating arch-shaped quiescent prominence structure for appearance of negative energy waves. We show that such waves may play an important role in the energy balance of some parts of the prominence leading to observable brightness changes.

Group #4

"ESCAPING PROMINENCES (EPs): HOW THE PLASMA GOT HEATED ??"

by: Frederic Auchere (FA), Frederic Baudin (FB), Jean-Pierre Delaboudiniere (JPD), Boris Filippov (BF), Leon Golub (LG), Serge Koutchmy (SK) and Michael Molodensky (MM)

Preliminary notes:

1- There is an obvious connection between EPs and CMEs that we do NOT consider here;
2- We do NOT as well look for the origin of the dynamical phenomenon nor consider the driving forces; EPs were studied before as a part of the more complex "Disparitions Brusques" (DBs) seen in H-alpha;
3- We define an EP as a structure imbedded inside the corona but obviously reminiscent of a filament eruption (FE) and rapidly travelling "through" the corona AND emitting in the usual coronal lines like FeXII at 19.5 nm;
4- We drop the usual assumption of active region filament being simultaneously ejected and heated by the same mechanism which produces the flare, when a flare is observed. /FE-EP have nothing to do with post flare loops. A EP can be observed without having a flare and in case we have a flare the FE can occur well before in time and anyway, becomes an EP well far away from the site of the FE.../

ABSTRACT (Preliminary):

New aspects of the DB phenomenon were recently discovered, thanks to coronal time sequences collected using imaging techniques:

i/ near 19.5 nm of FeXII with EIT(SoHO) at low cadence but large fov and TRACE, at high cadence and HR [JPD; FA; LG]
ii/ in W-L with the Lasco(SoHO) coronagraphs, at very larger fov [SK];
iii/ in the Radio range of cm and dm waves (Nobeyama; ...) with lower resolution.

The more classical observations taken in Halpha should also be considered especially when Doppler effect can be measured at high cadence [FB, SK]. This whole set of observations permits to define what we now call here FE-EP.

* FE are seen with EIT & TRACE due to the absorption of the background 19.5 nm corona by the relatively cool neutral hydrogen and possibly, the HeI and HeII atoms. A more quantitative evaluation of these observations is needed.
* EP are seen suddenly in emission when moving rapidly, as a continuation of the motion of the filament, on the same filtergrams and further away, on W-L Lasco images at r > 2.5 R. In W-L, it is sometimes difficult to distinguish a cooling down EP from the definitely escaping material which is a part of the CME.
In Halpha we probably see only FE. EP got "thermalised" during the travelling through the corona at r >= 3R, but it seems that a threshold of velocity or acceleration should be reached to make the mechanism efficient.

* We would like to discuss at least 5-6 cases, taken in Aug. 3, 1996, Aug. 11, 1999, June 6, 2000, July 14, 2000, February 27, 2000, etc.
which correspond to very different levels of activity (without and with a big flare; in high and in low latitudes) to demonstrate that the rate of heating of the plasma inside the threads of the filament seems directly related to its proper motion or "velocity". No obvious "reconnections" with the surrounding coronal field (structure) seems to appear during the heating phase which is short and occuring on a part of the corona where the surrounding magnetic field is getting weak. Indeed some destreching of elements of the helical structure of the filament is observed.

* This apparent relationship heating/motion permitting the plasma to suddenly reach the coronal temperature through the TR barrier does not support the classical heating mechanism by electron conduction from the hot surrounding coronal plasma.
It rather supports a heating mechanism by Joule dissipation of locally induced currents greatly magnified by the fast motion (and acceleration). This naive statement needs to be substantiated using a discussion we would like to have on the interpretation of the rescaling of helicity and also the consequences of the changes of the magnetic fields around.

* It is also suggesting that the same basic mechanisms could explain the radiative losses of more massive and
quiet filaments under the action of much smaller scales but permanent motions inside (including oscillatory motions). The right diagnostic is still missing making this last sentence more speculative but more like a prediction.

Misc

FULL-STOKES SPECTROPOLARIMETRY OF SOLAR PROMINENCES AT THEMIS

Frederic PALETOU, Arturo LOPEZ ARISTE, Veronique BOMMIER & Meir SEMEL