Dario Del Moro, Ph.D.
Born in Rome, Italy, on August 23rd, 1975
Assistant Professor at the Physics Department of the Rome "Tor Vergata" University

Current address: via della Ricerca Scientifica,1 I-00133 Rome, Italy
E-mail: dario.delmoro@roma2.infn.it

Education and Professional experiences:
2001: Physics Degree
2003: CNR Scholarship: "Computational methods for solar photospheric structures characterization".
2004: Research Grant: "Study of convective structures observed on the solar surface".
2005: Ph.D. in Astronomy

Language Skills*:*
Italian: native
English: fluent in speech, writing and reading
Spanish: fluent in speech, writing and reading

Principal Fields of Scientific Interest:

- Dynamics of the low solar atmosphere (photosphere and chromosphere)
- Organization of plasma and magnetic field structures in the solar photosphere
- Techniques for post-facto restoring, compression and processing of astronomical images
- Adaptive Optics systems

Dynamics of the low solar atmosphere:
The dynamics of the solar surface and the interaction with the magnetic structures control the external structure of the solar atmosphere, and more generally the entire heliosphere. The solar magnetic fields are produced and often organized by the motions of the solar plasma. Such movements organize the topology of the field from the photospheric to the coronal layers determining many of the physical properties of the solar atmosphere. In this context, I am involved in the analysis of the structures associated with convective motion of plasma and I have actively participated in important projects such as the European Solar Telescope (EST) project within the FP7, the Italian satellite ADAHELI, selected and funded by ASI for a feasibility study, and several PRIN projects financed by MIUR and INAF. As ADAHELI Associated Scientist, I have been also involved in the scientific definition of the mission and contributed both to the design of Ground Segment and to the definition of observation strategies.

Organization of plasma and magnetic field structures in the solar photosphere:
The distribution and organization of the solar magnetic field, together with its temporal variation, are responsible for the variability of radiation and particle emission of the Sun. In particular, the solar radiative variability reflects the spatial distribution and size of the magnetic structures on the solar disk, while the outflow of plasma (solar wind and coronal mass ejection) reflects the reconfiguration of the magnetic field, whose structure is intimately connected to the boundary conditions imposed by the photospheric field and its dynamics. In this area, I have developed simplified numerical models able to mimic the evolution of the solar surface magnetic field, and also analysed several dataset of both quiet and active regions of the sun acquired at the Dunn Solar Telescope/NSO (NM, USA) with the panoramic interferometer IBIS. In particular, I am leading a joint study on the emergence of magnetic flux on the solar surface in the form of coherent structures passively transported by the plasma.

Techniques for restoring post-facto, compression and processing of astronomical images:
The Earth atmospheric turbulence degrades the spatial resolution of images acquired by telescopes. I am interested in the study and application of strategies to reduce such effect, both in real-time and in post-facto processing. In particular, for the part of post-acquisition restoring, I have included the MFBD (Multi-Frame Blind Deconvolution) algorithm in the IBIS data calibration pipeline. This new pipeline has been shared with the Italian community of IBIS users. Also, in order to estimate the compression efficiency in the case of solar

images, I have participated in a study of the propagation of compression artefacts in the data reduction pipeline and in MFBD restoration process.

Adaptive Optics systems:
As part of the EST project financed by EU-FP7, I was involved in the wavefront reconstruction from the information acquired by Shack-Hartmann-type sensors. Also, I estimated the performance of the multi-conjugate adaptive optics system designed for the telescope using the LOST simulation package. At present, I am working on the implementation of a hardware turbulence simulation to study innovative algorithms to correct the wavefront. Such system will be also used to measure the aberrations introduced by optical elements and for the calibration of a prototype Fabry-Perot interferometer currently under construction.

The scientific activity is testified by 83 entries in the SAO/NASA Astrophysics Data System (ADS), 28 entries referring to refereed publications in the ISI/SCOPUS database and by the numerous congress and meeting participations.

Affiliations and Committee Memberships:

- SAIt
- ESF Pool of Referees (Astrophysics: sun and planets)
- ASI-ADAHELI Associated Scientist
- EST *Science Core Team*
- Referee for Astrophysical Journal, Astronomy & Astrophysics, Computer Vision
- Astromundus Erasmus Mundus Masters Course Quality Committee