



Udaipur Solar Observatory Physical Research Laboratory Colloquium

Speaker: Dr. Alberto Sainz Dalda

Bay Area Environmental Research Institute, CA USA

Title: “ IRIS2: using representative profiles to invert IRIS Mg II h & kline ”

Time: Thursday, 31 October 2019, 16:00 hrs

Venue: USO Seminar Hall

Abstract

The thermodynamics of the solar chromosphere and the transition region (TR) is critical for understanding how the solar corona is energized from the photosphere. The most common method to recover the stratified information in the solar atmosphere is through 'inversion codes' which employ an iterative algorithm to solve the radiative transfer equation for a given model atmosphere by minimizing the difference between the observed and synthetic spectra. Since 2013, NASA's Interface Region Imaging Spectrograph (IRIS) has been providing unprecedented observations of the solar atmosphere from the upper photosphere to the corona, with special attention to the chromosphere and the TR. IRIS is equipped with both spectral and imaging capabilities in several wavelengths spanning the far- and the near-UV domain. In this talk, I will present inversions of the Mg II h&k lines observed by IRIS using the STiC inversion code which considers non-LTE, partial redistribution, and plane-parallel geometry. The results from this code, while being comprehensive of the thermodynamic conditions in the chromosphere, are unfortunately, computationally intensive and expensive. An alternative approach is using the concept of the Representative Model Atmosphere with the STiC inversion code, called IRIS2. The foundation of this novel code is based on easy-to-understand, easy-to-use, representative elements obtained with a basic machine learning technique, such as k-mean clustering. This allows us to obtain a depth-stratified model atmosphere from the upper photosphere to the chromosphere in a few CPU-minutes for any IRIS Mg II h&k data set. I will illustrate how the concepts behind this code can be applied to any spectro(polarimetric) data.

The Speaker

Dr. Alberto Sainz Dalda received his PhD in 2009 from the University of La Laguna Tenerife, Spain under the supervision of Dr. Valentin Martinez Pillet at the Instituto de Astrofisica de Canarias. His doctoral thesis dealt with plasma flows in sunspots and their association to moving magnetic features, and the contribution of magnetic flux decay of active regions to the global solar magnetic flux. During his thesis, he also served as the operator for the 90 cm French-Italian THEMIS telescope at Observatorio del Teide from 1999 to 2009. Following his PhD, he joined Stanford University and Lockheed Martin Solar and Astrophysics Laboratory as a Physical Sciences Research Associate, providing scientific support to NASA missions, namely, Hinode-SOT/SP and SDO/HMI. In 2015 he moved to the High Altitude Observatory as a Project Scientist and later returned to the Palo Alto area in 2017 as a Researcher at the Bay Area Environmental Research Institute. Dr. Sainz Dalda specializes in the thermodynamics and magnetic fields in the solar photosphere and chromosphere using spectro-polarimetry and inversion techniques with several scientific publications to his credit. He was a recipient of the RHG Exceptional Achievement Award for Science by NASA as a member of the SDO Team.

ALL ARE WELCOME

