



European Week of Astronomy and Space Science 3-6 April 2018- Liverpool

Instrumental Concepts for Broadband (FUV to visible) Spectropolarimetry from Space

📅 04.04.2018 ⌚ 12:00 - 12:30 📍 Hall 1A 🗨️ Plenary

Martin Pertenais¹, Coralie Neiner², Pascal Petit³

¹ German Aerospace Center (DLR e.V.)

² LESIA - Observatoire de Paris

³ IRAP - Obs. Midi-Pyrénées

A challenge for spectropolarimetry instrumentation is to combine spectroscopy, meaning per definition wavelength diversity, to polarimetry which is strongly wavelength dependent.

The spectral ranges required for the different scientific cases keep growing, and instrumental solutions need to be developed to be able to answer these expectations. In the stellar community, for example, the access to both UV and visible ranges simultaneously could open the door to unexplored data and allow us to better understand the different processes governing stellar formation, development and death. Indeed, the UV range provides precious information on the environment of stars, while the visible range looks into the surface of the star itself. The space mission Arago, was therefore proposed to ESA Cosmic Vision calls M4 and M5, and the POLLUX instrument is currently being studied for the LUVOIR NASA proposed flagship mission.

In this frame, two instrumental concepts of spectropolarimeters were developed and tested. On top of respecting the usual space specifications (limited volume and weight, and high robustness), they offer the unique capability of constant high polarimetric efficiency from far-UV (123 nm) to near-IR wavelengths.

The first concept is based -as classical polarimeters- on rotating waveplates, but the optimization of the design of the waveplates is not made on the retardance but on the polarimetric efficiency. This allows to create a constant polarimetric efficiency over a wide spectral range.

The second concept is even more innovative as it uses polarization scramblers (birefringent wedges) to spatially modulate the polarization state of the light. The main advantage of this concept is that it is completely static (moving parts are to be avoided in space if possible) and provides the full Stokes information of the full wanted spectrum in one single shot.

Both theoretical concepts and the corresponding prototyping activities will be presented during this talk.