Advancing high-precision spectropolarimetry with the installation of ZIMPOL at GREGOR: current status and future plans

Andrea Francesco Battaglia[1], Renzo Ramelli[1], Francesco Vitali[1], Franziska Zeuner[1], Daniel Gisler[1], Michele Bianda[1], and Svetlana Berdyugina[1]
[1] Istituto Ricerche Solari Aldo e Cele Daccò (IRSOL), Locarno, Switzerland

contact e-mail: *andrea.francesco.battaglia@irsol.usi.ch*

Solar spectropolarimetric observations play a crucial role in diagnosing magnetic fields throughout the solar atmosphere as well as detecting anisotropies in radiation fields and collisional processes. High sensitivity polarimetric observations enable the study of faint polarization signals, particularly those arising from scattering processes in both the quiet Sun and active regions, including flares. The Zurich Imaging Polarimeter (ZIMPOL) represents a state-of-the-art instrument that minimizes seeing-induced spurious effects, which usually limit polarimetric precision, through its fast modulation capabilities (up to 42 kHz). This design allows to achieve a precision of 10^{-5} in fractional polarization units.
Following the optical optimization of the GREGOR telescope in Tenerife, the aim is to investigate small-scale structures by studying solar magnetism through high-precision polarimetric observations using ZIMPOL at the largest European solar telescope. In addition, we aim to continue offering the ZIMPOL system to a broader community and implement a remote observing mode with ZIMPOL. Several observing campaigns have been carried out successfully, and more are planned, particularly in preparation for the installation of the ZIMPOL system at GREGOR, complementing existing instruments to explore the visible part of the solar spectrum. This poster presents the current status and future plans of the ZIMPOL at GREGOR project.