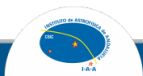# SPACE SOLAR PHYSICS: PHI for Solar Orbiter and IMaX and SP for Sunrise
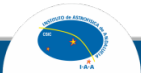
Solar Physics Group
(Director: Dr. David Orozco/ Tutor: Dr. Luís Bellot)

Antonio J. Dorantes Monteagudo

SOLARNET Summer School: A week above clouds
August 5-9, 2019

EXCELENCIA
SEVERO
OCHOA

- Study MgI b_2 (517 nm) line, a chromospheric line sensitive to magnetic fields.
  - Zeeman effect
  - Scattering polarization and Hanle effect

- Study MgI b_2 (517 nm) line, a chromospheric line sensitive to magnetic fields.
  - Zeeman effect
  - Scattering polarization and Hanle effect
- Inversion techniques for MgI b_2.
  - Weak Field Approximation

WFA

$$V = -k\lambda_0^2 g_{ef} B_l \frac{dI}{d\lambda} \quad : \quad k = 4.67 \cdot 10^{-13} \text{G}^{-1} \text{Å}^{-1}$$

EXCELENCIA
SEVERO
OCHOA

- Spectral synthesis using a 3D simulation of solar magnetoconvection (Khomenko et al. 2018b) with RH code (Rybicki & Hummer, 1991-1992).
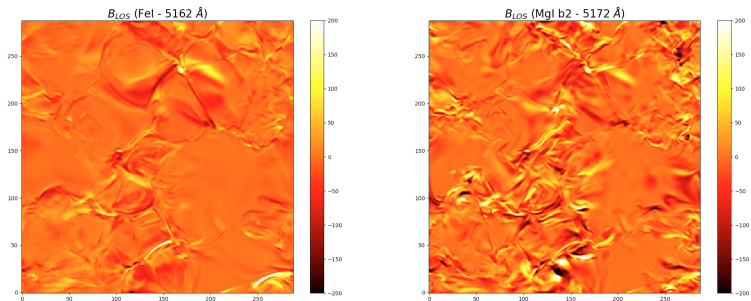- WFA and longitudinal Magnetic Field (B_{LOS}).

Figure: Computed longitudinal magnetic field considering Weak Field Approximation with the spectral synthesis obtained from Khomenko et al. 2018 simulation

- Study MgI b_2 (517 nm) line, a chromospheric line sensitive to magnetic fields.
  - Zeeman effect
  - Scattering polarization and Hanle effect
- Inversion techniques for MgI b_2.
  - Weak Field Approximation
  - Milne-Eddington Atmospheres with gradients of the Source Function

ME + exponential

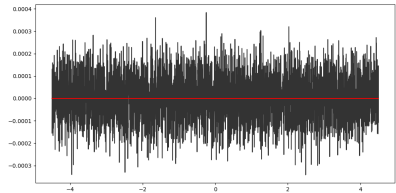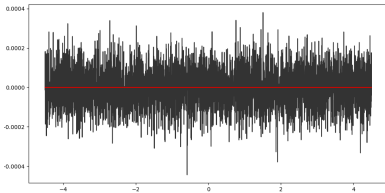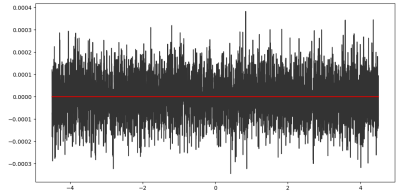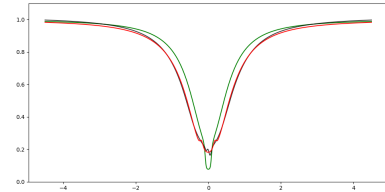$$S(\tau) = a + b\tau + \sum_{i=1}^{N} A_i e^{\epsilon_i \tau}$$

Figure: Inverted results from a ME model with exponential variations of the source function according to a MgI b_2 simulation, considering no magnetic field (noise in Stokes Q, U and V). From left to right and up to bottom: Stokes I, Q, U, V. Initial values: green line. Fitted values: red line. Synthetic data: black line.
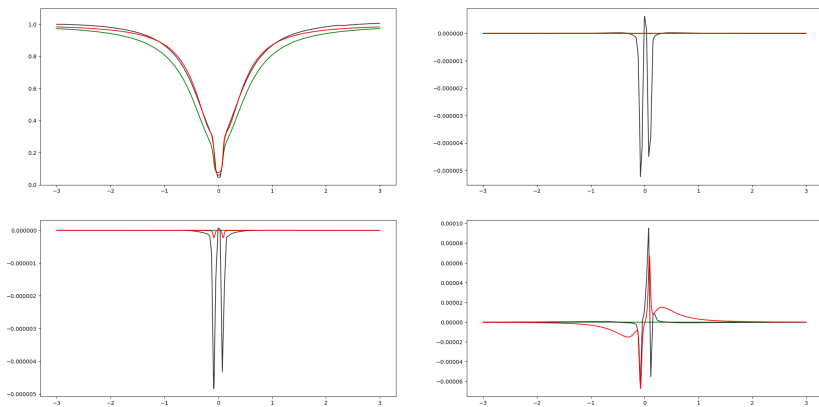
Figure: Inverted results from a ME model with exponential variations of the source function according to a MgI b_2 simulation (average spectral data). From left to right and up to bottom: Stokes I, Q, U, V. Initial values: green line. Fitted values: red line. Synthetic data: black line.