TIP II + He 10830: Diagnosing the High Chromosphere

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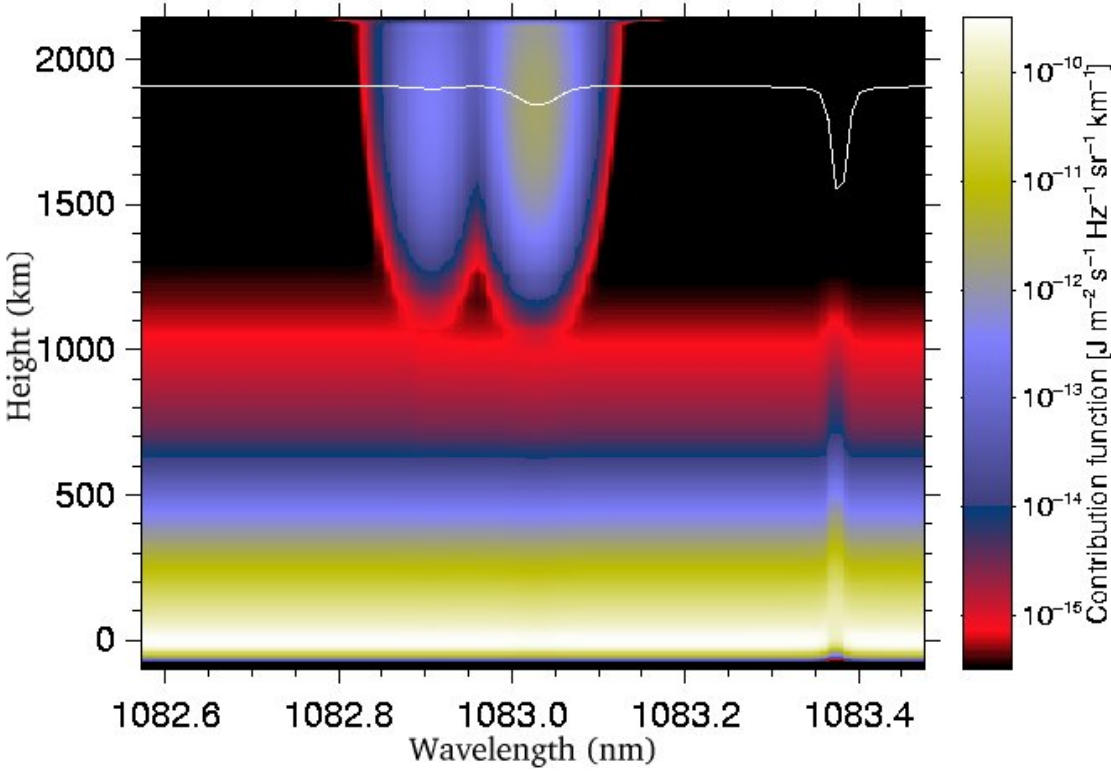
Outline

1. He 10830
2. Wave Propagation in Sunspot Umbrae
3. Active Region Filaments
4. Solar Spicules

About He 10830

- Formation occurs in the high chromosphere (Avrett et al. 1996)
- Good indicator of active regions on the disk
- Photospheric nearby line (Si I 10827.09 Å)



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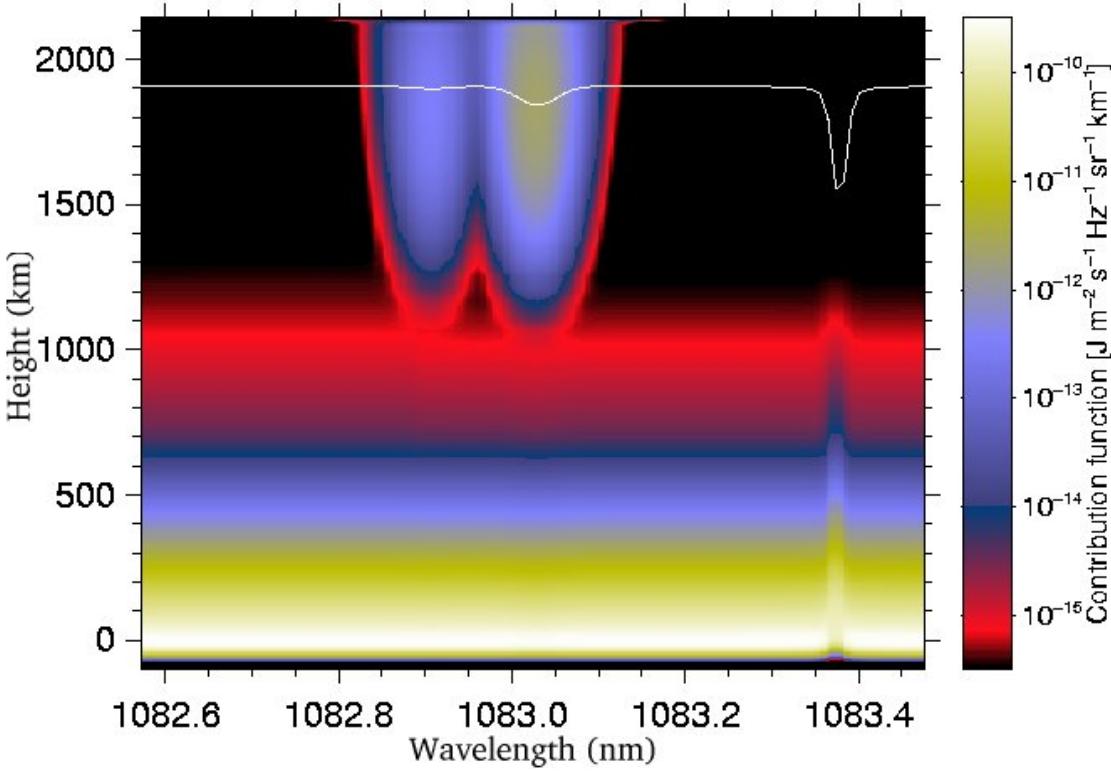

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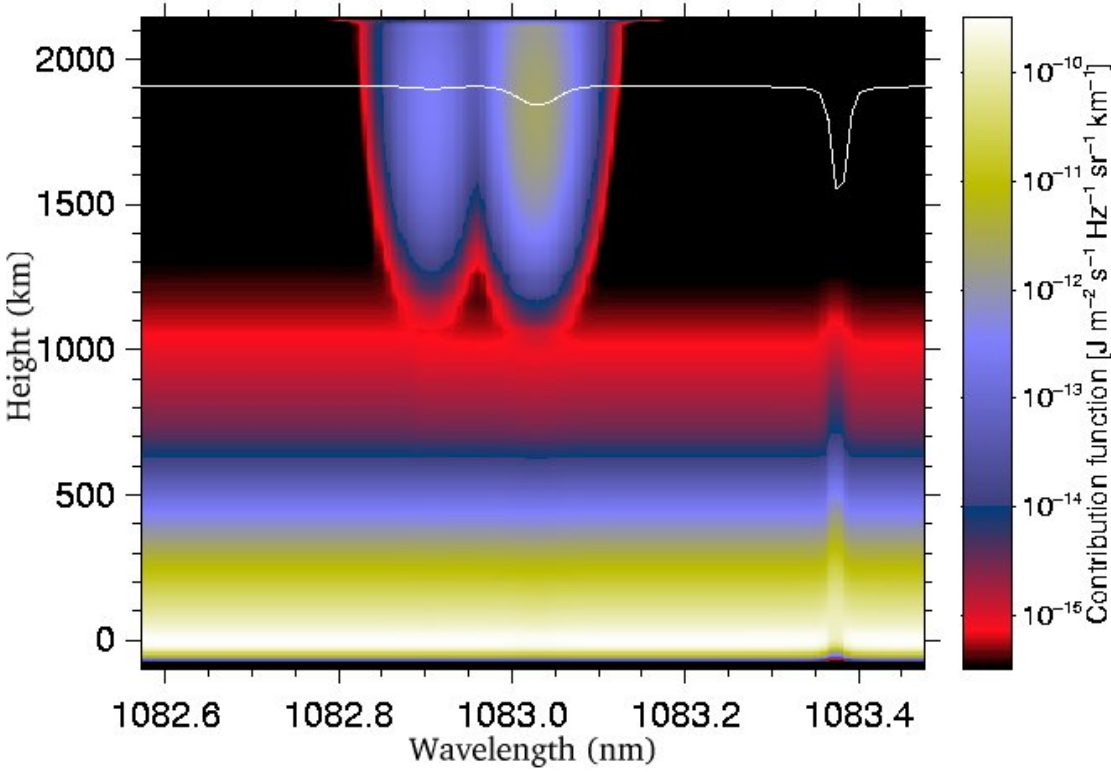


He 10830: Observations with TIP

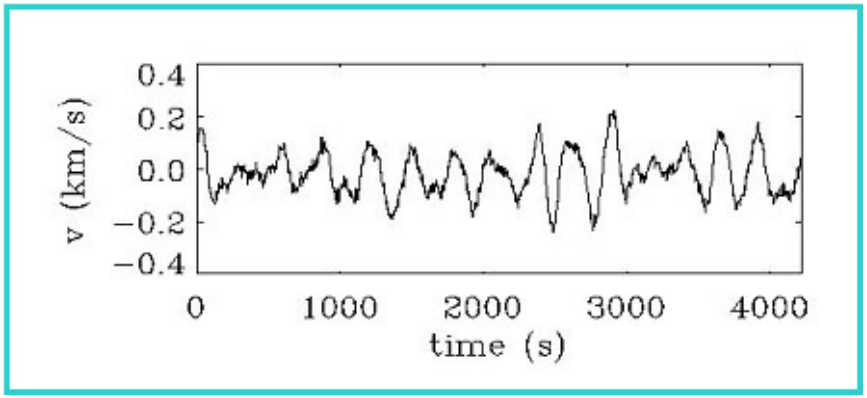
Tenerife Infrared Polarimeter (TIP, Martínez-Pillet et al. 1999)

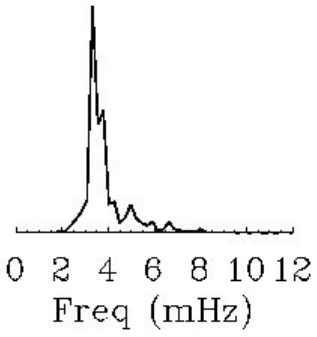
- TIP I and II: 1 - 2 microns
- Simultaneous measurements of I, Q, U and V(λ, x)
- Allows for high spatial, spectral and temporal sampling
- Can work simultaneously with POLIS (Fe I 630nm + Ca II H 396.7nm) and KAOS (AO system)
- TIP II will be working with VTT until GREGOR starts operating

Wave Propagation: Velocity Oscillations

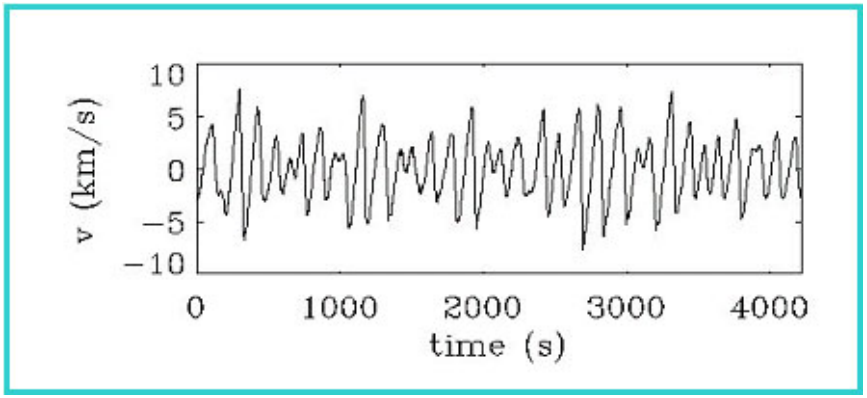
Helium Stokes V movie

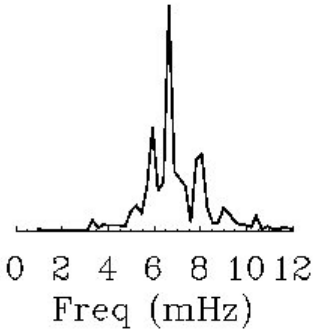
photosphere (Silicon)





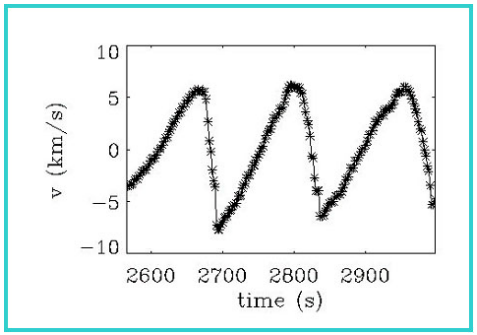
chromosphere (Helium)



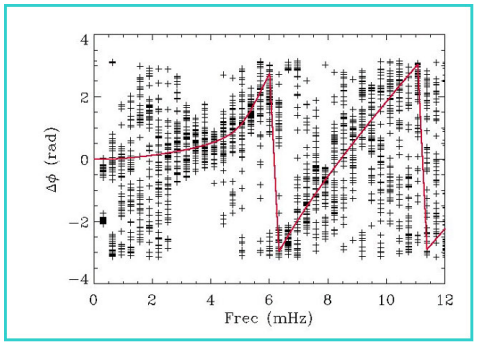


Wave Propagation

Umbral chromosphere: shock wave trains (heat dissipation?)

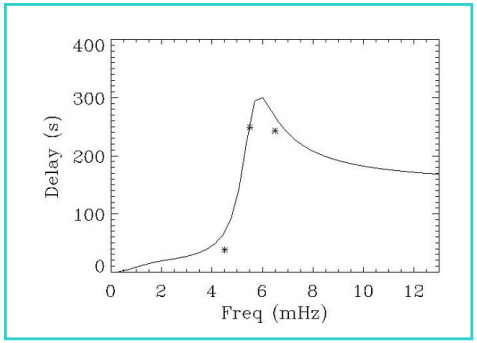


Phase delay between chromospheric and photospheric signals: theoretical modeling (atmospheric cutoff ∼4 mHz)



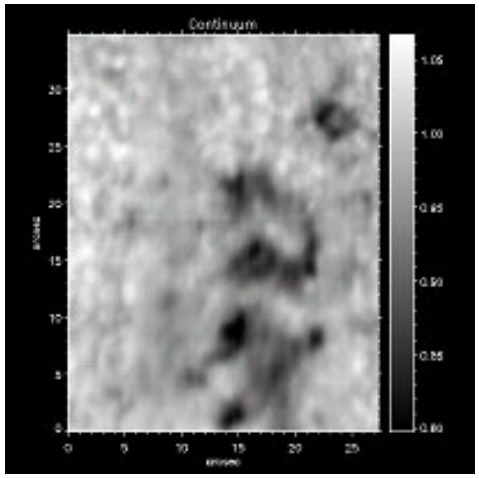
Theoretical and measured time delays agree

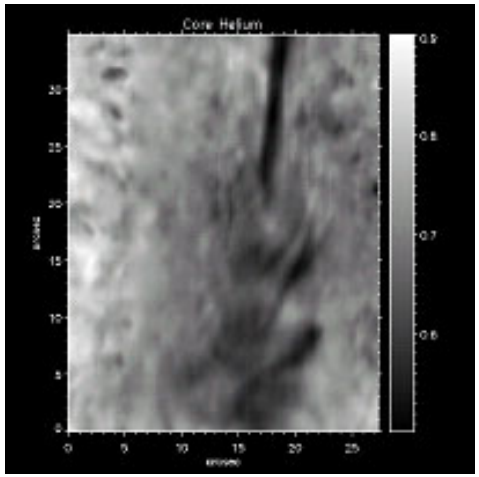
(Centeno et al. 2006, ApJ)



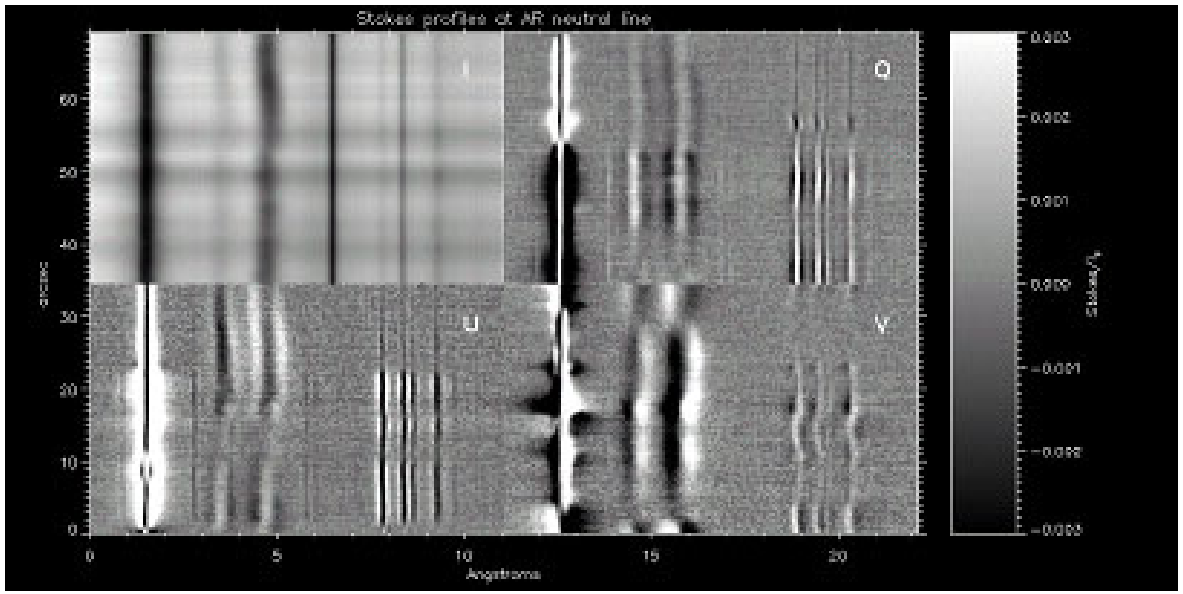
Active Region Filaments: neutral line

(Martínez Pillet et al; SPW4, Boulder, Sep. 2005)



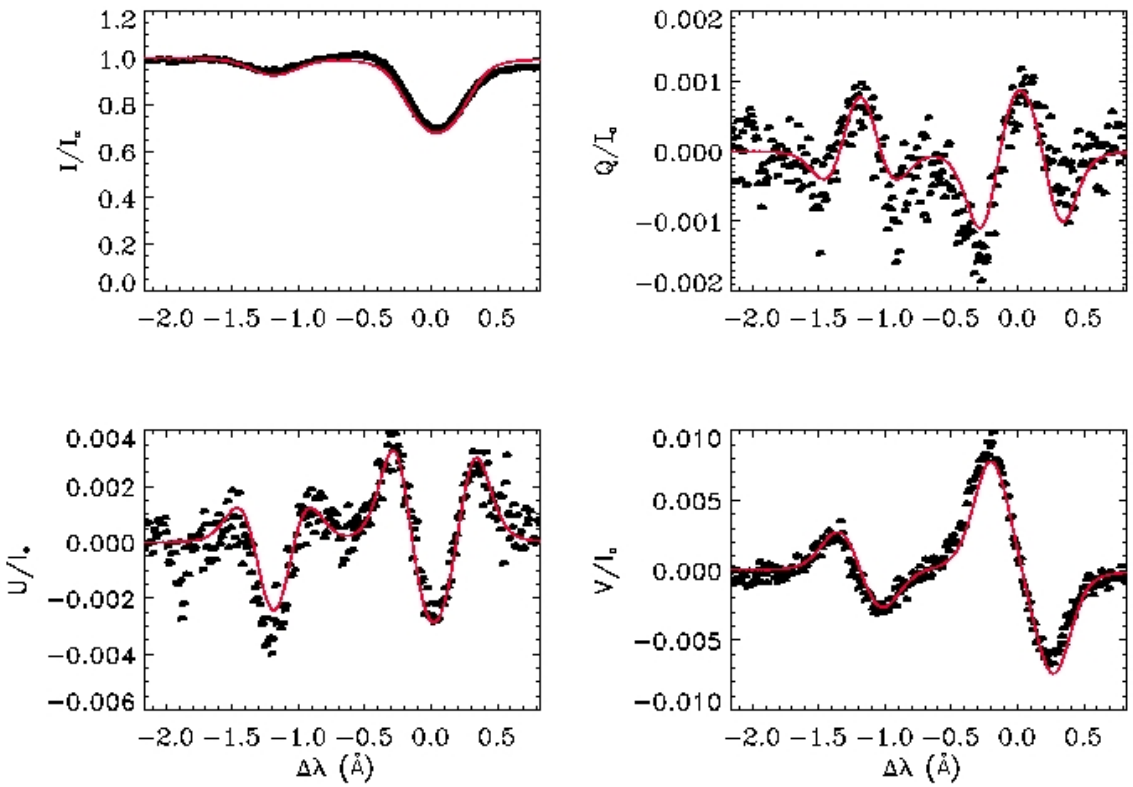


Profiles dominated by Zeeman



Active Region Filaments: ME Inversions

Large magnetic fields! (B ∼600 Gauss; underestimated by Zeeman)
Large inclinations (horizontal fields)

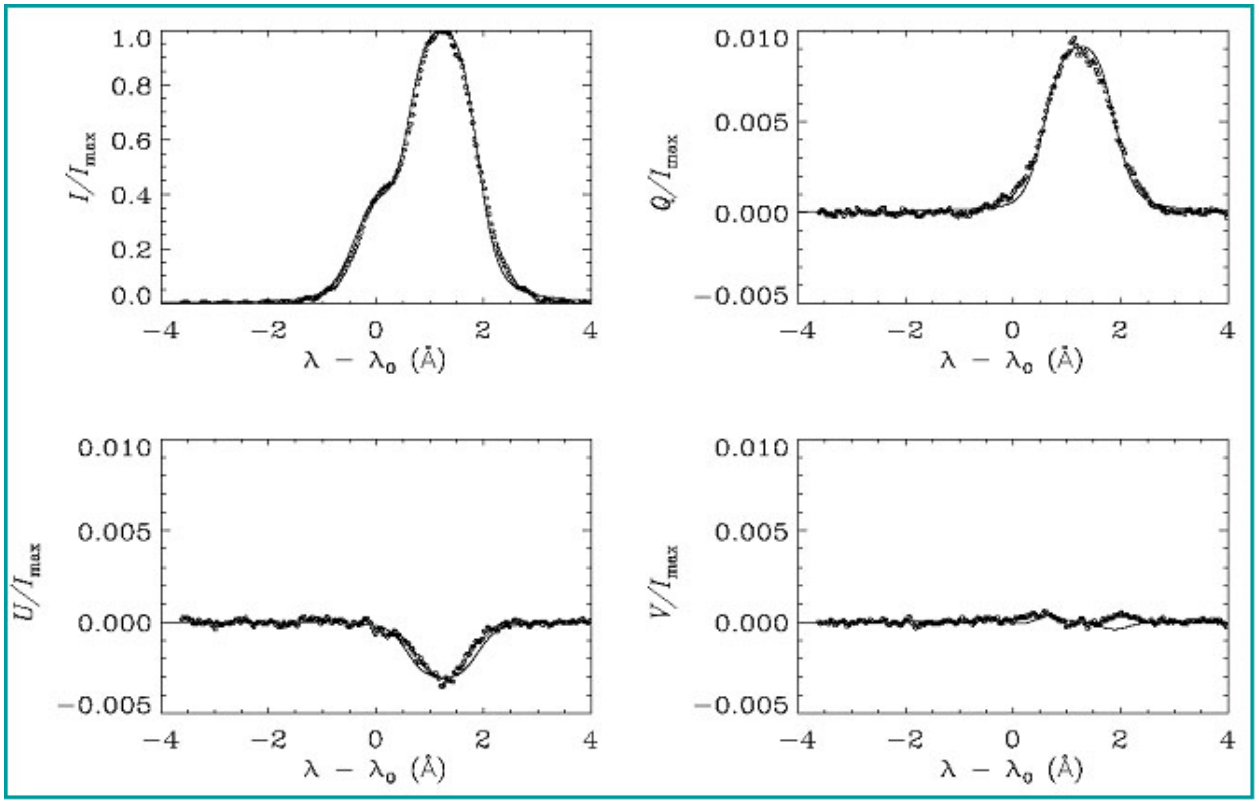


Spicules: Hanle and Zeeman Effects

QUIET SUN SPICULES (Trujillo Bueno et al. 2005; ApJ Letters)

Hanle effect: rotation of the direction of polarization plane of the scattered light

RT modeling with Hanle + Zeeman effects gives:
B = 10G
Inclination = 37°



Thanks!!