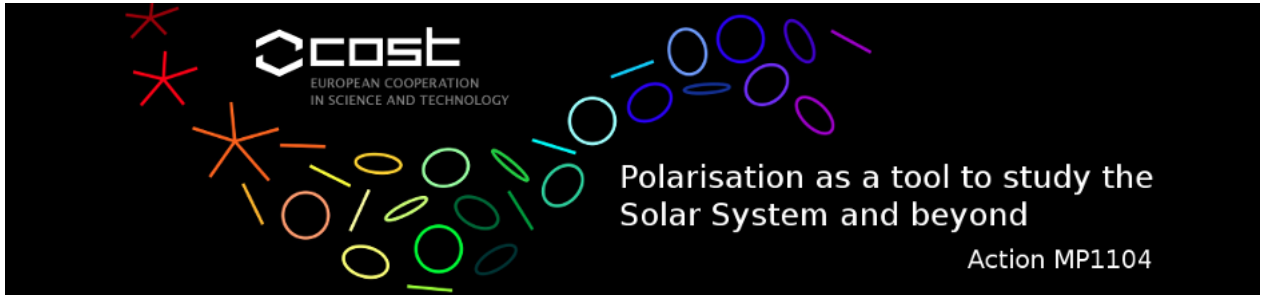


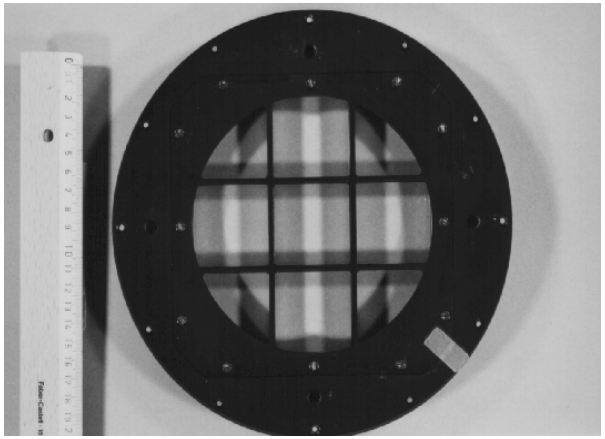
Polarimetry with FORS

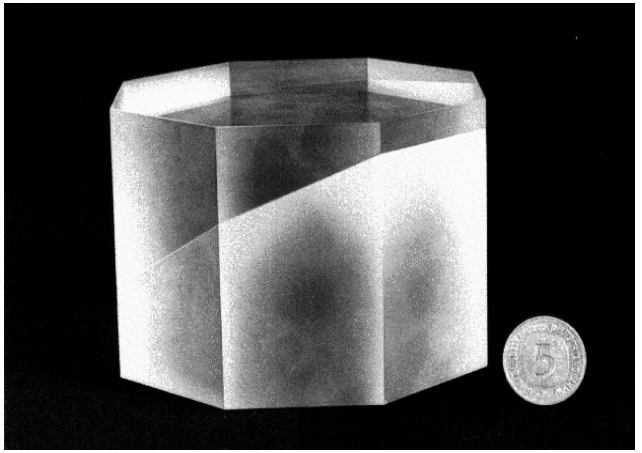
Stefano Bagnulo

Armagh Observatory, UK

FORS @ ESO VLT

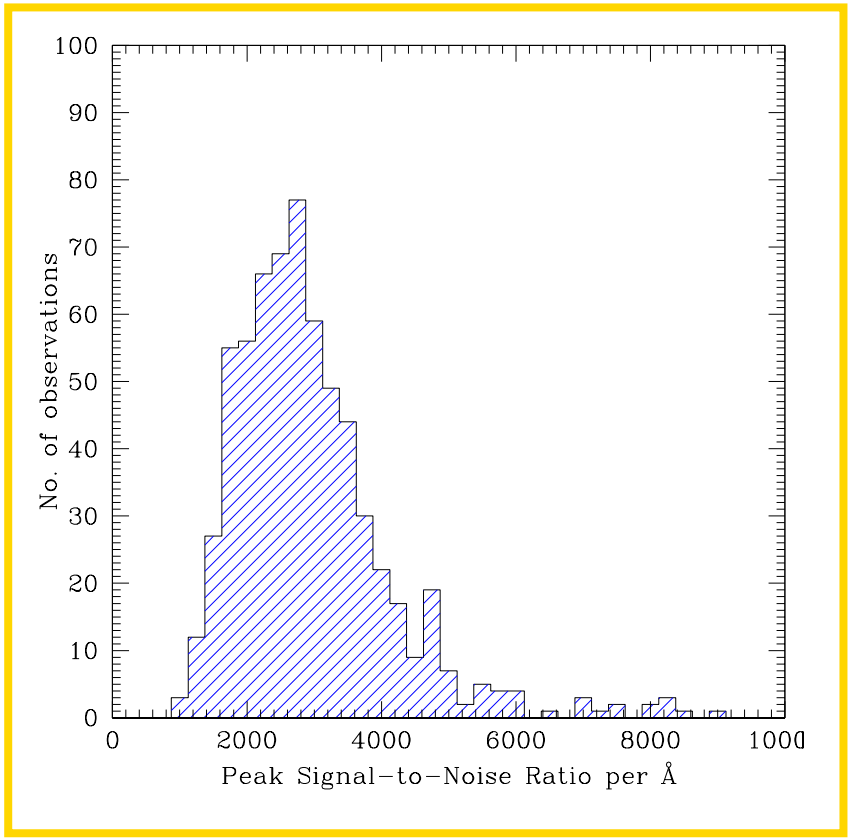
Polarimetric optics



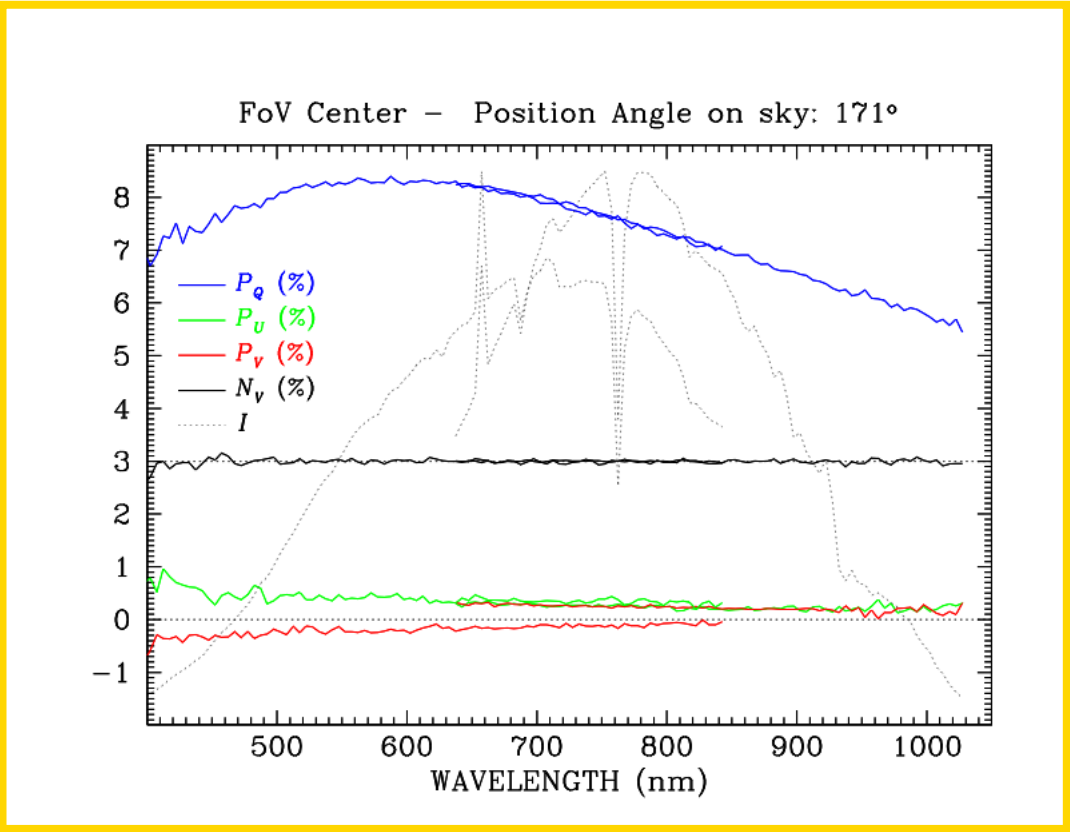


Retarder waveplate + Wollaston prism

FORS1 PMOS archive data



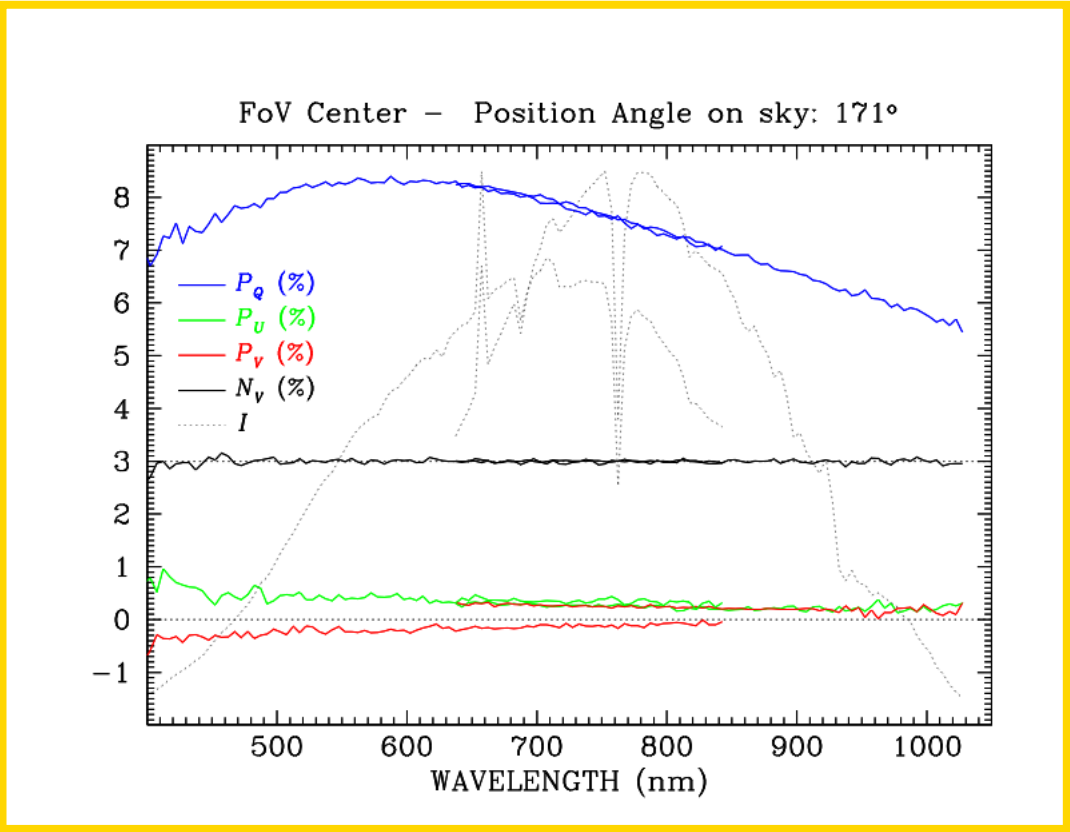
X-talk from lin. to circ. polarisation



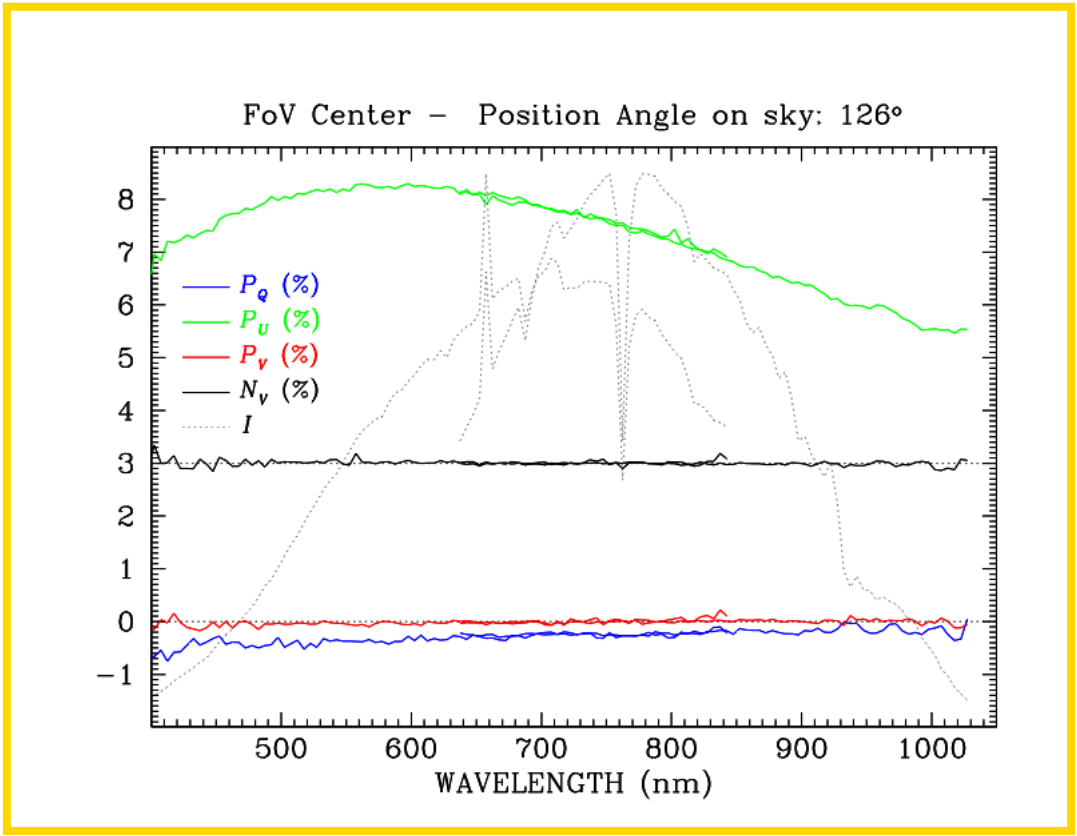
INSTRUMENT ROTATES BY 45º

$$P_Q \rightarrow -P_U$$
$$P_U \rightarrow +P_Q$$
$$P_V \rightarrow +P_V$$

X-talk from lin. to circ. polarisation



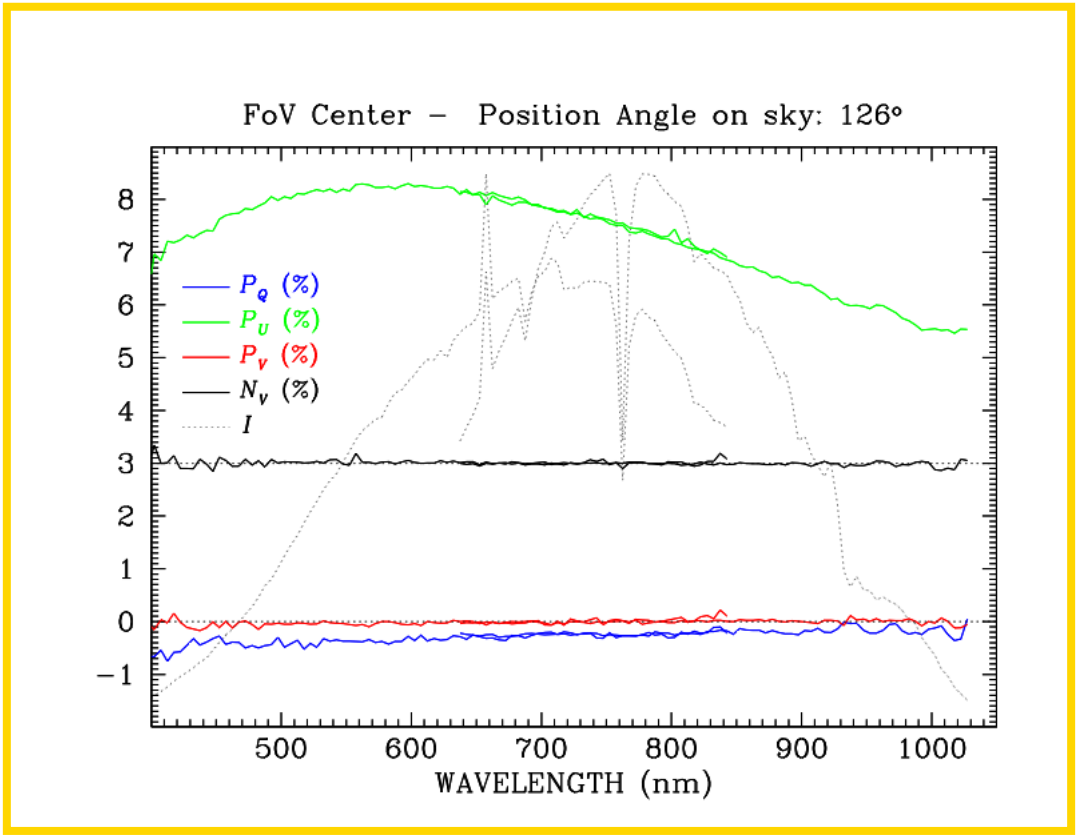
X-talk from lin. to circ. polarisation



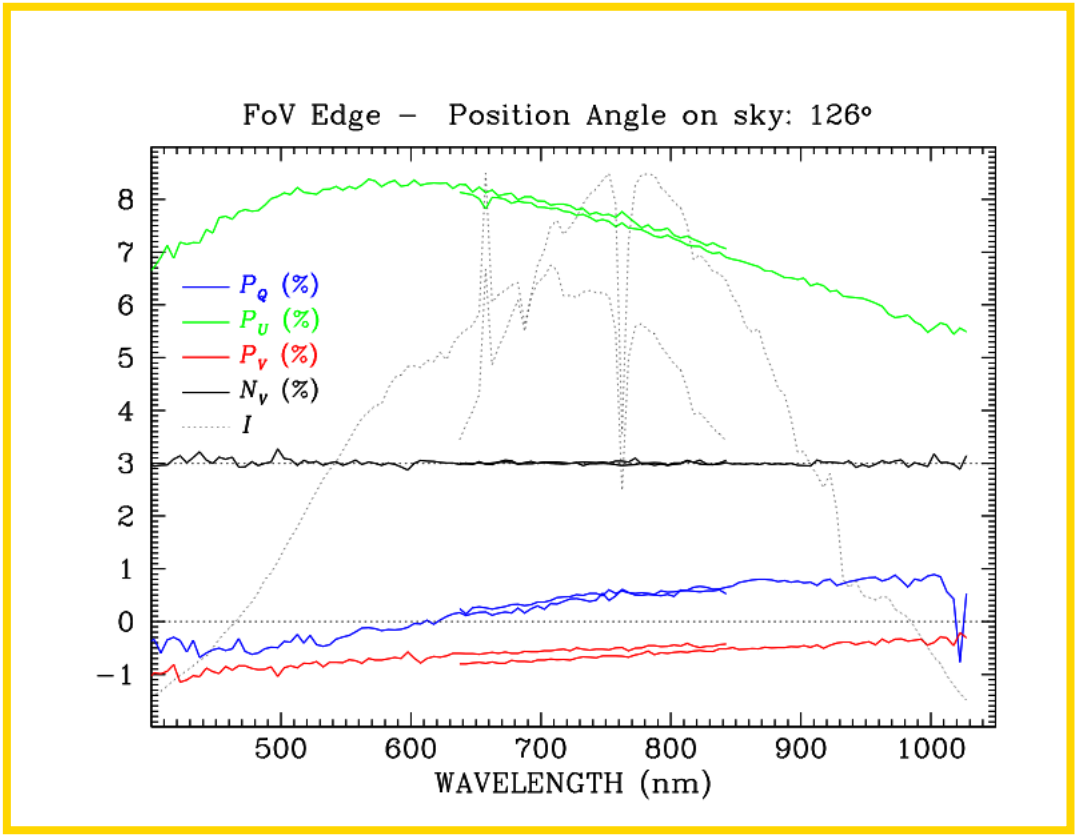
Telescope offset by ~ 3 arcmin

$$P_Q \rightarrow P_Q$$
$$P_U \rightarrow P_U$$
$$P_V \rightarrow P_V$$

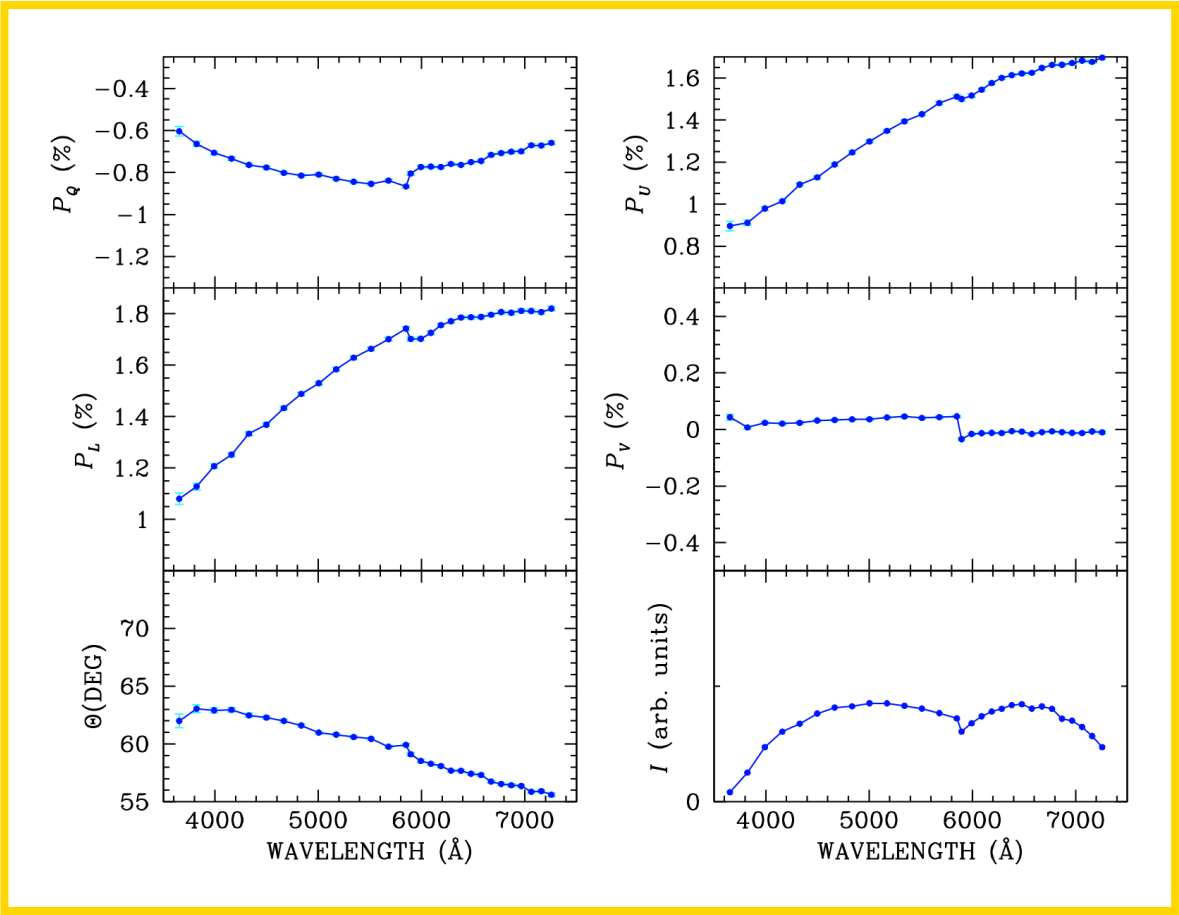
X-talk from lin. to circ. polarisation



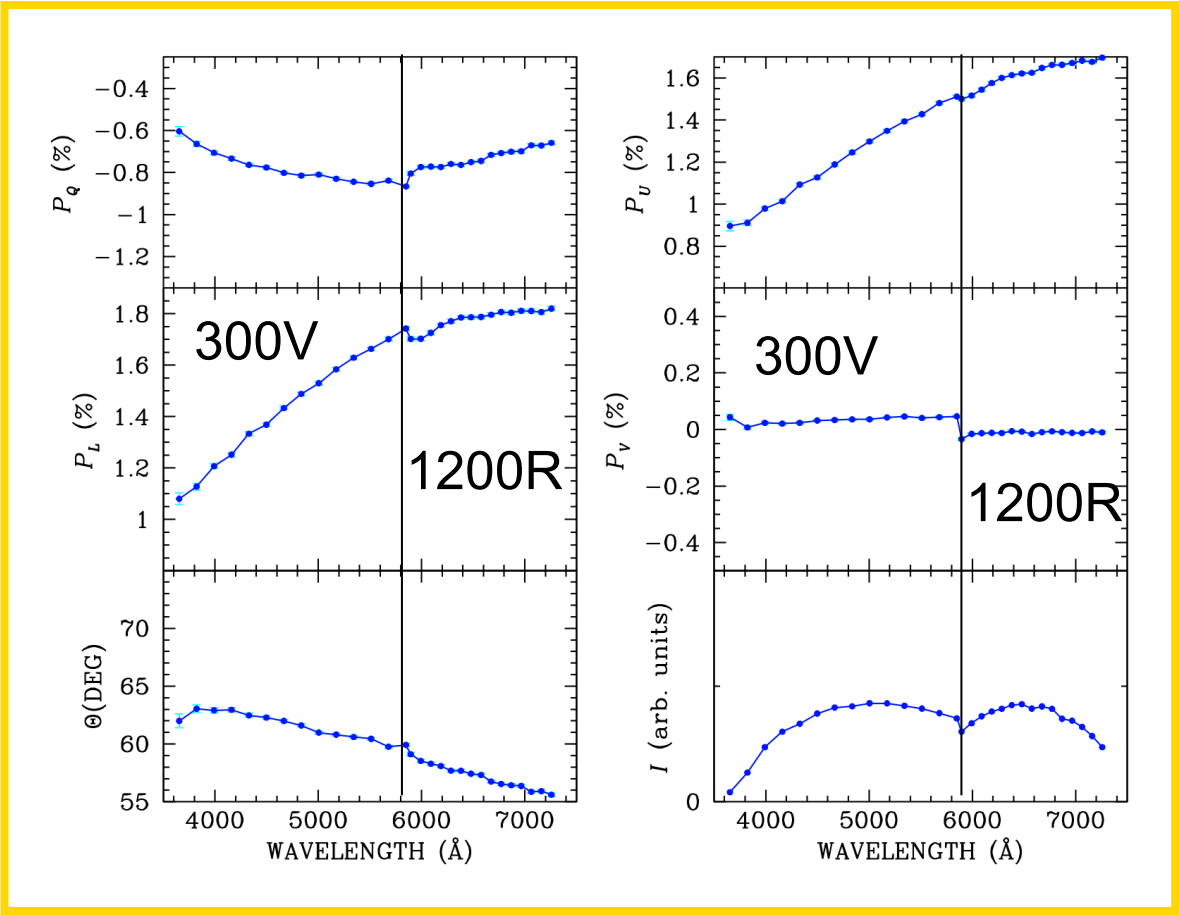
X-talk from lin. to circ. polarisation



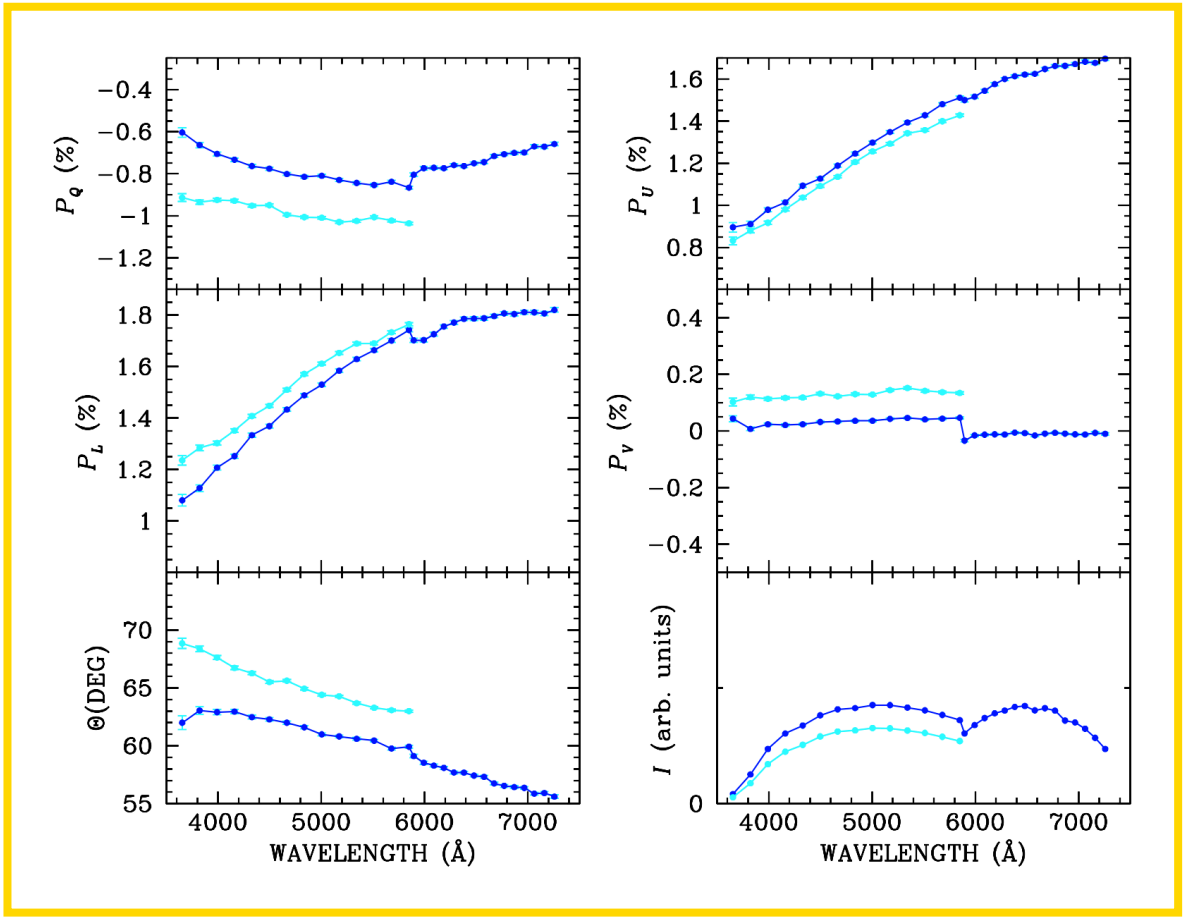
Stability against instrument rotation



Stability against instrument rotation

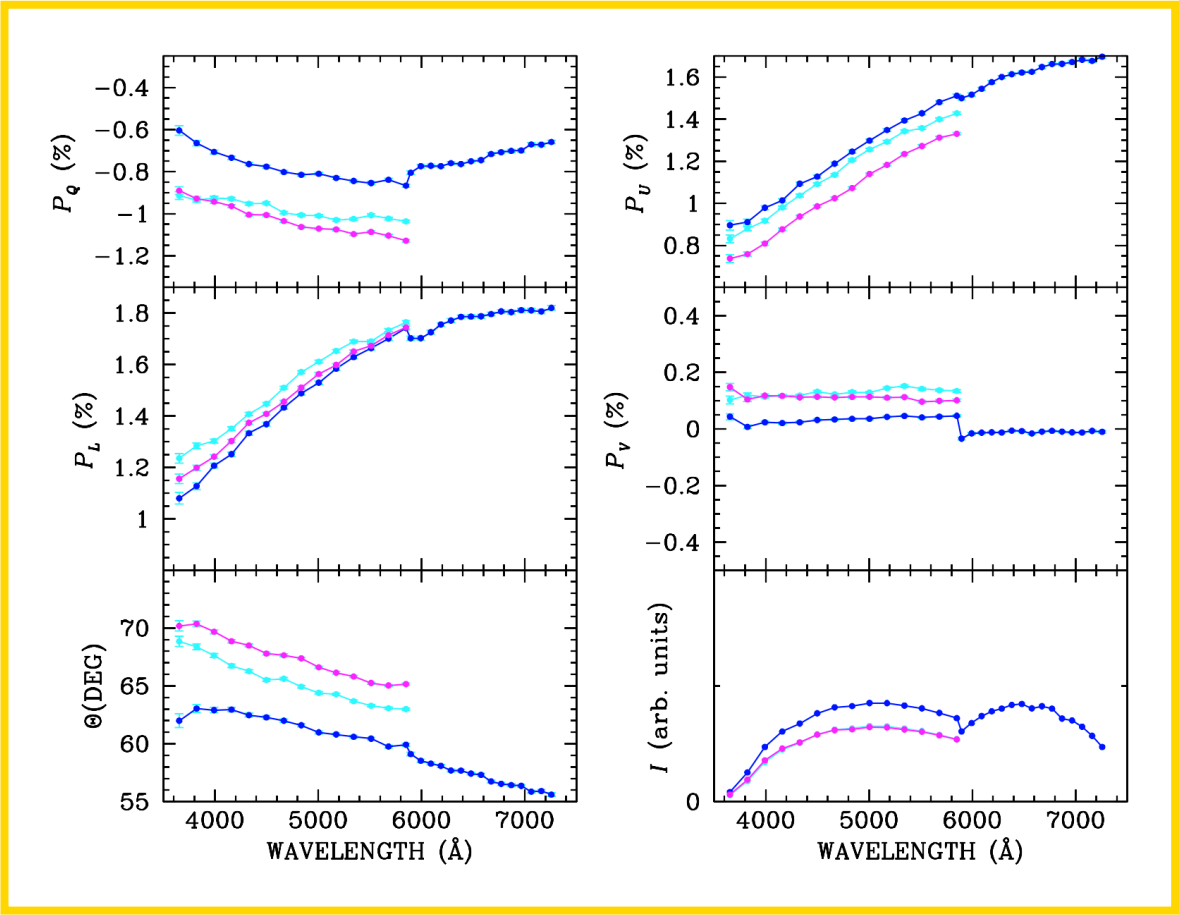


Stability against instrument rotation



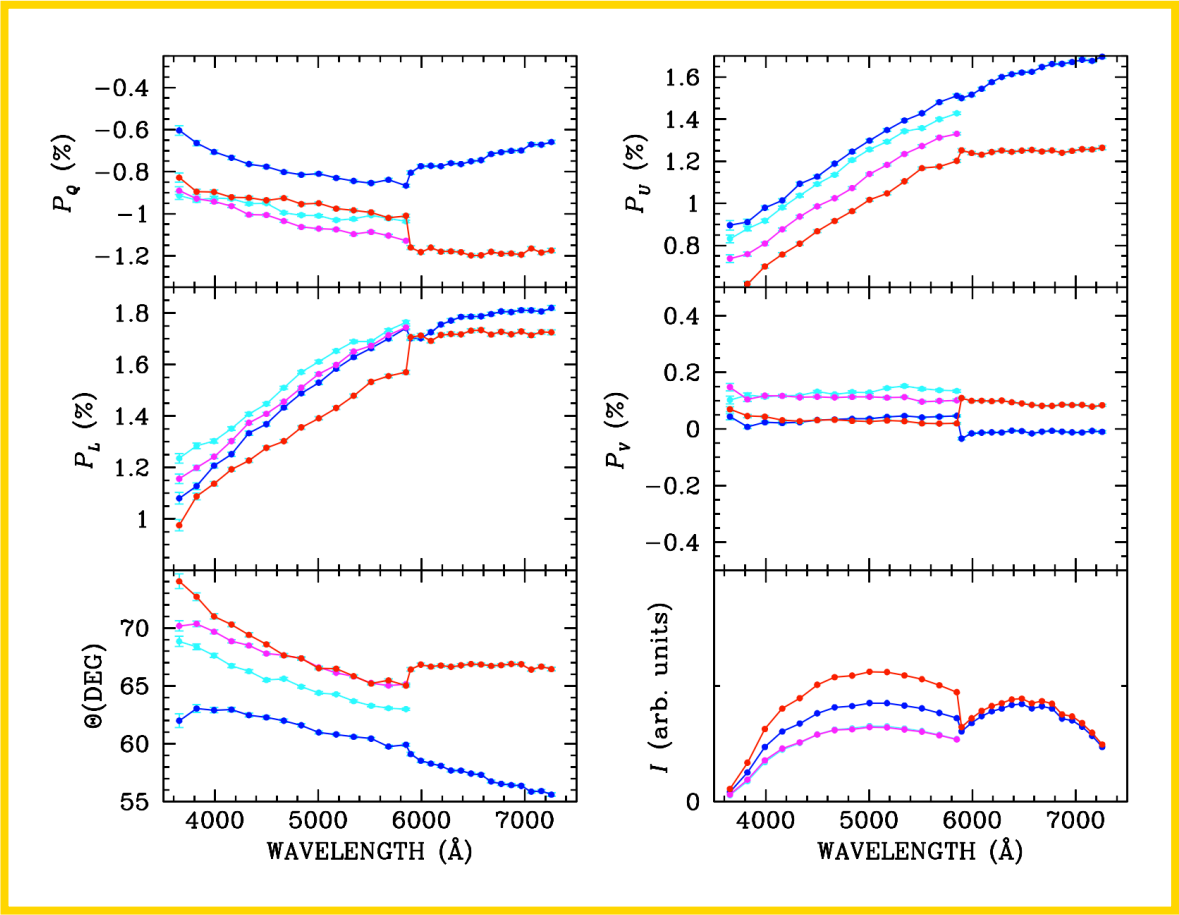
0º
+30º

Stability against instrument rotation



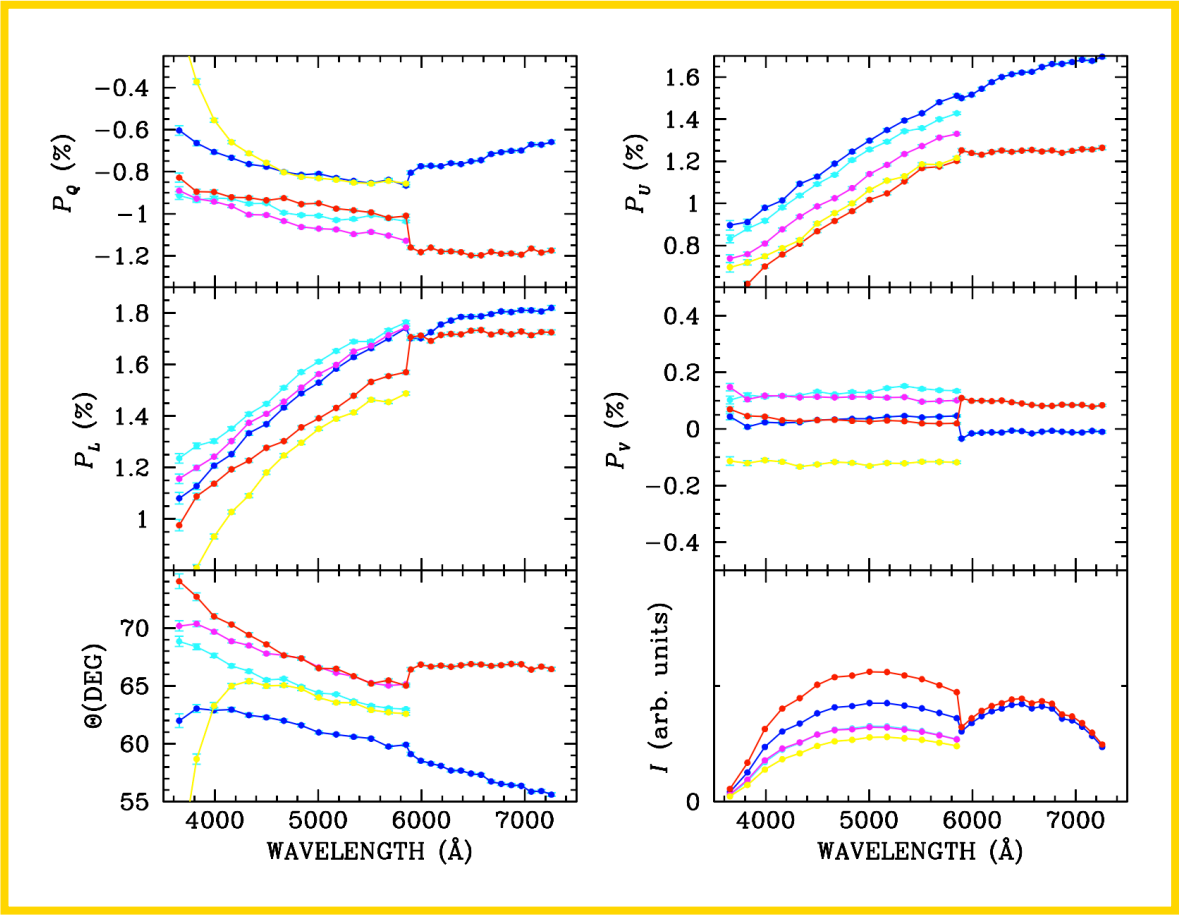
0°
+30°
+60°

Stability against instrument rotation



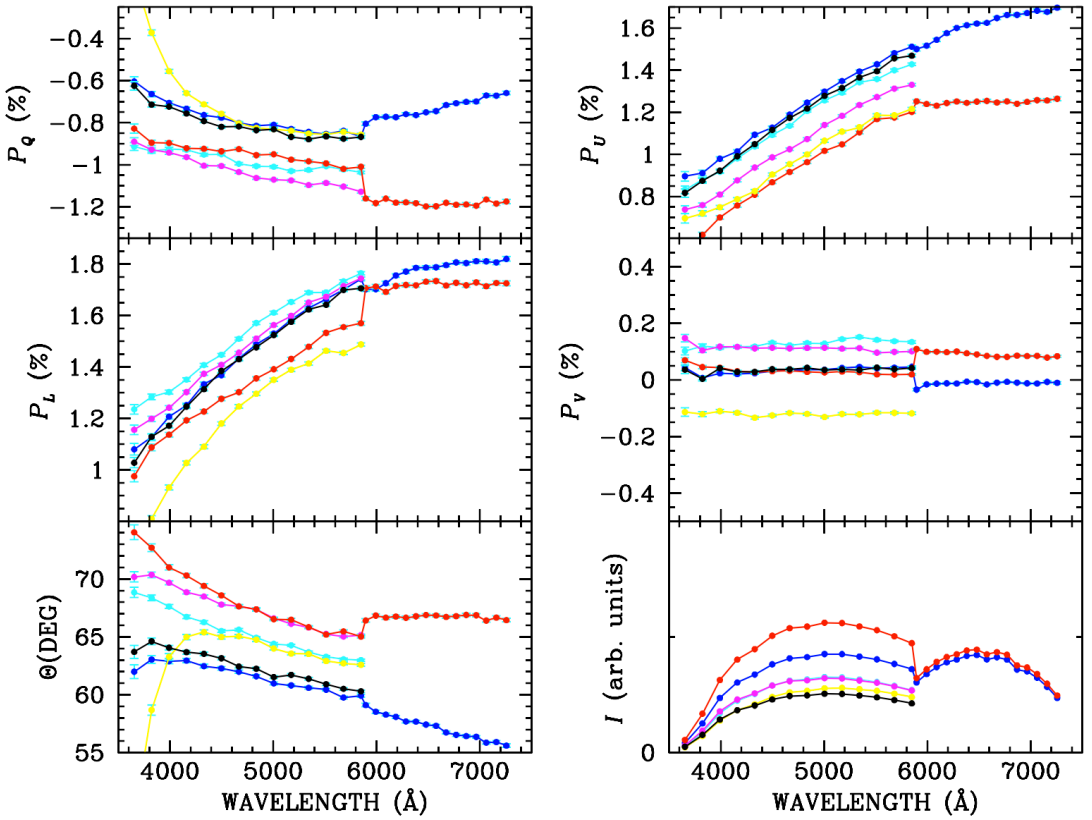
0º
+30º
+60º
+90º

Stability against instrument rotation



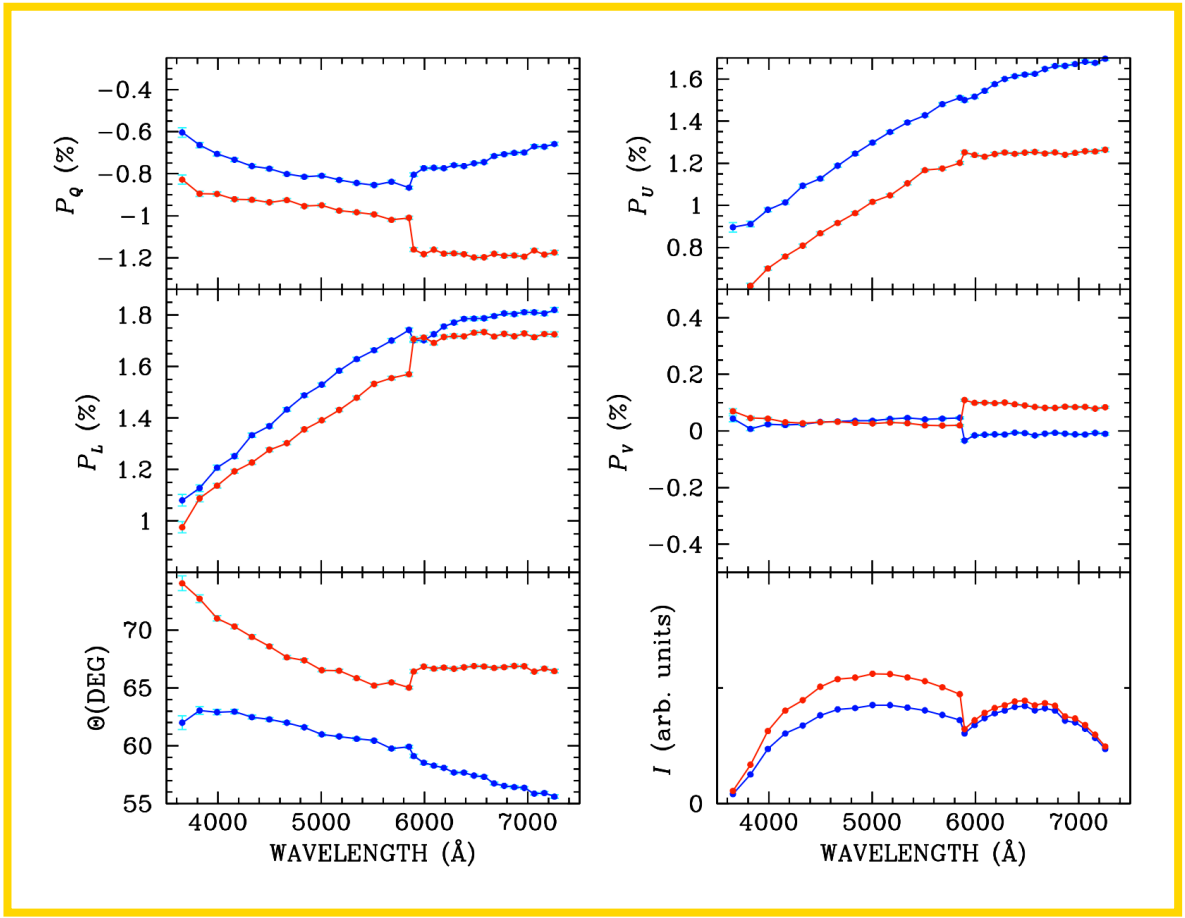
0º
+30º
+60º
+90º
+120º

Stability against instrument rotation



0º
+30º
+60º
+90º
+120º
+180º

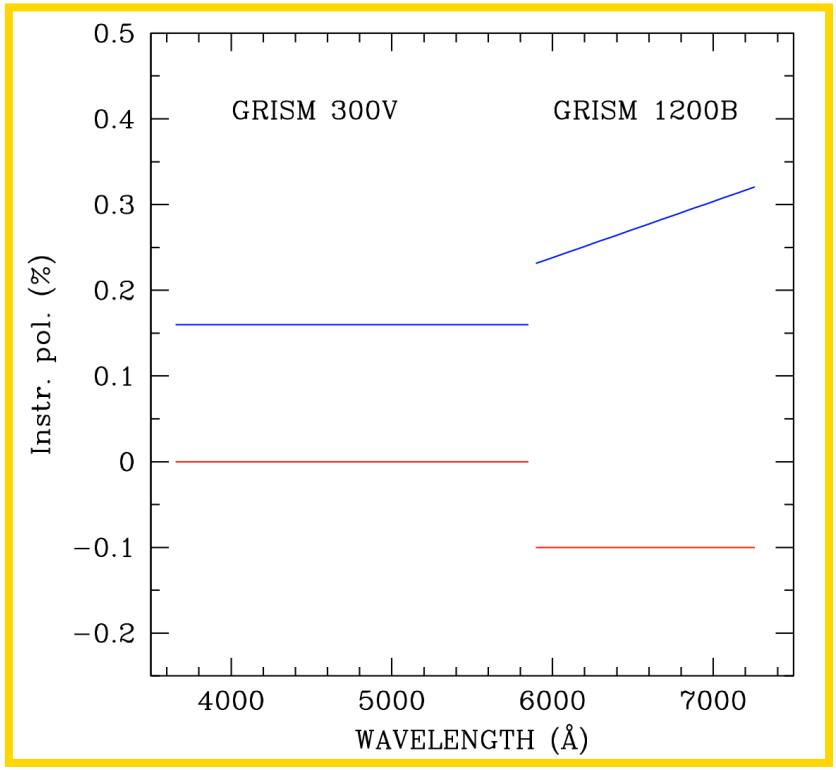
Stability against instrument rotation



0°

+90°

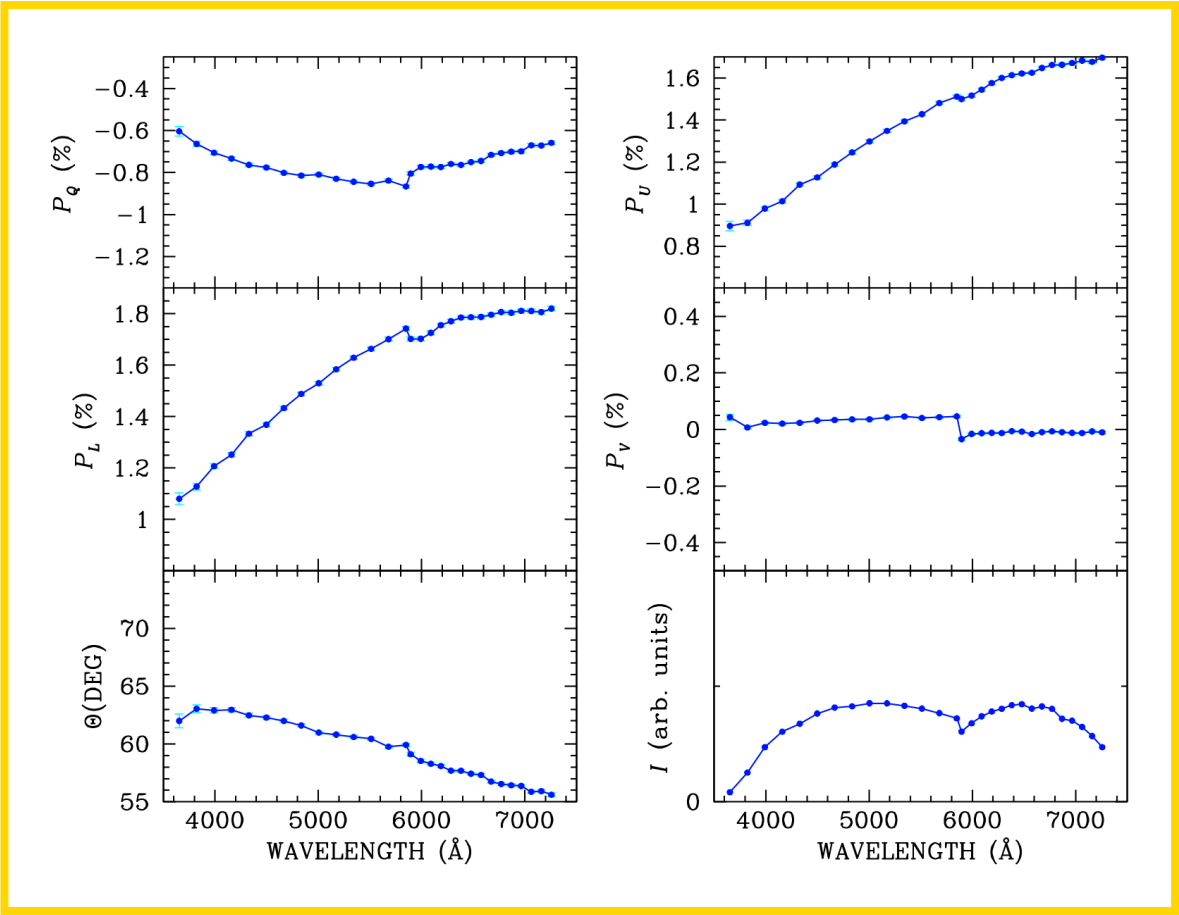
Instrumental polarisation



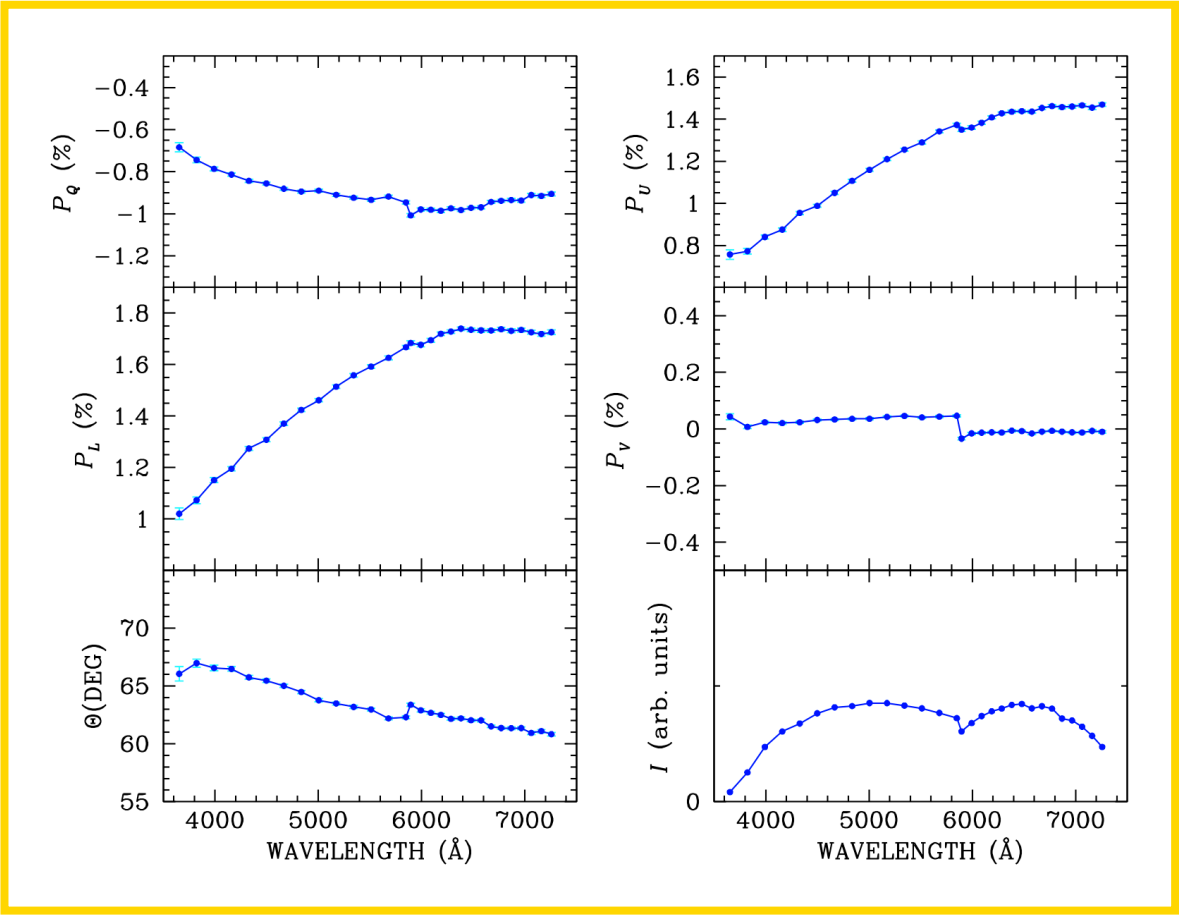
P_Q inst.

P_U inst.

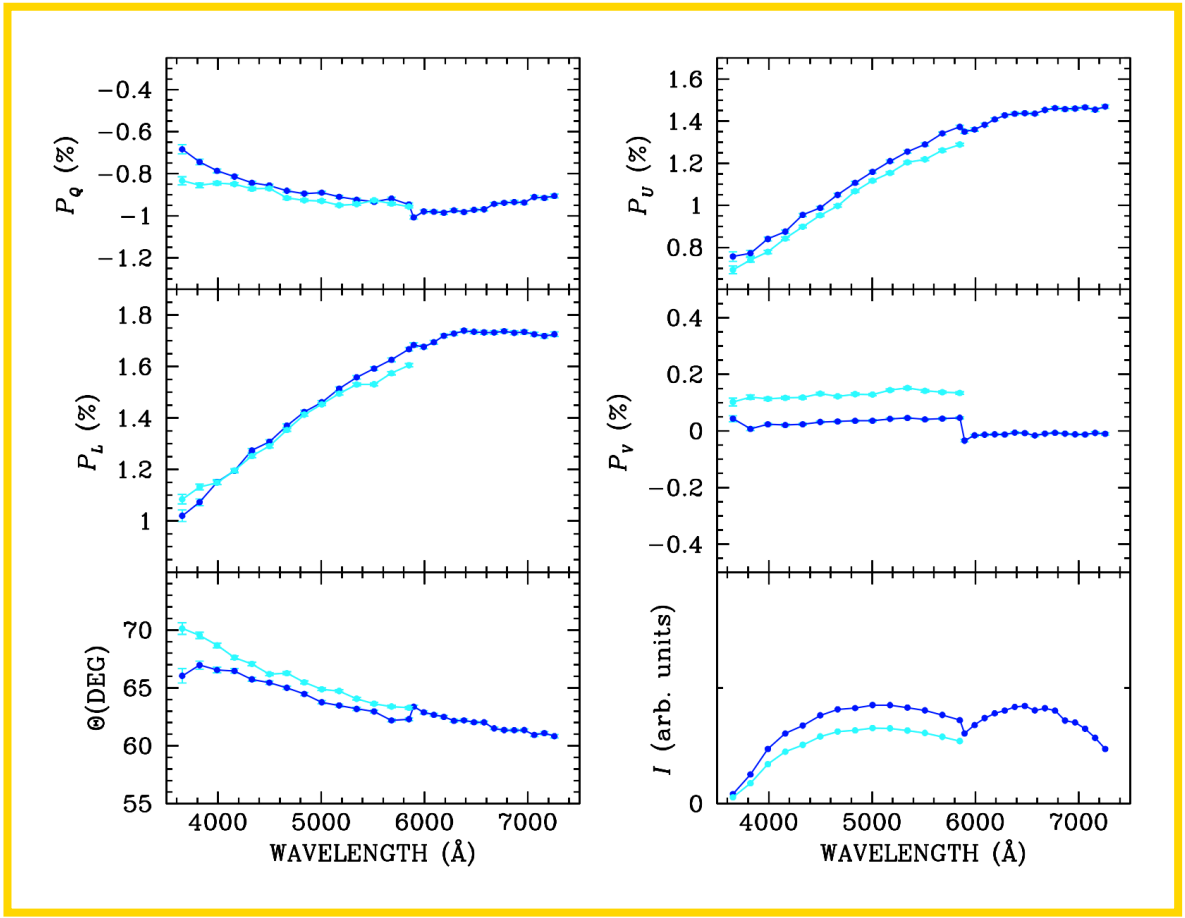
Stability during instrument rotation



Stability during instrument rotation

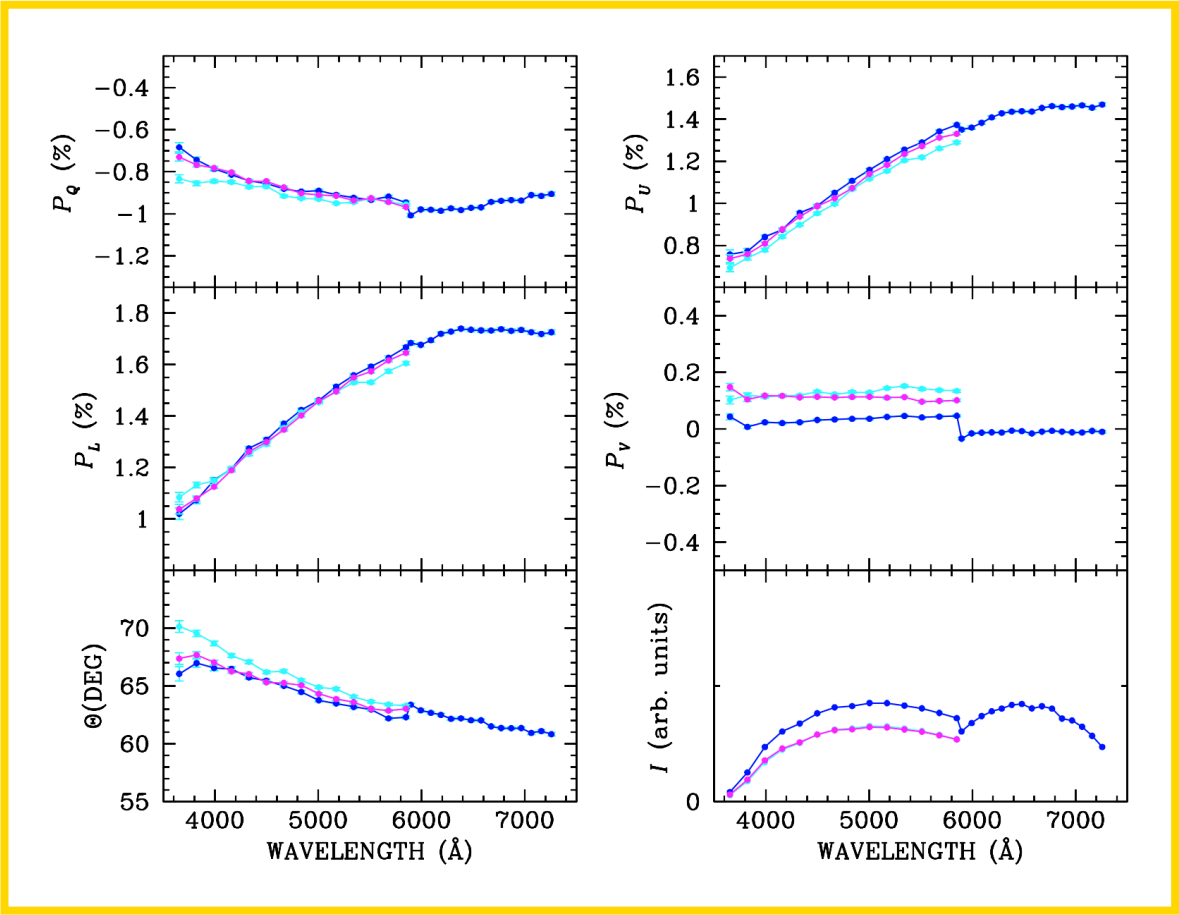


Stability during instrument rotation



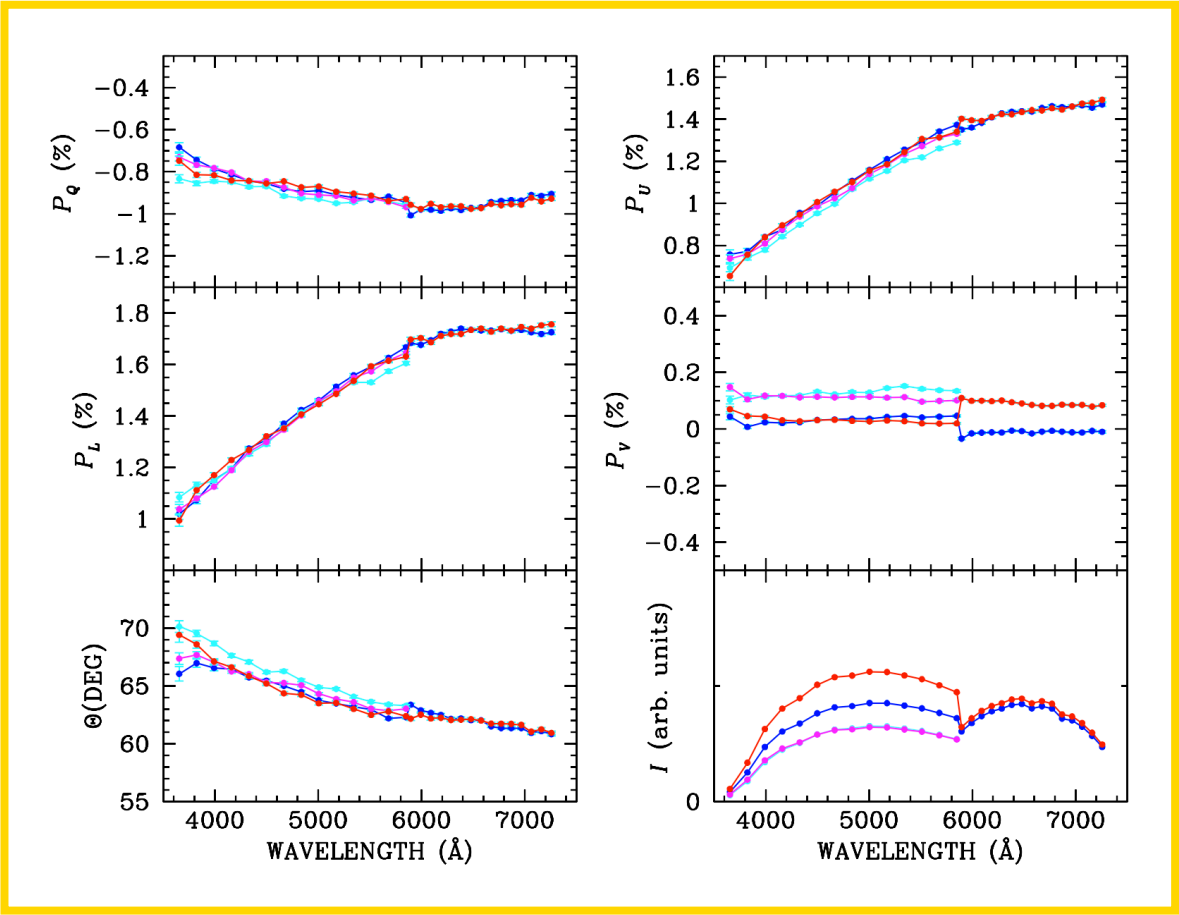
0°
+30°

Stability during instrument rotation



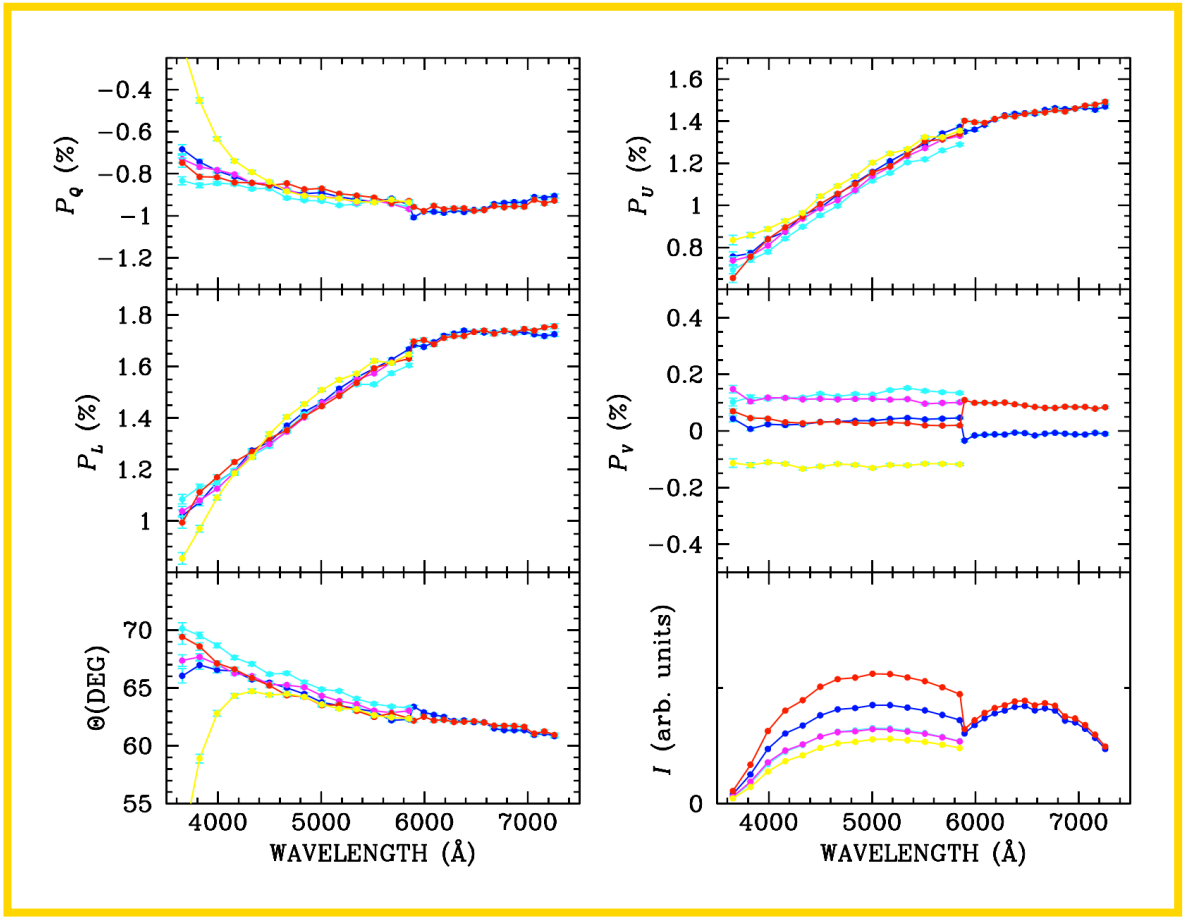
0°
+30°
+60°

Stability during instrument rotation



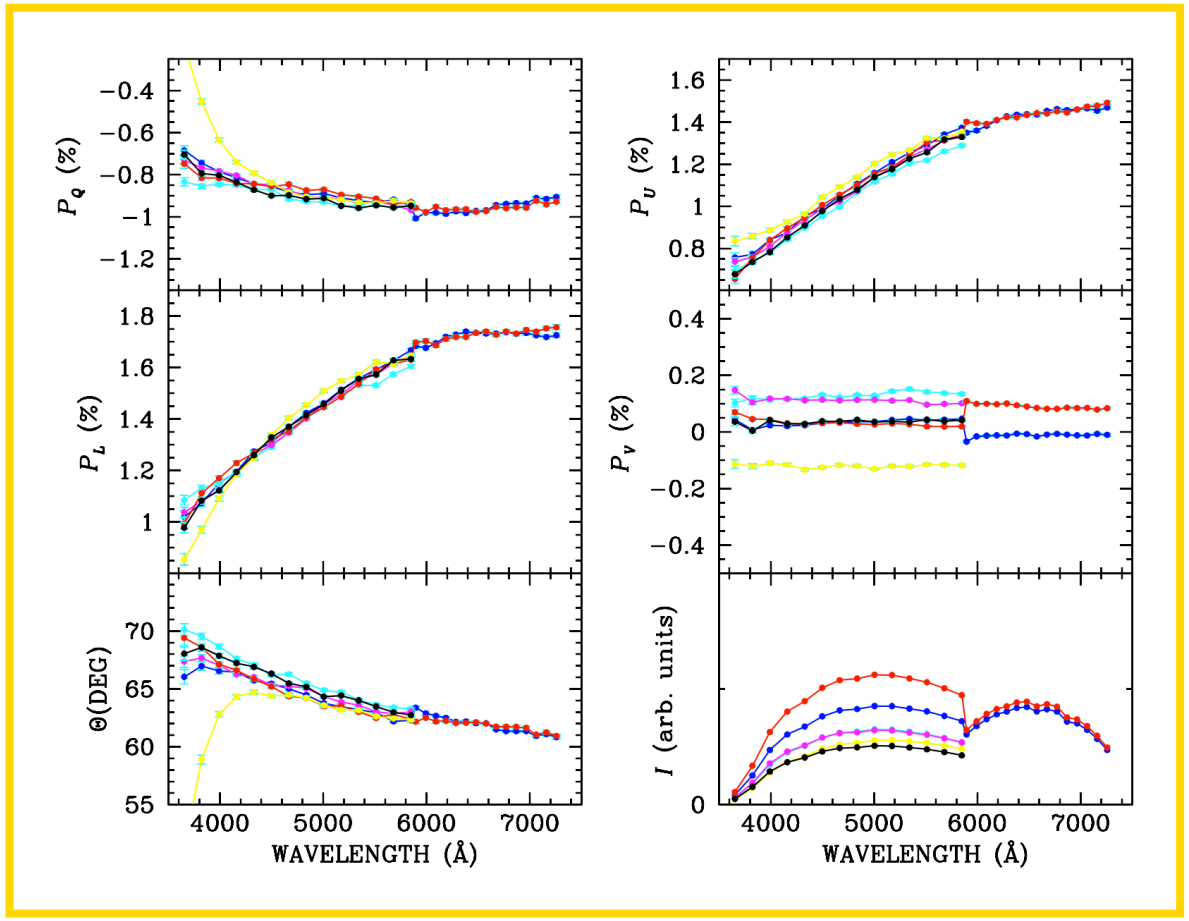
0º
+30º
+60º
+90º

Stability during instrument rotation



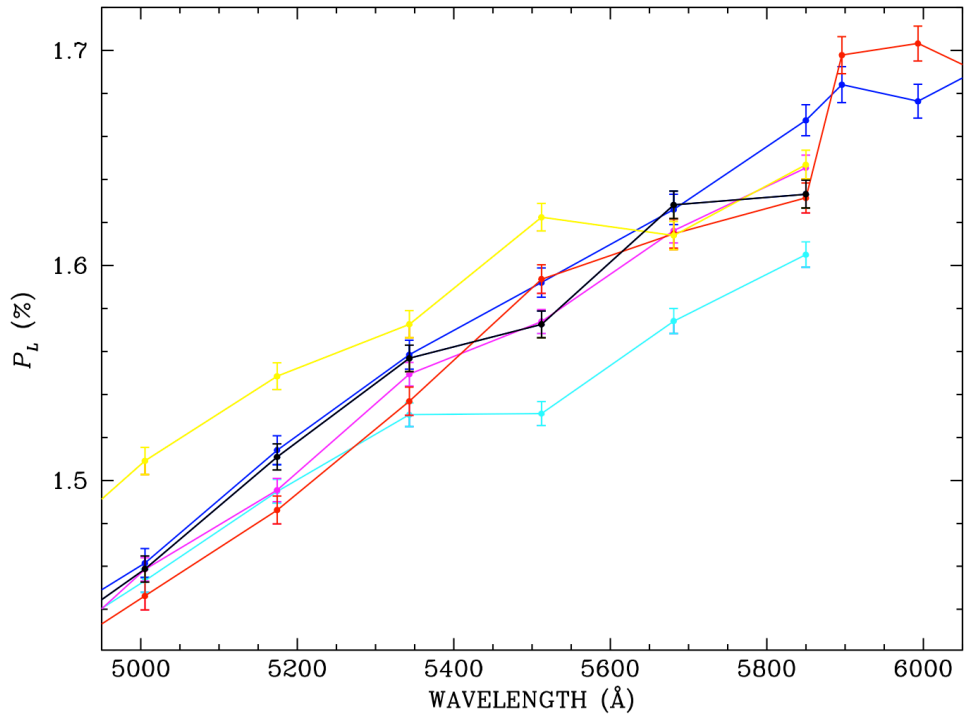
0º
+30º
+60º
+90º
+120º

Stability during instrument rotation



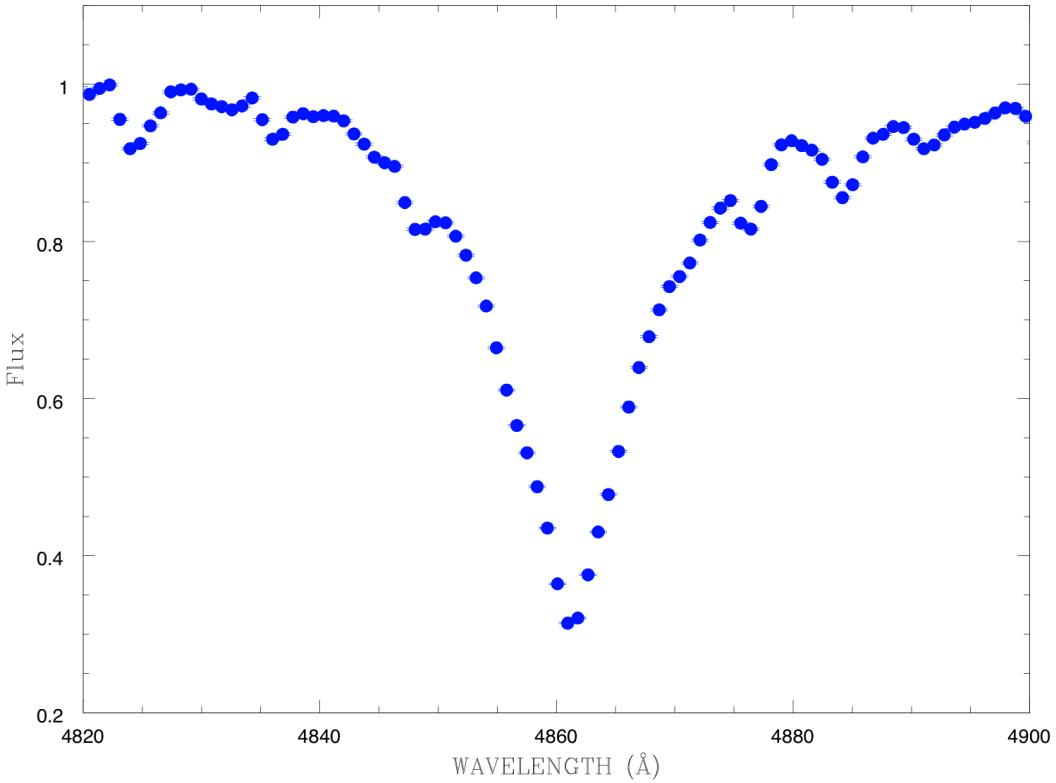
0º
+30º
+60º
+90º
+120º
+180º

Stability during instrument rotation

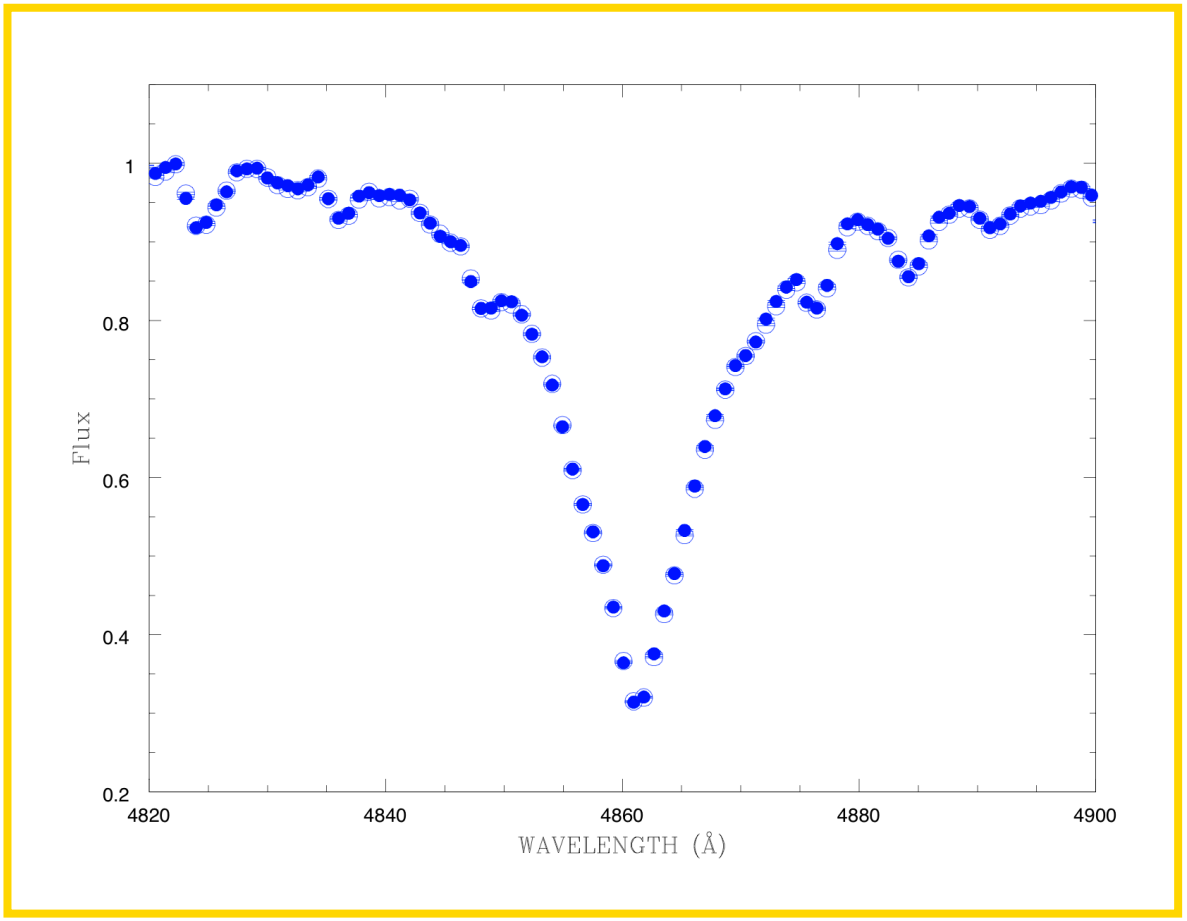


0º
+30º
+60º
+90º
+120º
+180º

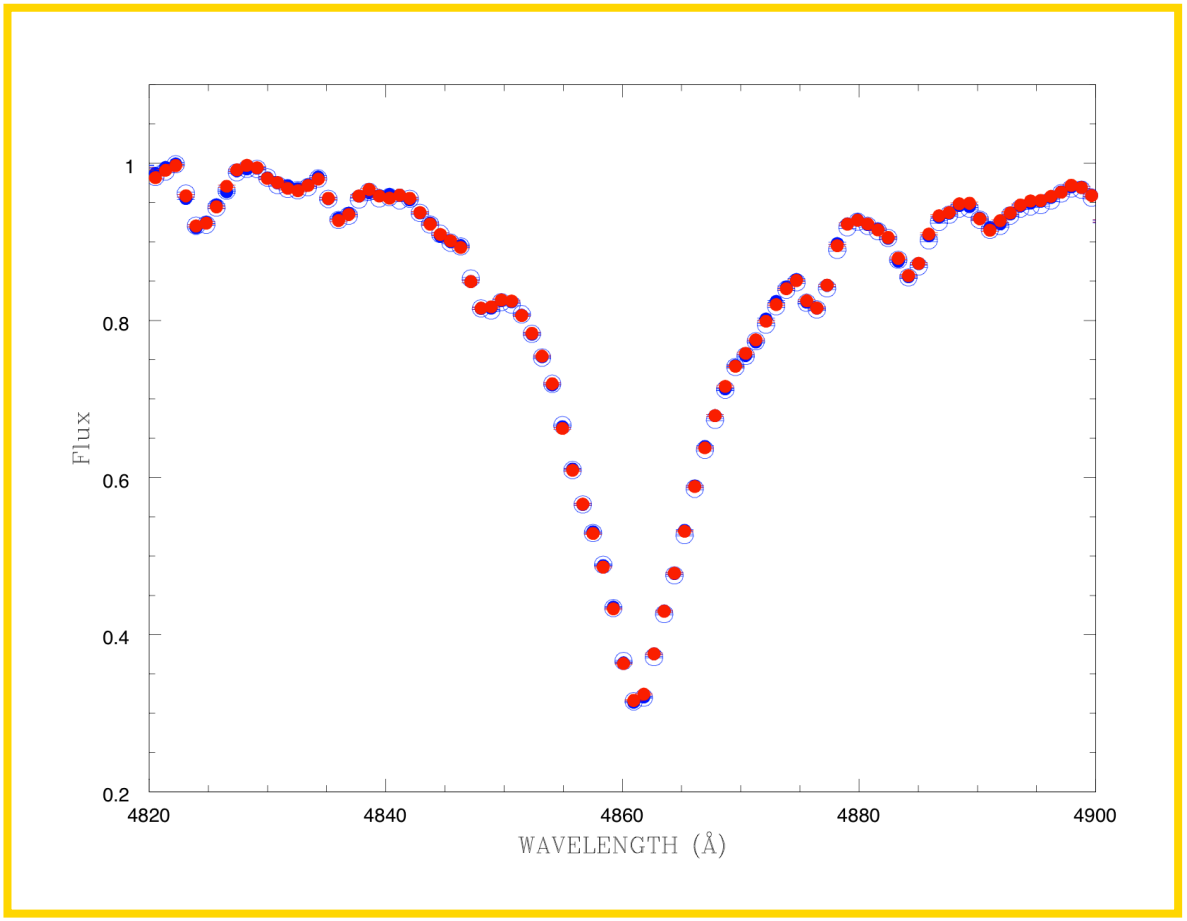
Stability during normal operations



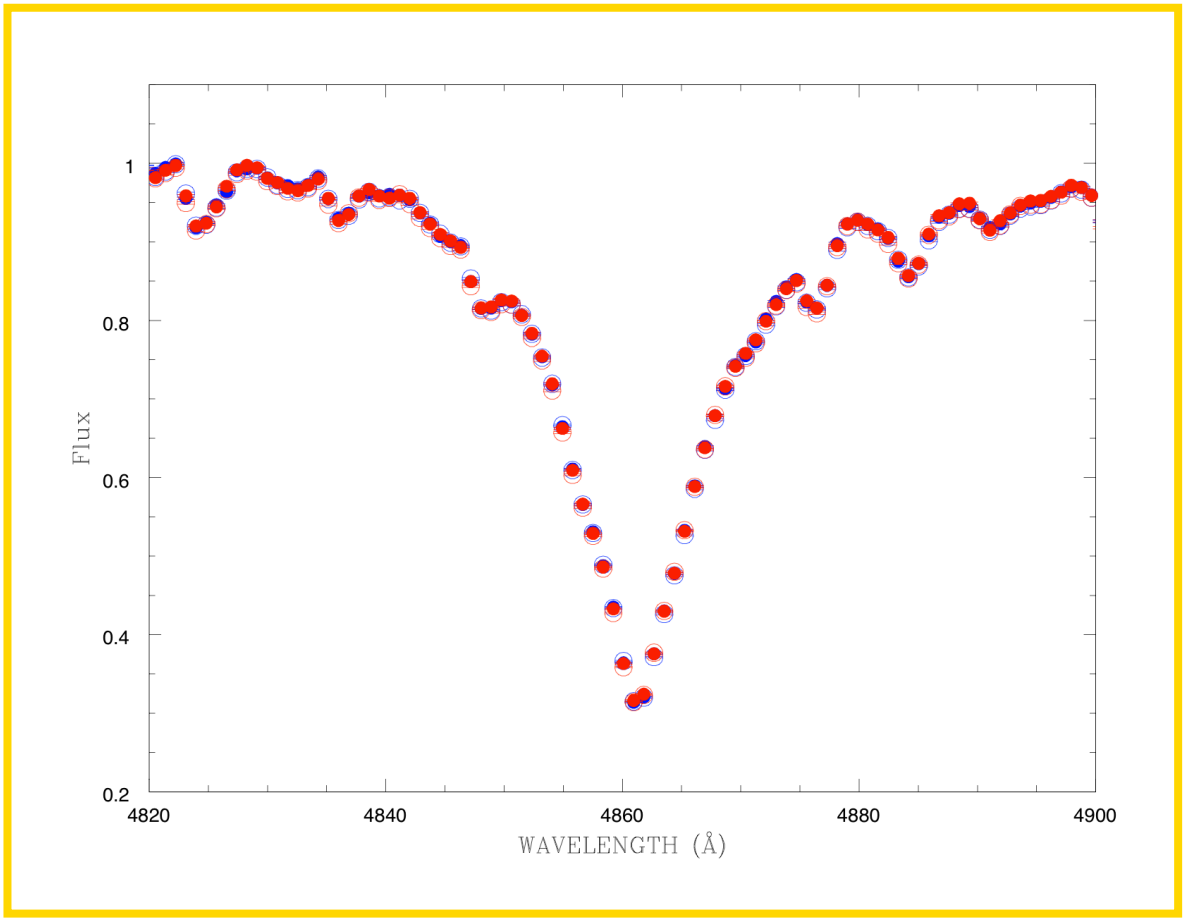
Stability during normal operations



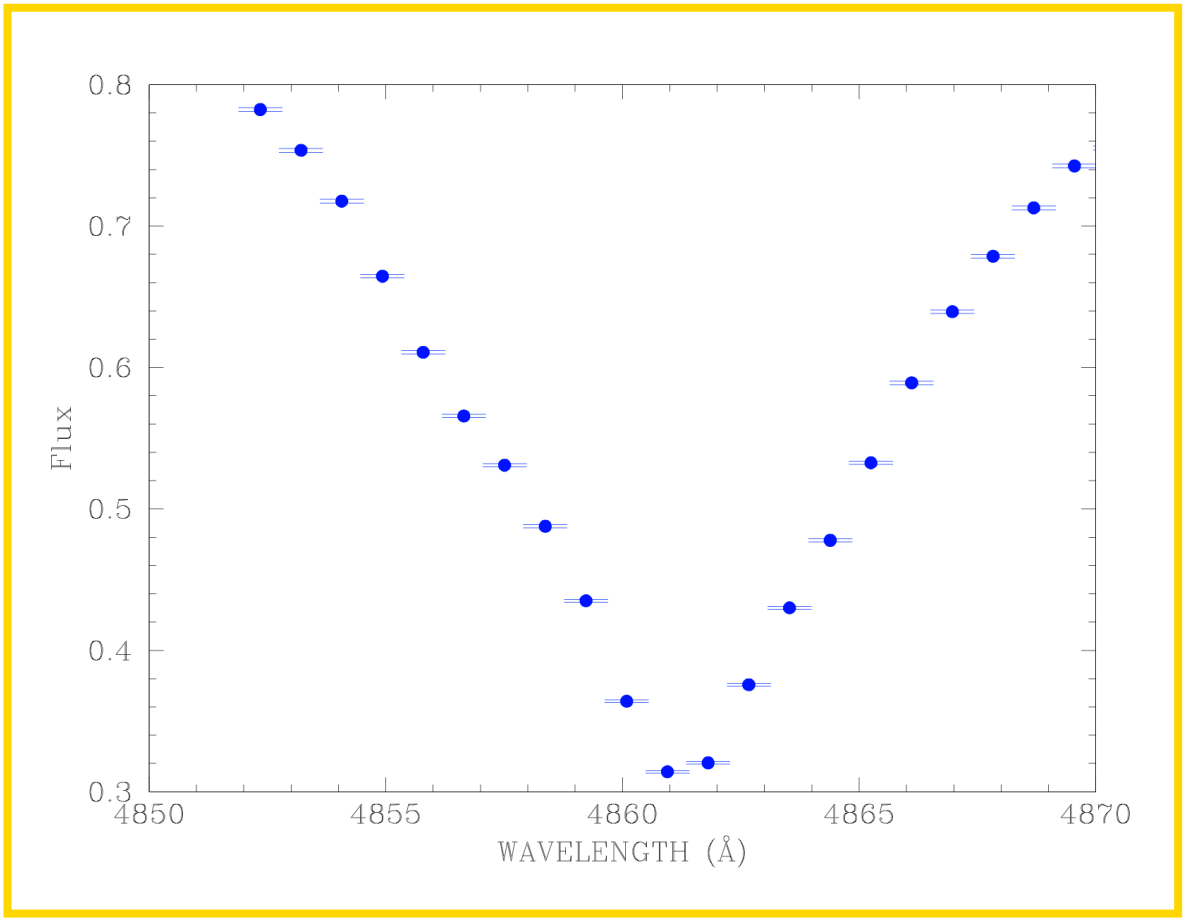
Stability during normal operations



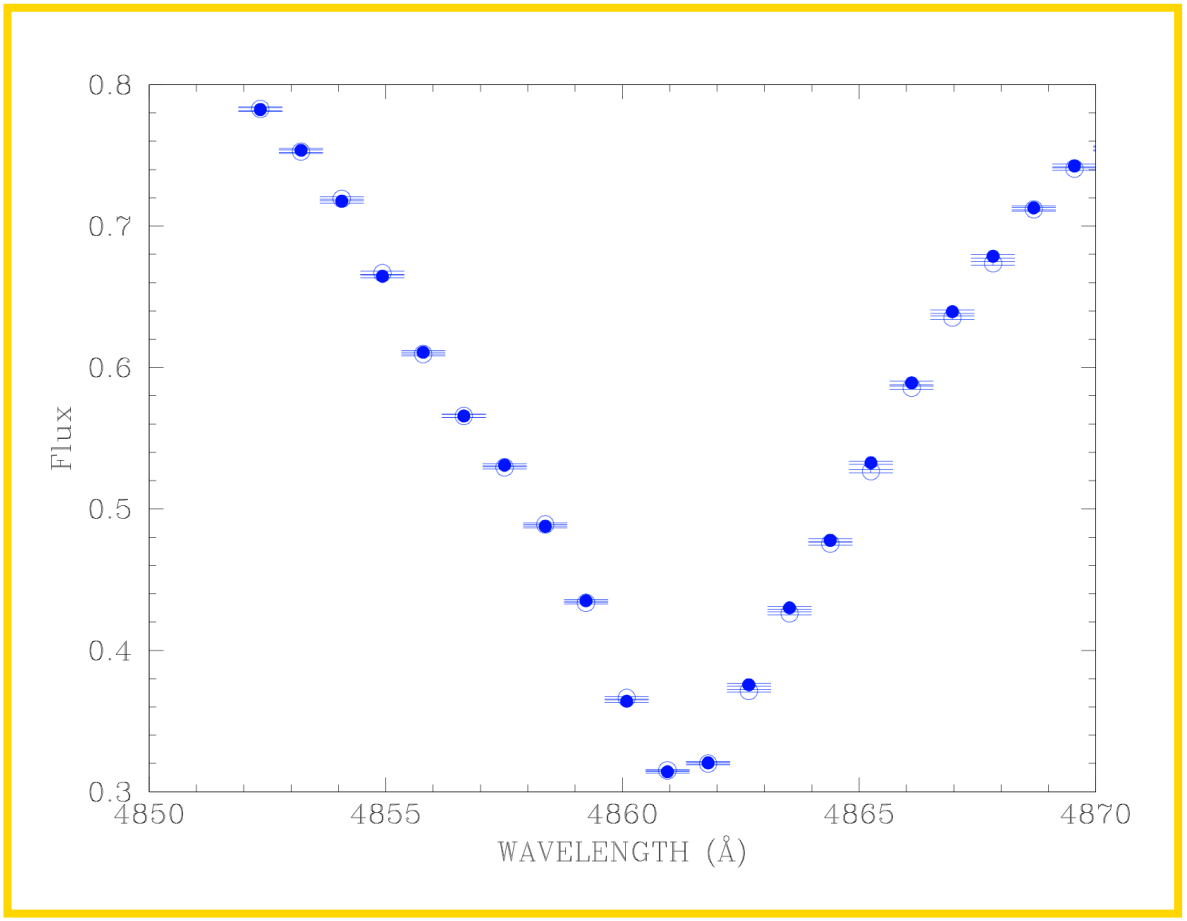
Stability during normal operations



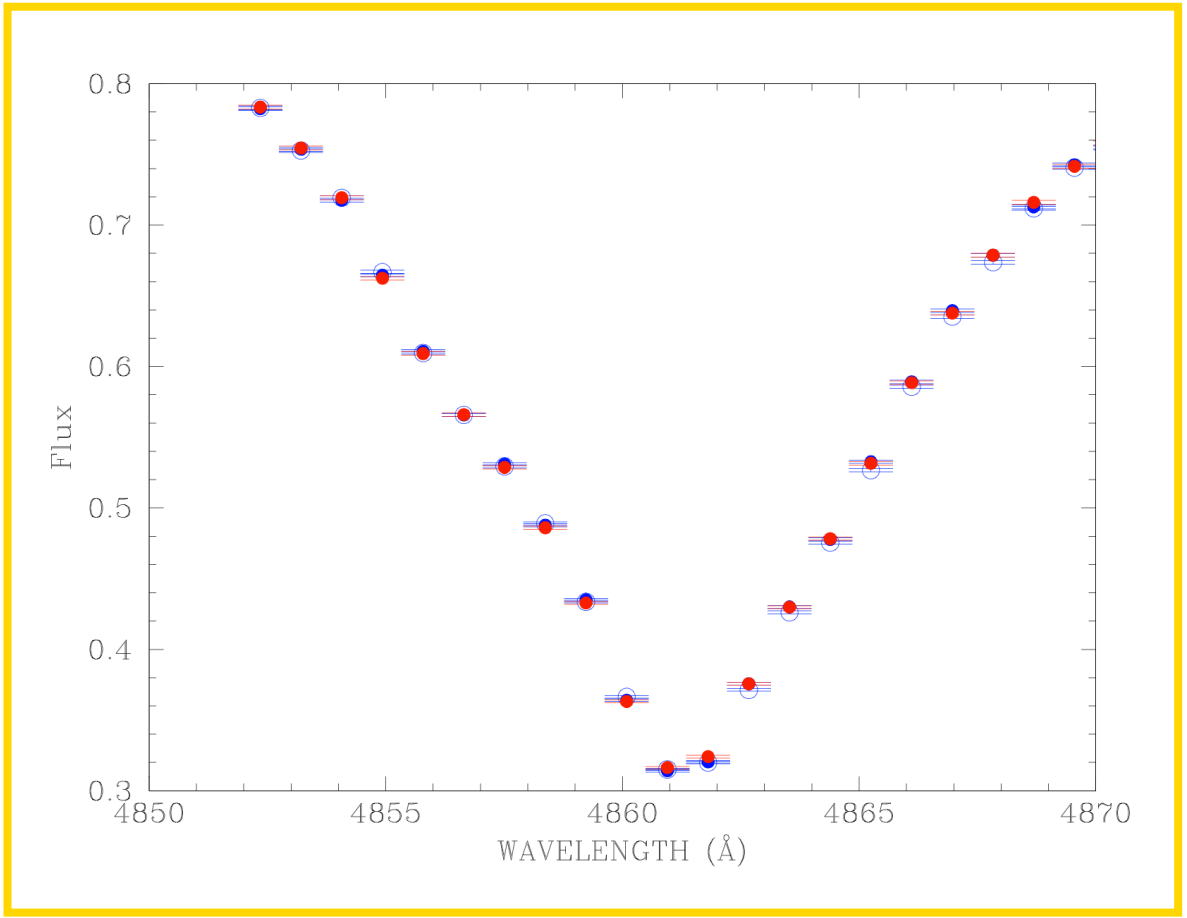
Stability during normal operations



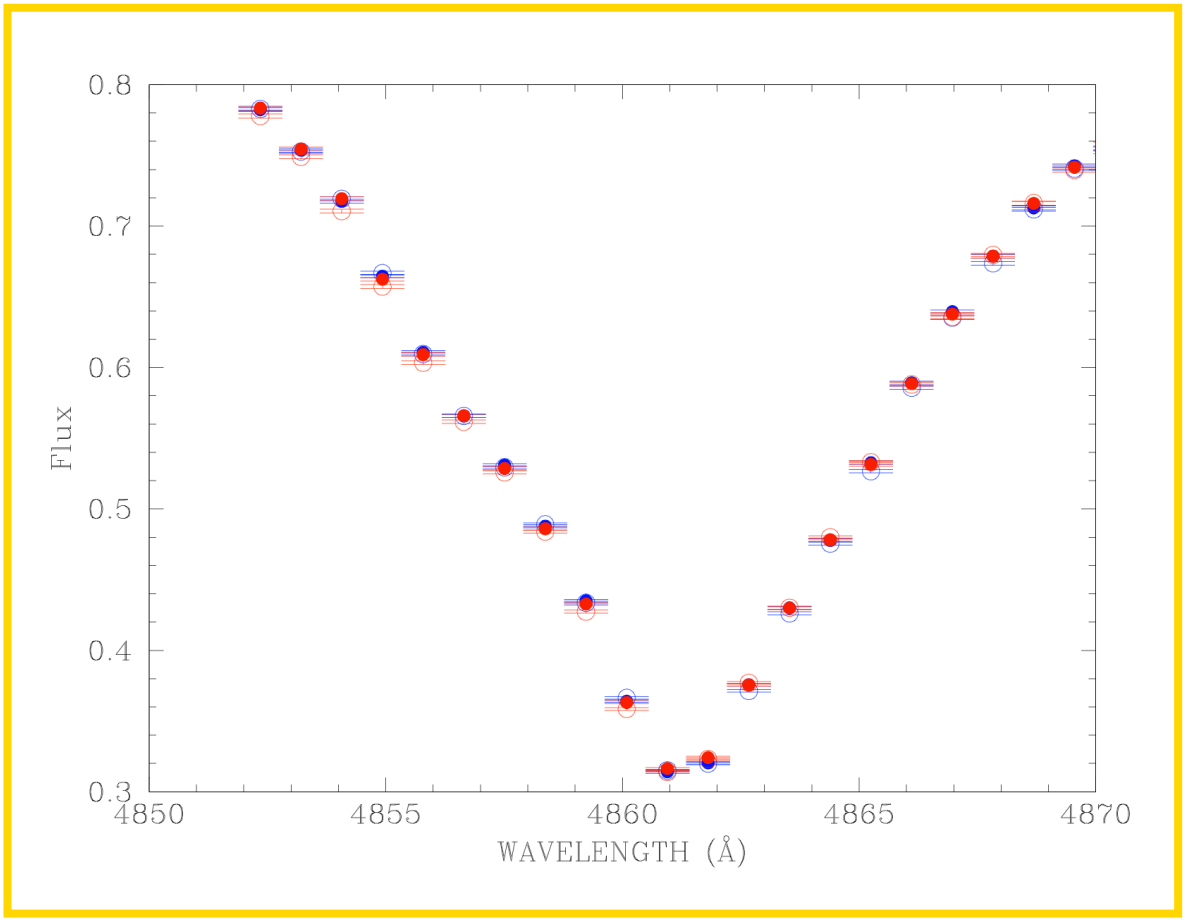
Stability during normal operations



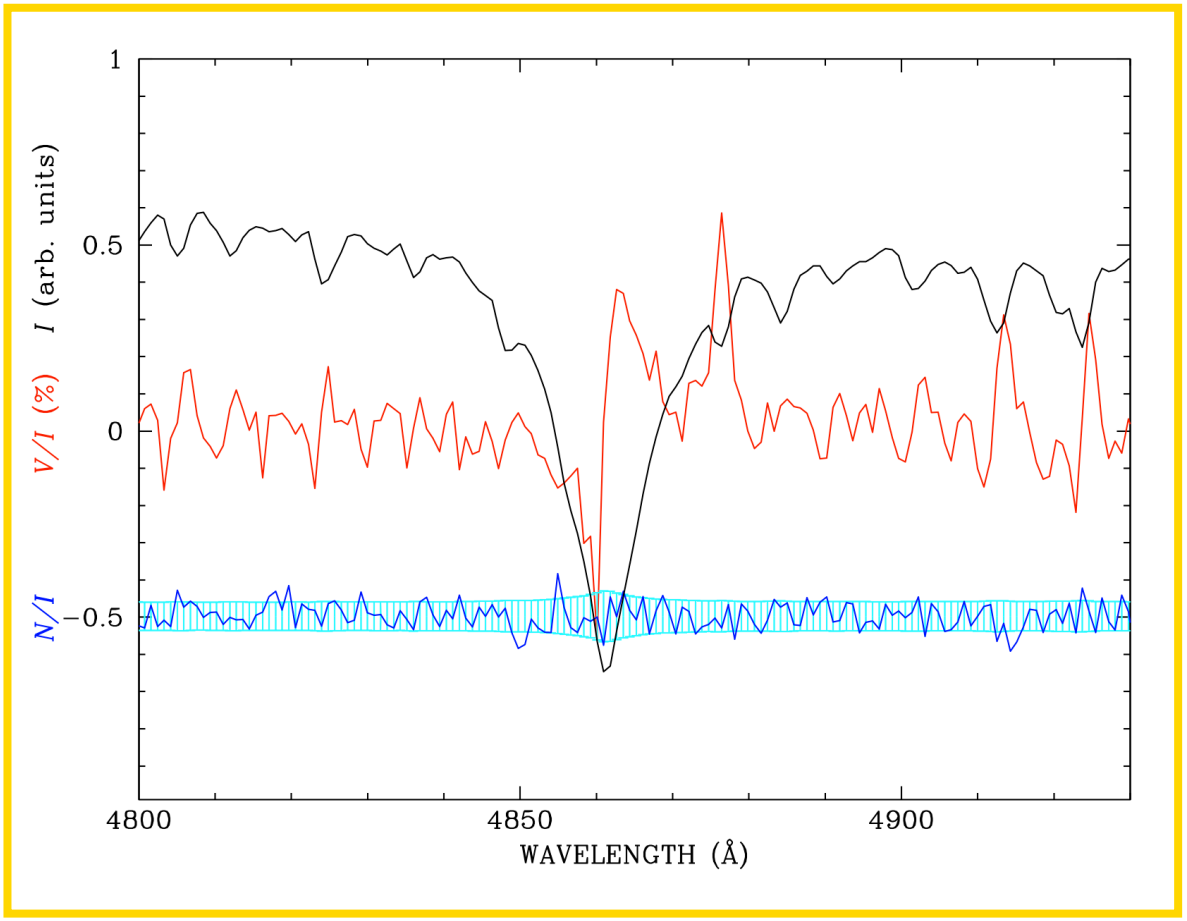
Stability during normal operations



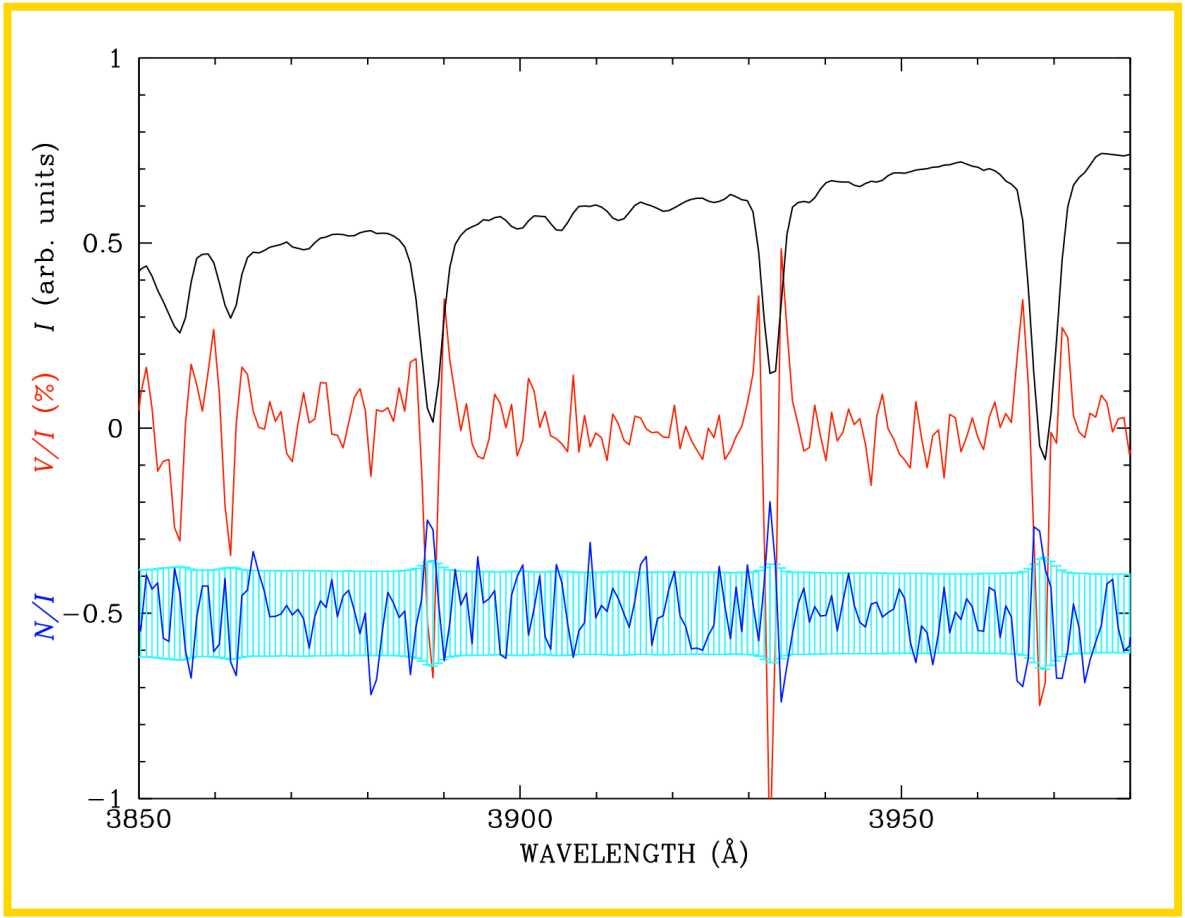
Stability during normal operations



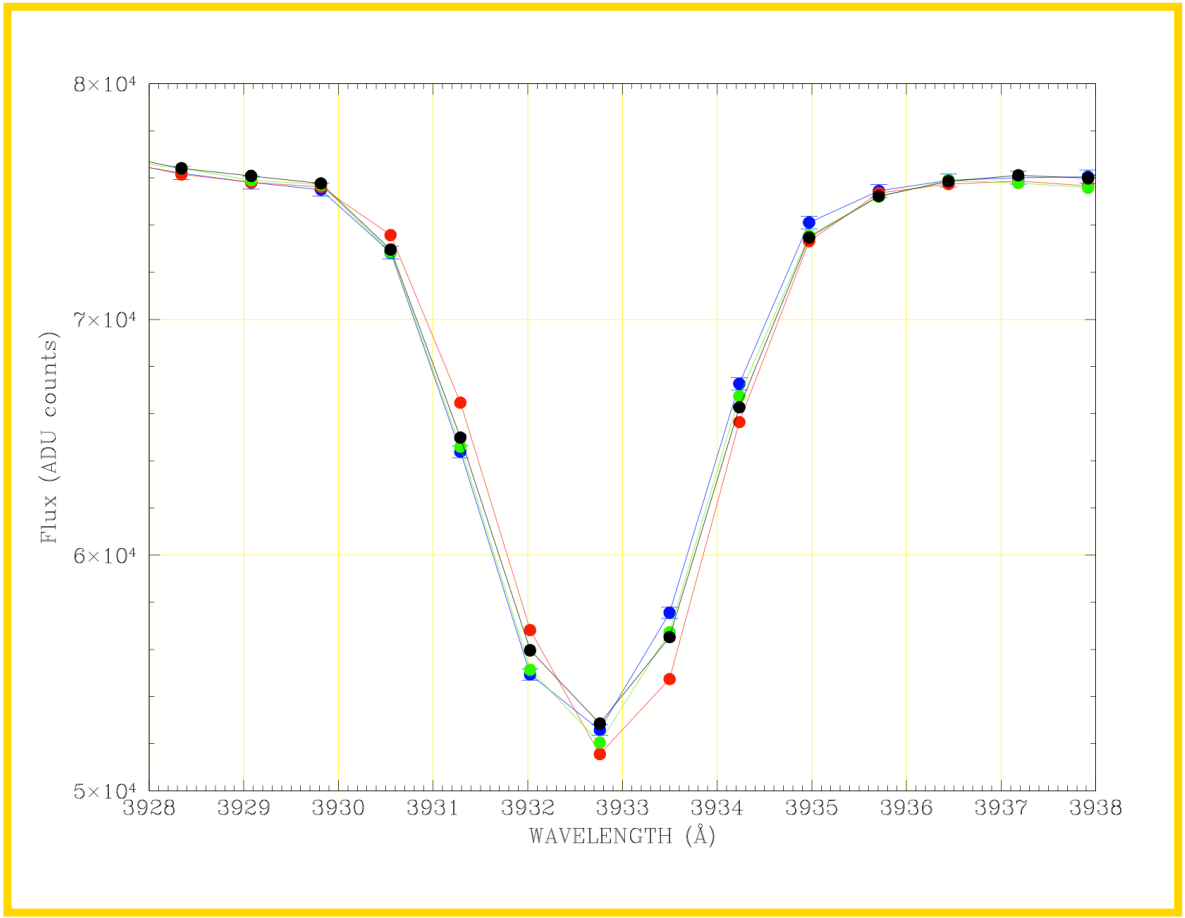
Stability during normal operations



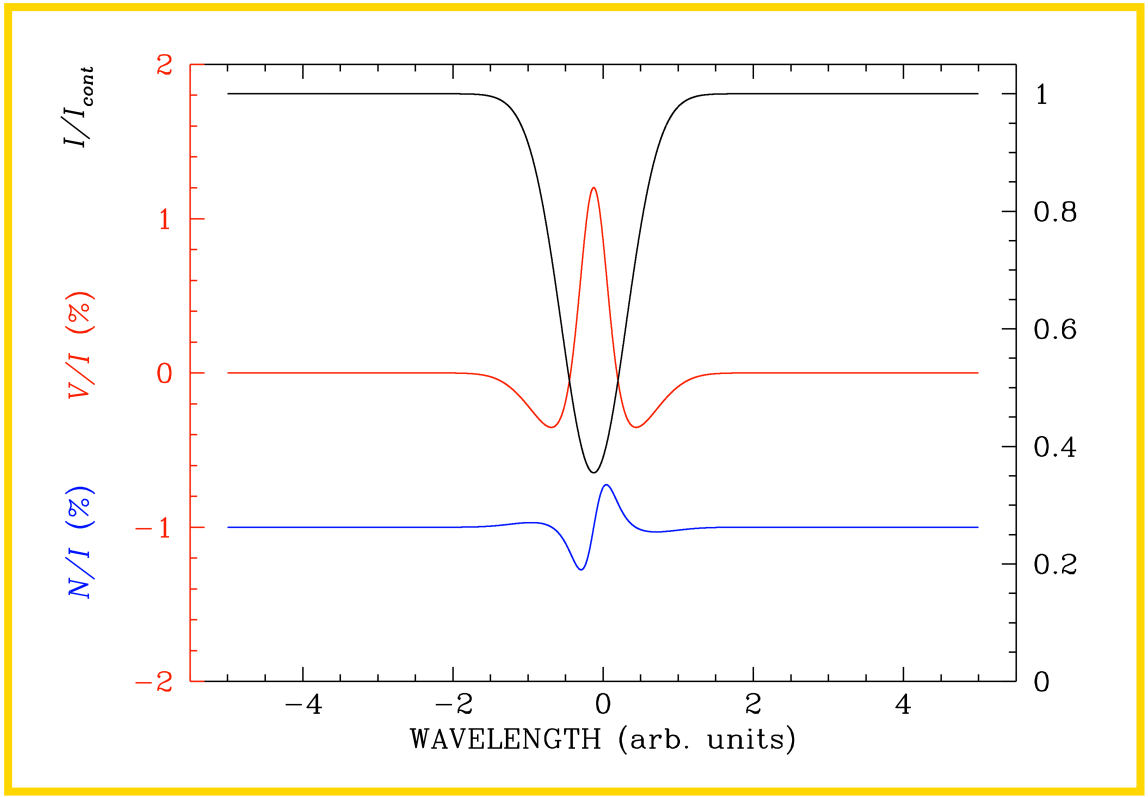
New exciting discoveries of magnetic fields



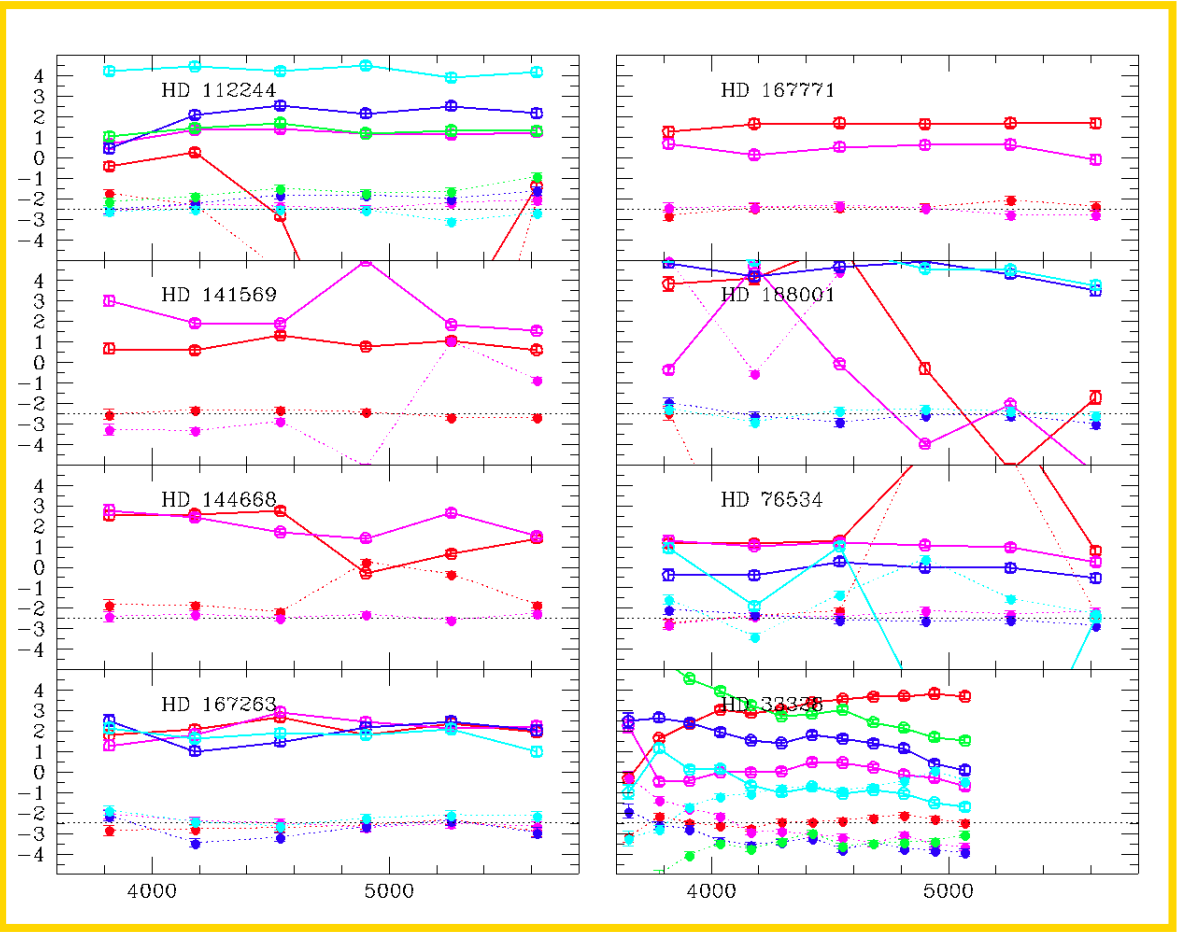
Stability within normal operations?



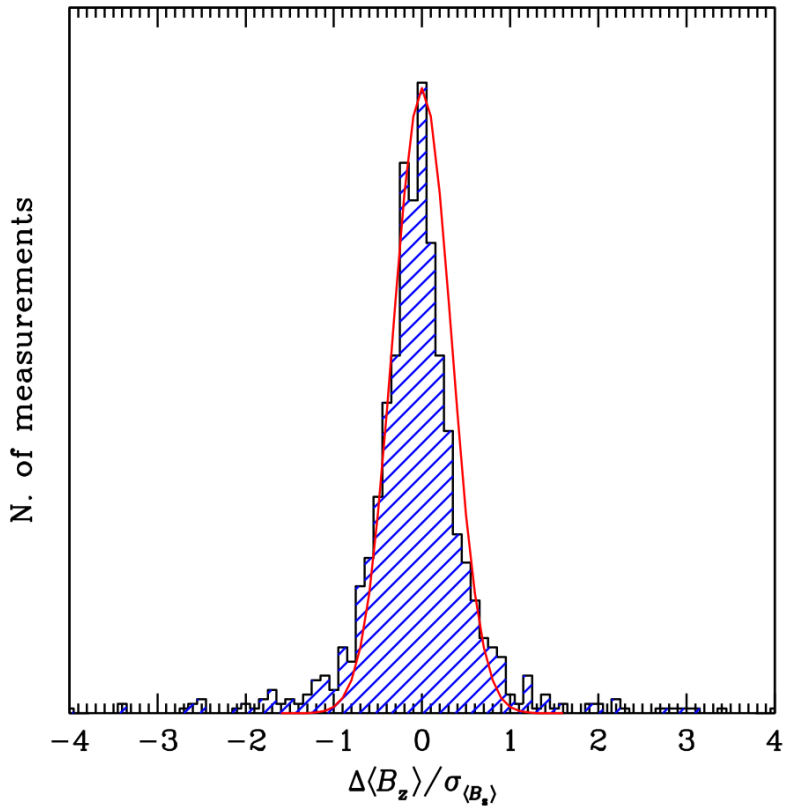
The effect of small (differential) flexures



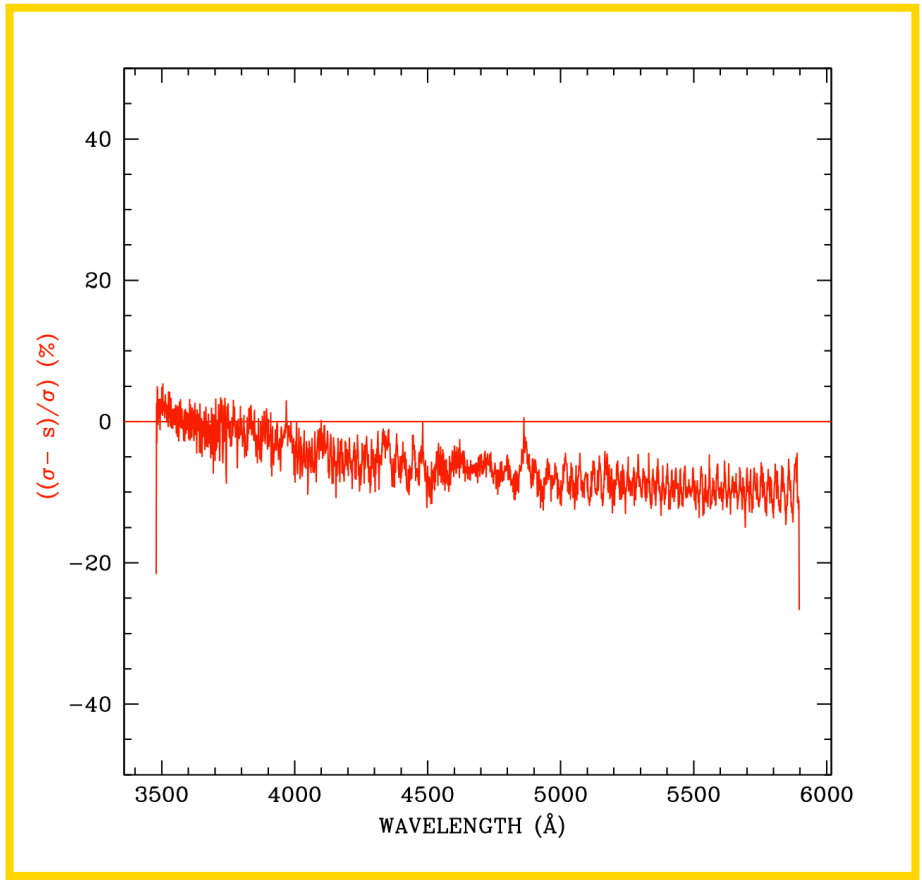
Stability during normal operations



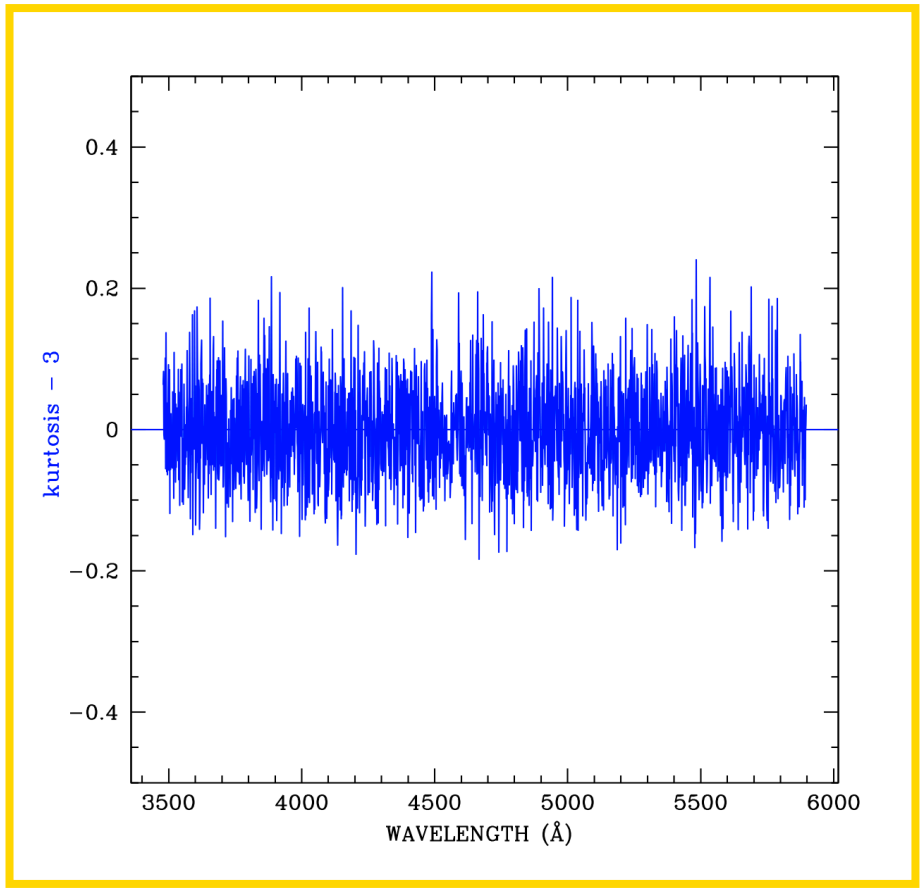
Noise from data reduction

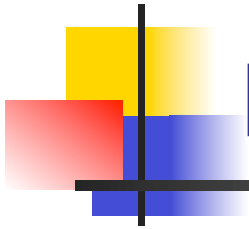


Is normalised *V* normal?



Is normalised *V* normal?





Further (useful?) info:

Bagnulo et al. 2009, PASP, 121, 993

Bagnulo et al. 2012, A&A, 538, 129

What FORS users liked, or would have liked, from the instrument and from its calibration plan

For imaging polarimetry of extended objects (e.g., comets, galaxies):

- Imaging capabilities, free of instrumental polarization ($<10^{-3}$) within its entire field of view
- Capability to flat-field in IPOL and PMOS (for accurate sky subtraction in extended objects)

What FORS users liked, or would have liked, from the instrument and from its calibration plan

In spectropolarimetric mode:

- ❑ High precision in the continuum
- ❑ Large spectral coverage (hence low spectral resolution)
- ❑ X-talk free
- ❑ Shorter overheads (i.e., faster instrument setup and CCD readout)
- ❑ Standard magnetic stars regularly observed
- ❑ A well defined and tested algorithm for data reduction