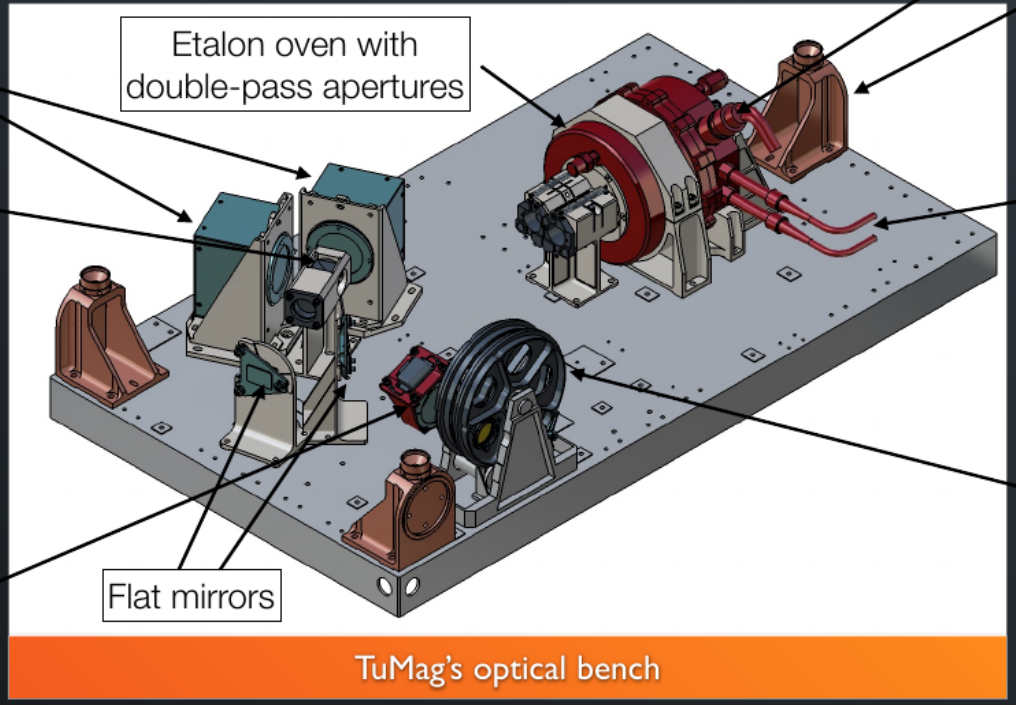
Tunable Magnetograph (TuMAG)

Basic specifications

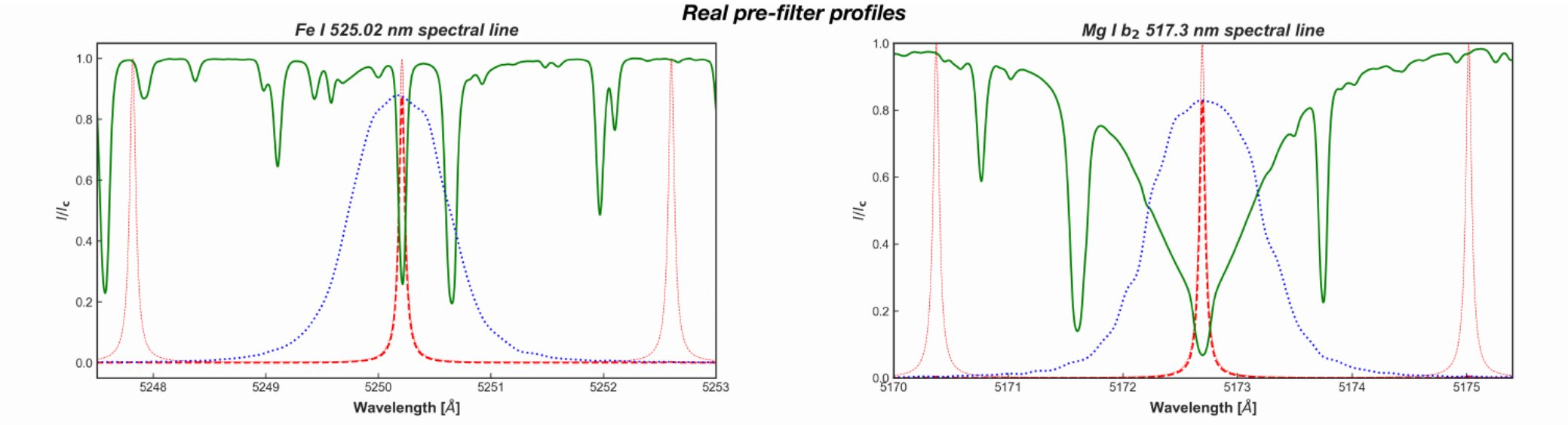
- Diffraction-limited imager at three spectral lines: Fe I @ 525.02 & 525.06 nm and Mg I_{b2} @ 517.3 nm (for a perfect incoming wavefront)
- Phase diversity measurements enabled
- 7+1 samples for Fe I and 9+1 samples for Mg I_{b2}
- Spectral resolution ≥ 50000
- Vector polarimetry (all four Stokes parameters) to 10^{-3} in *Q*, *U*, and *V*
- Temporal resolution better than 60 s
- Longitudinal polarimetry (Stokes *I* and *V*) in 5 + 1 samples
- Temporal resolution better than 15 s
- Deep magnetograph mode for 1000 ≤ S/N ≤ 100000

Optical unit



TuMag's optical bench

Spectral lines



Observing modes

TuMag Basic Parameters

Spatial resolution:	0,108	[arcsecond]			
Spatial sampling:	0,038	[arcsec/pixel]			
Field of view:	64"x64"	1684	pixels^2		
Spectral resolution:	6,58	pm			
S/N per frame in polarization	166		Exp. time / frame	41,7	[ms]
Polarization efficiency [%]	50		*at 24 fps		
Camera FullWell	90000	[electrons]			
Camera fill state per frame	30,00%				
Prefilter transmision	74.4%	Camera QE:	95,30%		
Transmission ISLID+Telescope:	0,49				
Transmission TuMag:	0,131				
Total transmission:	0,064				
Photon budget (F7)	748398	[ph/s/pixel]			

Spectral lines: **Fe I 525.02 nm + Fe I 525.06 nm + Mg I b2 517.3 nm**

Observing Modes:	N wavelengths	N pol States	N acc**	Total obs time***	Target S/N	Size (MB/s)
Obs 0-s:	15	1	2	**11,88**	500	11,22
Obs 0-p:	15	4	19	**53,1**	1000	10,04
Obs 1:	10	4	19	**35,67**	1000	9,97
Obs 2:	8	4	19	**26,74**	1000	10,63
Obs 3:	5	2	25	**11,65**	1000	7,63
Obs 4:	3	4	114	**57,83**	2500	1,84
Obs 5:	3	4	114	**57,67**	2500	1,84
PD (100 frames):	1	4	1	**10,67**	1000	66,64

Obs 0-s: **spectrocopic** mode. 15 wl sampes across the line from -70 to 70 pm with 10 pm step size for Mg I b2
Obs 0-p: **extended** mode. 15 wl sampes across the line from -70 to 70 pm with 10 pm step size with polarization for Mg I b2
Obs 1: **normal** mode. 9 wl points in the line + continuum [-30 , -20 , -10 , -5 , 0 , 5 , 10 , 20 , 30 , 70] pm for Mg I b2
Obs 2: **normal** mode. 7 wl points in the line + continuum [-12 , -8 , -4 , 0 , 4 , 8 , 12 , 22] pm for Fe I 525 lines
Obs 3: **fast** mode. 4 wl points in the line + 1 continuum [-8, -4 , 4 , 8 , 22] pm for Fe I 525 lines. Stokes I and V only.
Obs 4: **deep** mode. 3 wl points in the line [-10 , 0 , -10] pm for Mg I b2 line
Obs 5: **deep** mode. 3 wl points in the line [-8 , 0 , -8] pm for Fe I 525 lines

* Camera baseline frame rate 24fps (continuous)
** Number of accumulations is determined to achieve required S/N=1000 in each obs mode. PD modecorresponds to single frames.
*** Times correspond to a single line observations (in seconds) . Add 4 seconds for line selection.