

INAF-Osservatorio astronomico di Torino

Technical Report nr. 153

**Technical description of the CorMag
Instrument**

G. Capobianco, G. Massone, S. Fineschi

Pino Torinese, 25th july 2011



Technical description of the CorMag Instrument



OATo TR 153
Rev. 0.0
2011.07.25

2

Index

Index	2
Index of Figures	2
List of Acronyms	2
Revision Log	2
Technical Description	3

Index of Figures

Figure 1 – CorMag telescope layout.....	3
Figure 2 – CorMag telescope optical layout.....	3
Figure 3 – CorMag mechanical draw.....	5
Figure 4 – Spot diagram for different fields	5
Figure 5 – Fraction of enclosed energy	6
Figure 6 – The CorMag telescope	6
Figure 7 - Mechanical assembly of the LCTF. From left: the pre-filter, the LCPR and the multistage LC Lyot filter	7

List of Acronyms

CaT	Camera Triplet
CCD	Charge Coupled Device
CorMag	Coronal Magnetograph
CoT	Collimator Triplet
D	Detector
DFP	Detector Focal Plane
FS	Field Stop
FSR	Free Spectral Range
FWHM	Full Width at Half Maximum
LCPR	Liquid Crystals Polarization Rotator
LCTF	Liquid Crystals Tunable Filter
O	Objective Lens

Revision Log

<i>Date</i>	<i>Issue</i>	<i>Release</i>	<i>Released by</i>	<i>Comment</i>
2011.07.22	0	0	G.Capobianco	First issue

Technical Description

The CorMag instrument is a spectropolarimeter telescope designed for the detection and the spectropolarimetry of the solar corona FeXIV emission line (530.3 nm) during the total solar eclipses observations. The optical layout is shown in Figure 1 and Figure 2.

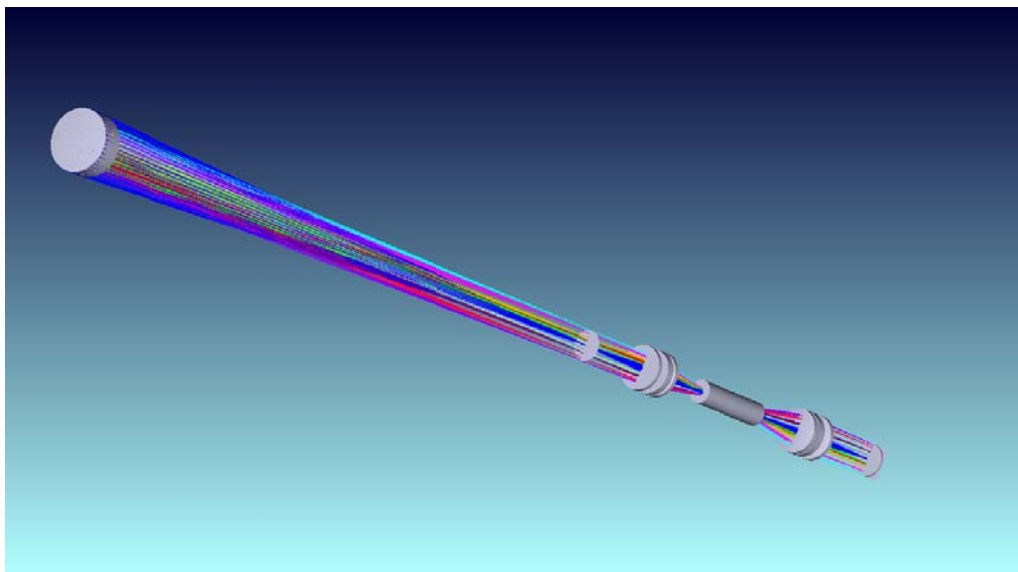


Figure 1 – CorMag telescope layout



Figure 2 – CorMag telescope optical layout

From the left, the first element is the objective lens (O), an achromatic doublet, after the field stop (FS) there are the collimator triplet (CoT), the Liquid Crystal Tunable Filter (LCTF), the camera triplet (CaT) and the detector focal plane (DFP). The properties of the elements are resumed in Table 1. The mechanical draw is in Figure 3. The polarimetric block with the LCTF and the relay optics have a length of 282.9 mm.

Objective lens [O]	Focal length[mm]: 800	
	Diameter [mm]: 60	
	F/#: 13.3	
Collimator triplet [CoT]	Focal length [mm]: 100	
	Diameter [mm]: 50	
	Glasses: N-LAF21/SF10/N-LAK8	
	Achromatic designed by Optec	
Liquid Crystal Tunable Filter [LCTF]	LCTF General	Length [mm]: 90
		Diameter [mm]: 60
	Pre-filter	Aperture [mm]: 20
		Number of stages: 4
LCPR	FSR [nm]: 2.7	
	FWHM [nm]: 0.15	
		Center wavelength [nm]: 528.64 – 533.38
		Tuning step [nm]: 0.01
		Manufacturer: Andover Corp.
		Center wavelength [nm]: 530.69
		FWHM [nm]: 1.89
		Manufacturer: MLO
		Rotation angles [deg]: 0 - 180
Camera triplet [CaT]	Focal length [mm]: 100	
	Diameter [mm]: 50	
	Glasses: N-LAF21/SF10/N-LAK8	
	Achromatic designed by Optec	
Detector [D]	Type: CCD Camera FLI Proline 1001E	
	Sensor: Kodak KAF-1001E	
	Frame size [pixels]: 1024x1024	
	Pixel size [μm]: 24	
	A/D Conversion [bit]: 16	

Table 1 – CorMag single elements specifics

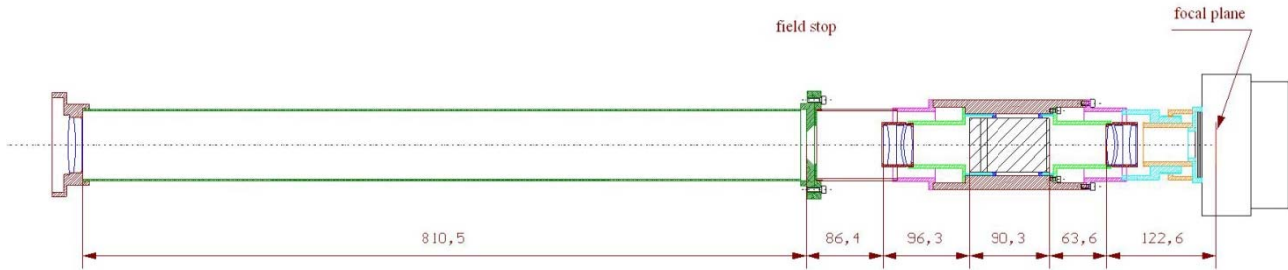


Figure 3 – CorMag mechanical draw

The spot diagram for different fields and the fraction of enclosed energy are reported in Figure 4 and in Figure 5.

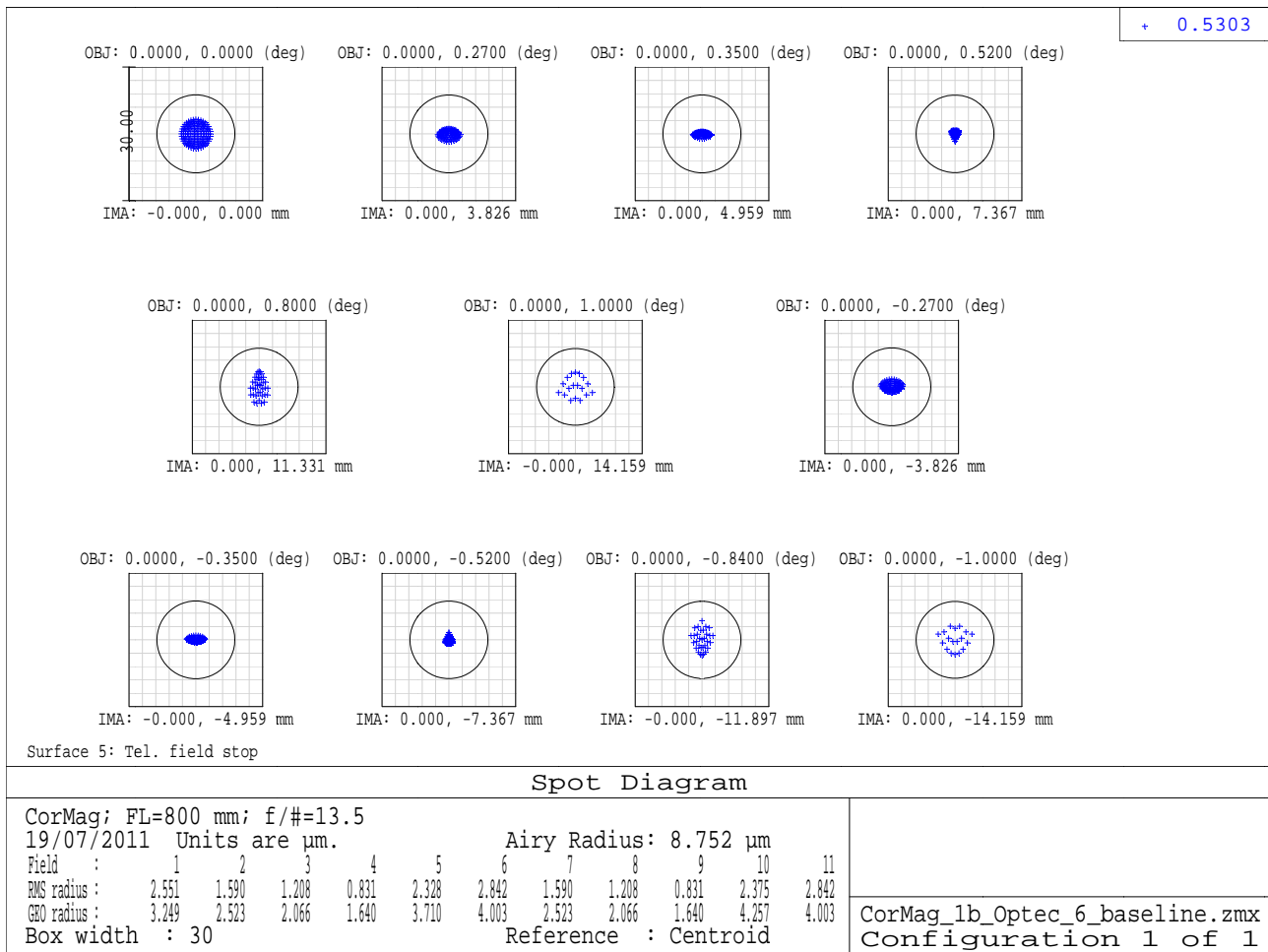


Figure 4 – Spot diagram for different fields

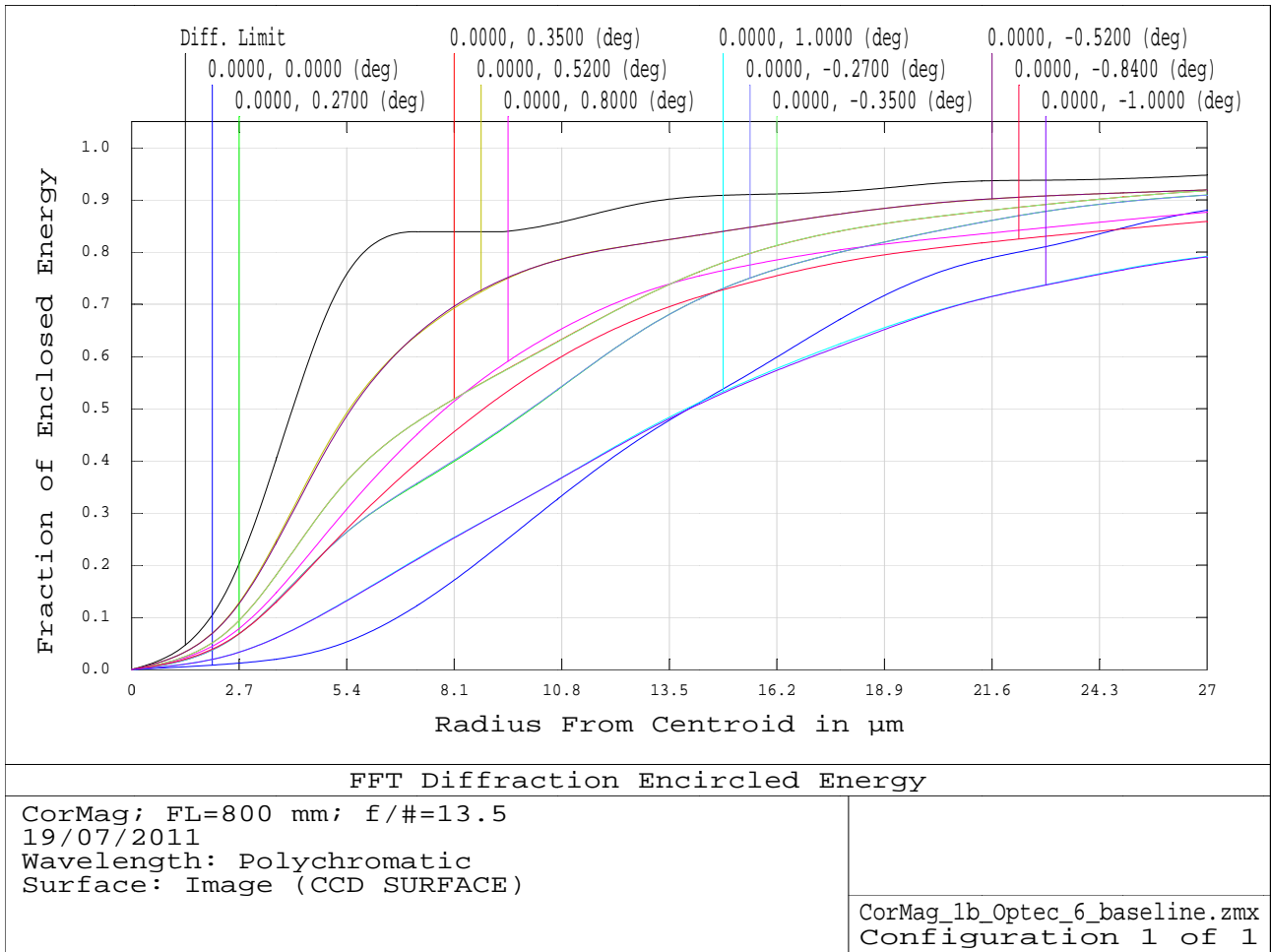


Figure 5 – Fraction of enclosed energy

A picture of the CorMag instrument is in Figure 6.



Figure 6 – The CorMag telescope

The mechanical assembly of the LCTF is shown in Figure 7.

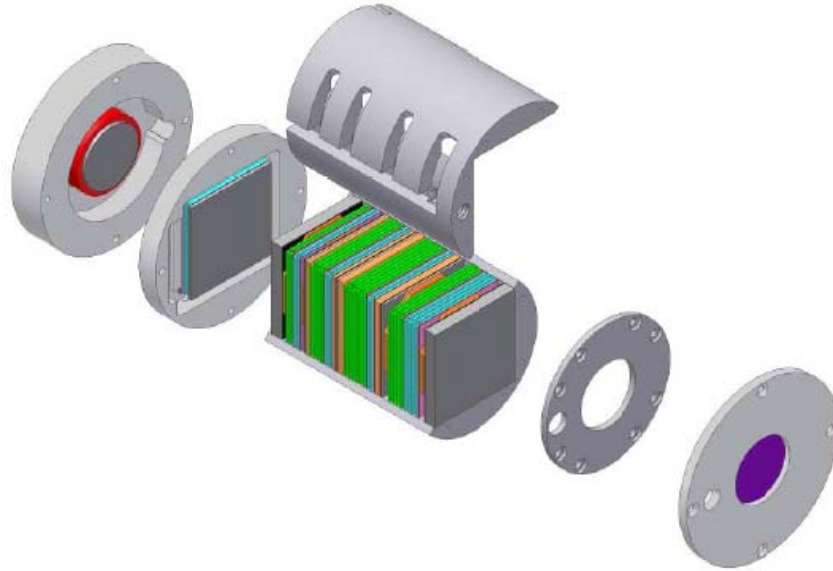


Figure 7 - Mechanical assembly of the LCTF. From left: the pre-filter, the LCPR and the multistage LC Lyot filter