Optical observations of the solar chromosphere by NAO Rozhen

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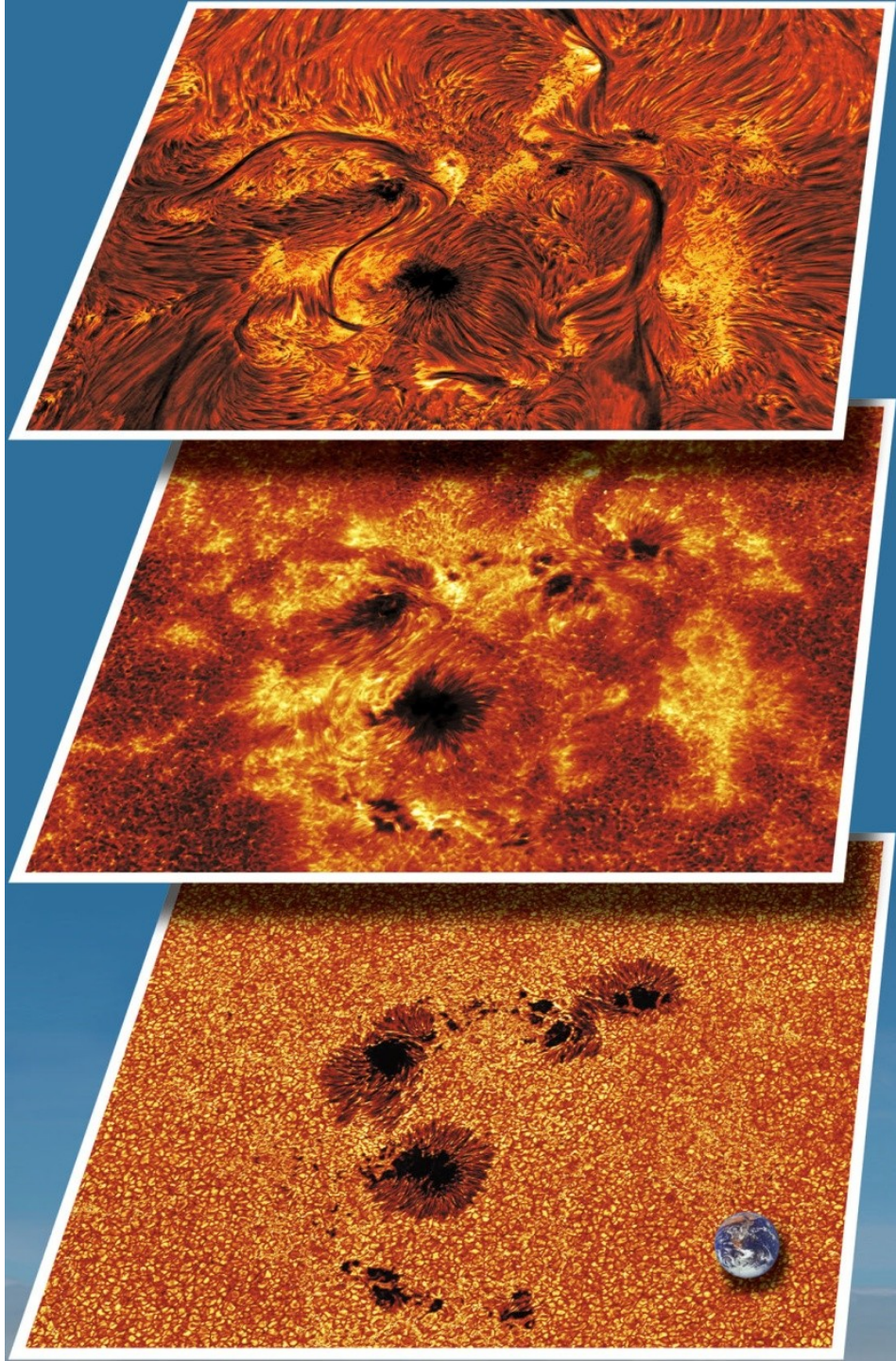
designation	λ (Å)	width (Å)	type	tuning
blue continuum	4320	6	interference	fixed
red continuum	6563	3	interference	tiltable
G band	4305	10	interference	fixed
Ca II H	3968	1.35	interference	tiltable
Hα	6563	0.25	Lyot	tunable
Ba II	4554	0.08	Lyot	tunable

Dutch Open Telescope on La Palma

http://www.staff.science.uu.nl/~rutte101/dot/DOT_tomography.html

1999-2010г.



Hα (656.3 ηм)
chromosphere

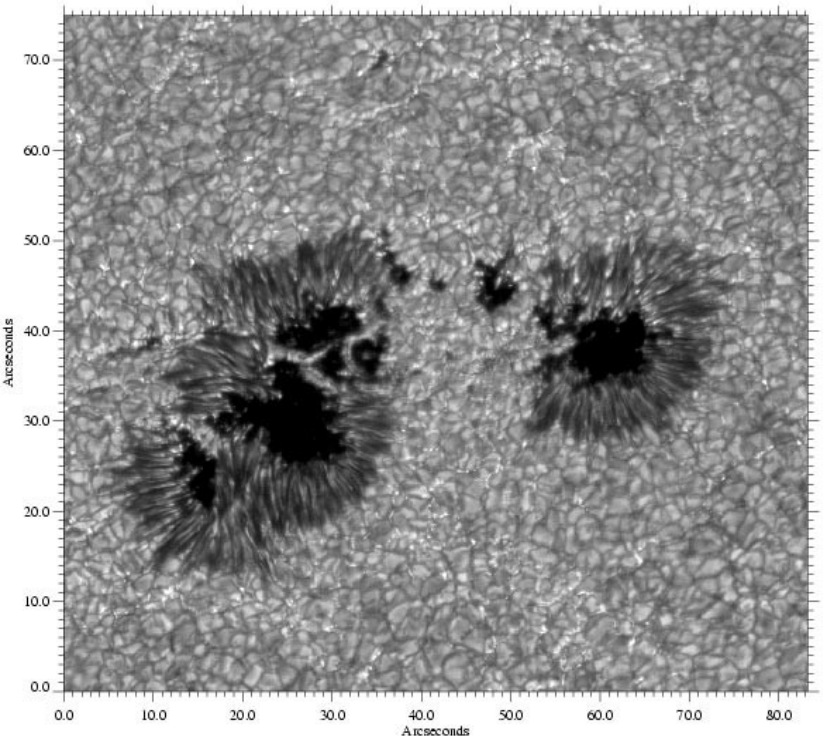
2000 км

Ca II H (396.8 ηм)
photosphere/chromosphere

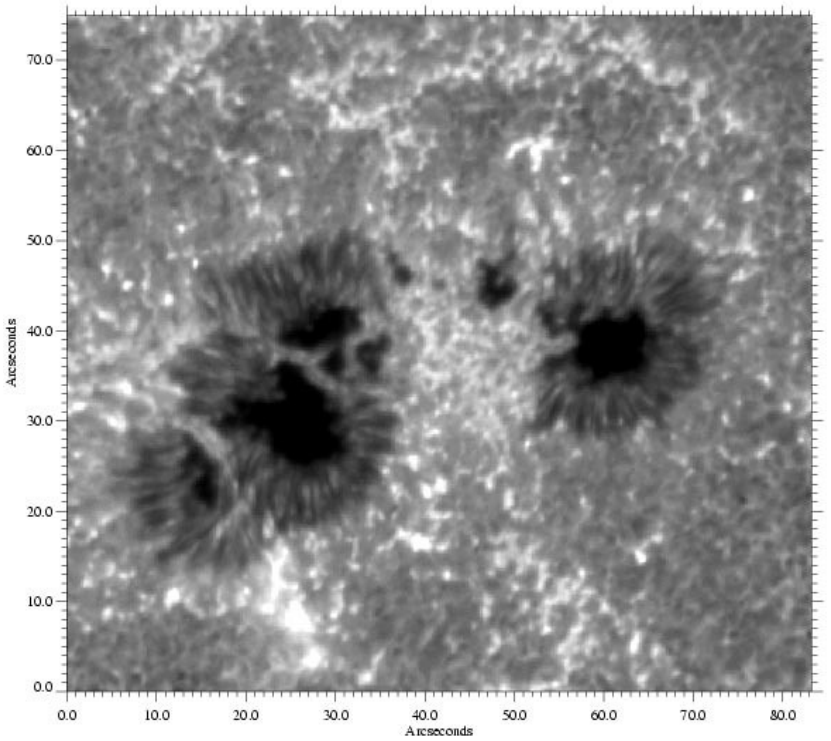
500 км

G-band (430.5 ηм)
(CH molecule)
photosphere

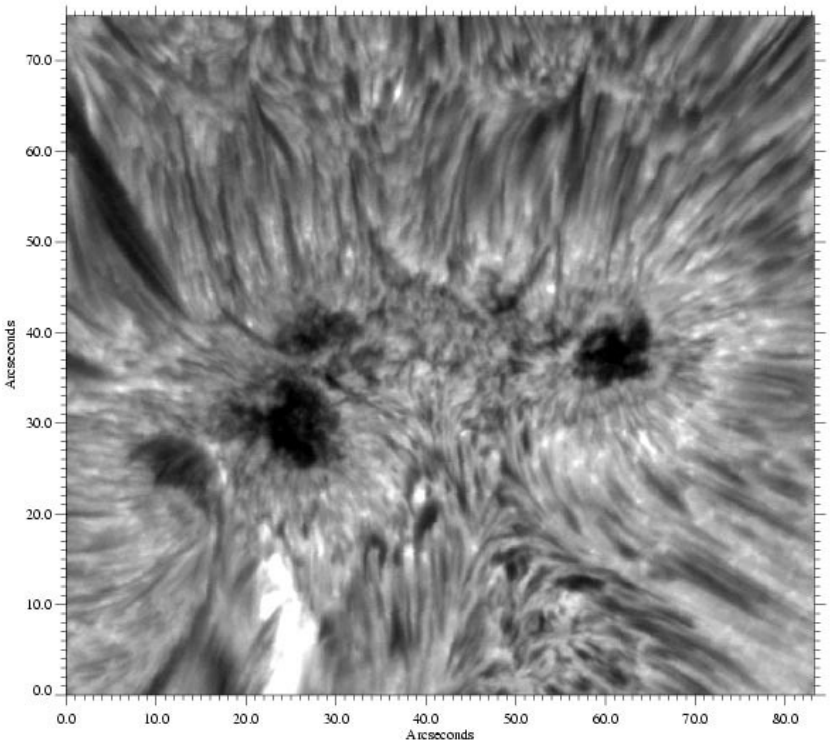
0 км



G band (4305.4Å)
T~6000 K



Ca IIK (3933.66Å)
T~4000 K



H_α (6562.81Å)
T~40000 K

- Solar photosphere imaged in the G band
- The Ca IIK shows the magnetic “network” made up by concentrations of the magnetic elements as bright due to magnetically induced heating
- The H_α line maps expanding fibrils in the transition to the corona, where the magnetic field lines constitute coronal loops sampled

October 7, 2001, DOT Team

- CO molecule (4.67 μm), lower hromosphere (T~4000 K); *H. Uitenbroek, 1999, NSO McMath-Pierce Telescope*

Offer

1. China

1.1 Multi-Tubes Solar Telescope MAX

Suggestion for BG solar observations from Weijun Mao:

Telescope will be consists of **four** tubes, aperture of tubes selected to meet the diffraction limits **better than 1 arc-second.**

1. Chromosphere observing tube:

Clear aperture 165mm.
Full-disc observing mode,
FOV: ∱36′
Há birefringence filter: will be mounted in collimating optical system.
Center wavelength: 6562.81Å.
Passband FWHM: 0.25Å.
Wavelength shift range: +/-2Å , controlled by PC , shifting duration between terminal wavelength position will be less than 30 seconds.

2. Calcium K line observing tube :

Clear aperture 100mm.
Full-disc observing mode,
FOV: ∱36′
K line birefringence filter: will be mounted in collimating optical system.
Center wavelength: 3933.66Å.
Passband FWHM: 2.0Å.
Wavelength shift range: +/-2Å , controlled by PC , shifting duration between terminal wavelength position will be less than 30 seconds.

3. G-BANG observing tube :

Clear aperture 120mm.
Full-disc observing mode,
FOV: ∱36′
g-band interference filter.
Center wavelength: 4305.4Å.
Passband FWHM: 8Å (it is ok for white light observation, but it depends on you.)

4. Fe I line observing Magnetic tube :

Clear aperture 120mm.
Full-disc observing mode,
FOV: ∱36′
Fe I line birefringence filter: will be mounted in collimating optical system.
Center wavelength: 6302.51 Å.
Passband FWHM: 0.10Å.
Wavelength shift range: +/-0.5Å , controlled by PC , shifting duration between terminal wavelength positions will be less than 30 seconds.

5. Four tubes will mounted on one equatorial telescope.

6. Functions will be equipped : auto-pointing, auto tracking, focusing by computer, cover of telescope controlled by computer etc.

1. China

1.2. Multi-Tubes Solar Telescope MIN

Suggestion for BG solar observations from Weijun Mao:

Telescope will be consists of **two** tubes, aperture of tubes selected to meet the diffraction **limits better than 1 arc-second**.

1. Chromosphere observing tube:

Clear aperture 165mm.
Full-disc observing mode,
FOV: ∱36′
Há birefringence filter: will be mounted in collimating optical system.
Center wavelength: 6562.81Å.
Passband FWHM: 0.25Å.
Wavelength shift range: +/-2Å ， controlled by PC ， shifting duration between terminal wavelength position will be less than 30 seconds.

2. G-BANG observing tube:

Clear aperture 120mm.
Full-disc observing mode,
FOV: ∱36′
g-band interference filter.
Center wavelength: 4305.4Å.
Passband FWHM: 8Å

3. Two tubes will mounted on one equatorial telescope.

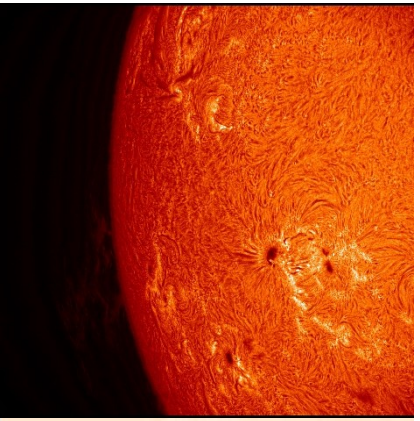
4. Functions will be equipped ： auto-pointing, auto tracking, focusing by computer controll, cover of telescope controlled by computer etc.

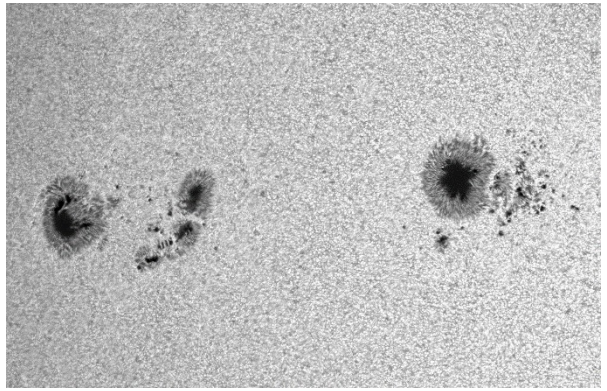
Introduction of some examples of Solar telescope made by Nanjing

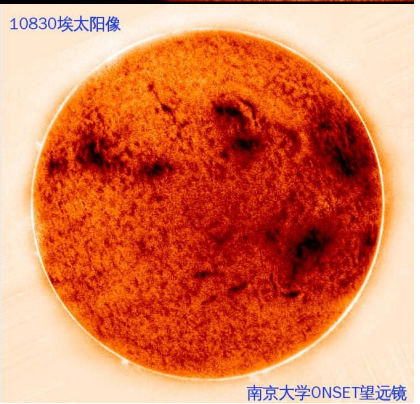
1. **Nanjing University**
Optical & NIR Solar Eruption Tracer (ONSET)

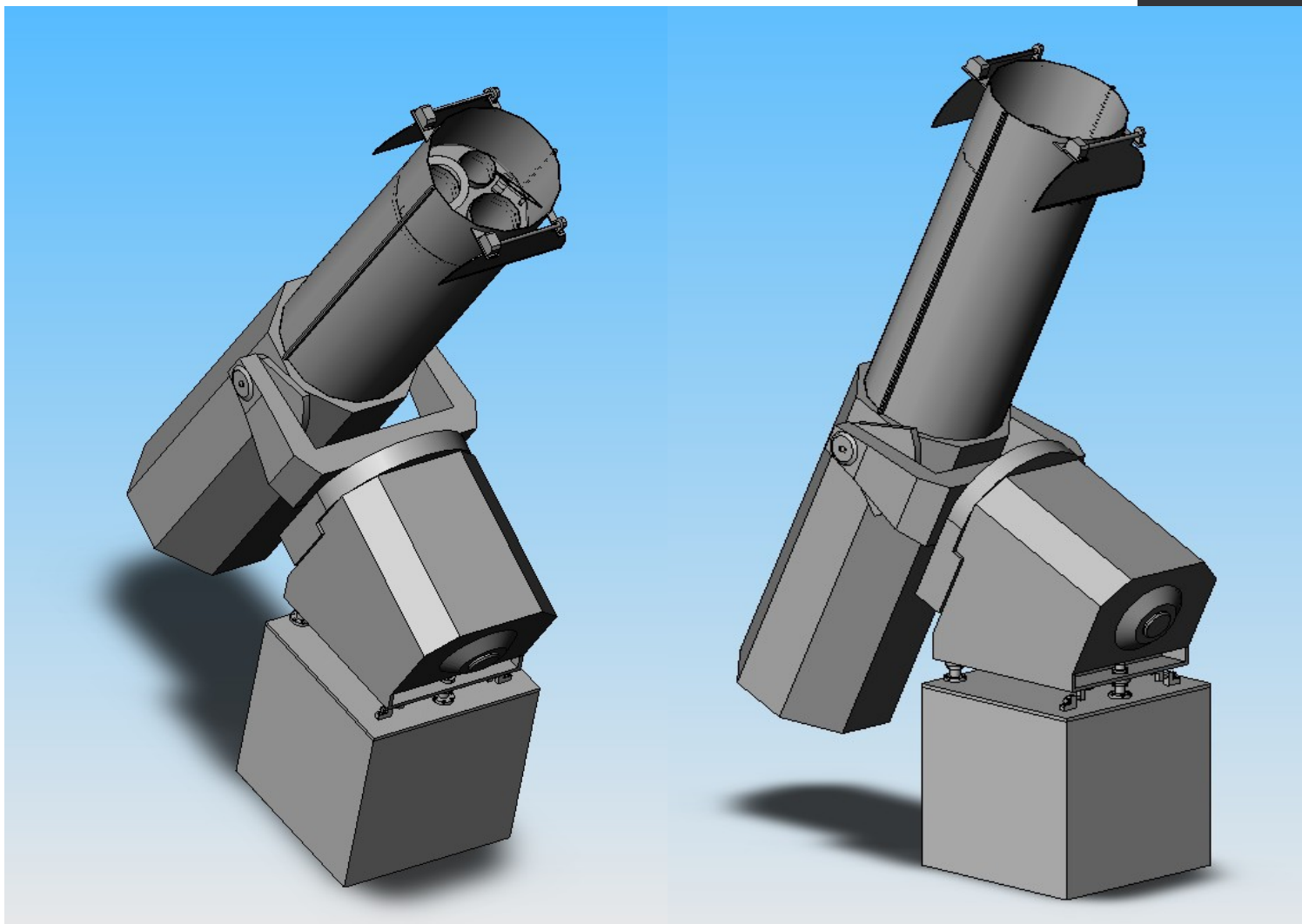
Consists of four tubes:

275mm Ha tube with, 0.25A FWHI Lyot filter;
275mm 10830A tube with, 0.5A Lyot filter;
200mm white light tube;
140mm tracking tube.







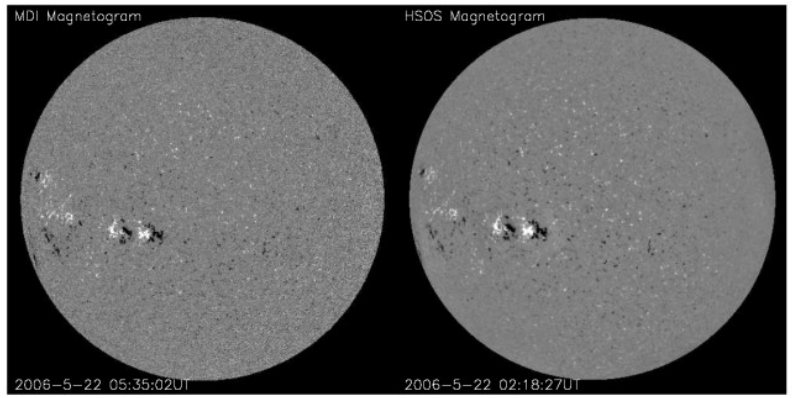


Introduction of some examples of Solar telescope made by Nanjing

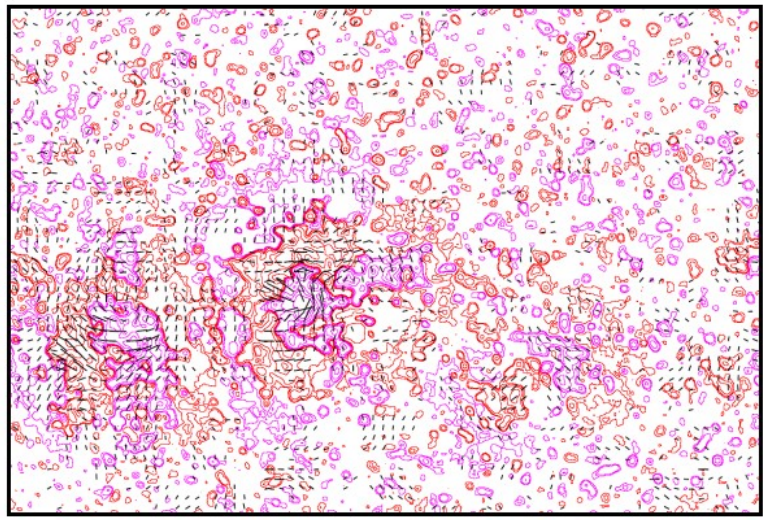
2.Full Solar Disk Hα / Vector Magnetograph Telescope, National hi-tech research and development program

magnetic vector field image

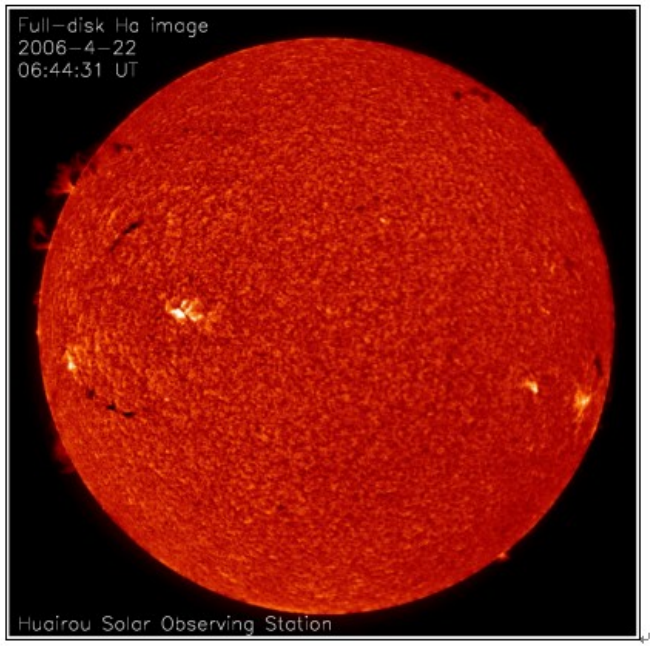
图：全日面太阳光学与磁场监测系统



图：全日面矢量磁图的纵向分量（右）和 SOHO 空间太阳卫星上的 MDI (左) 磁图比较

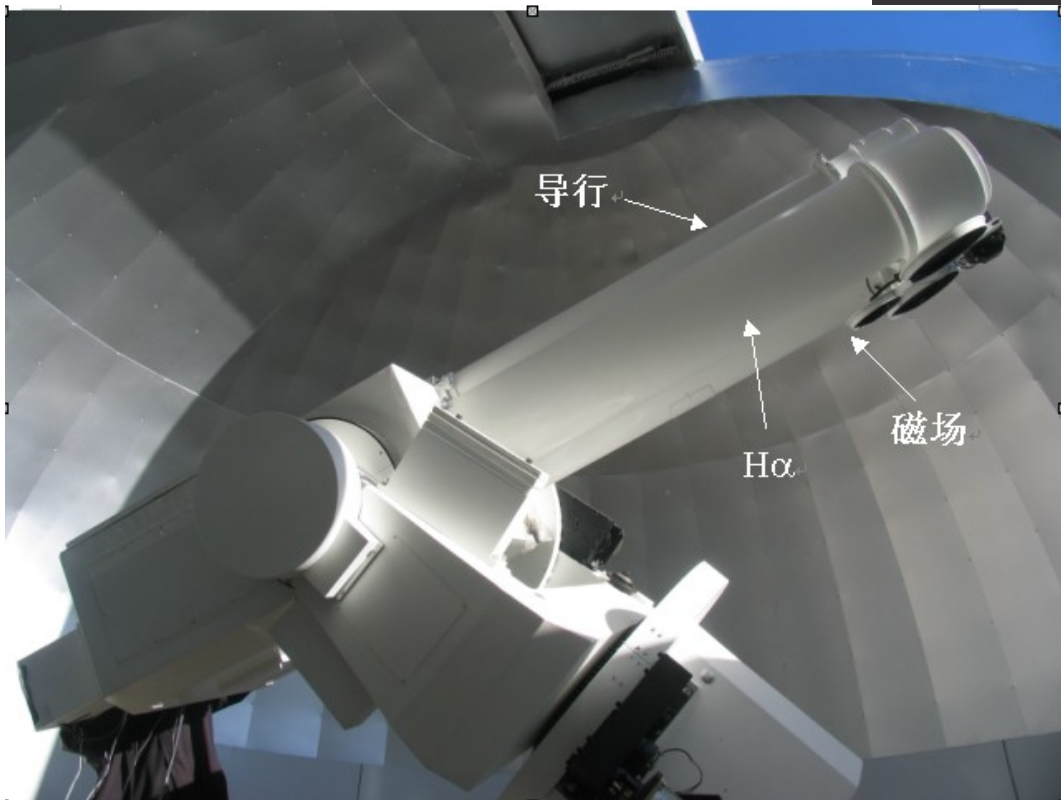


chromosphere image

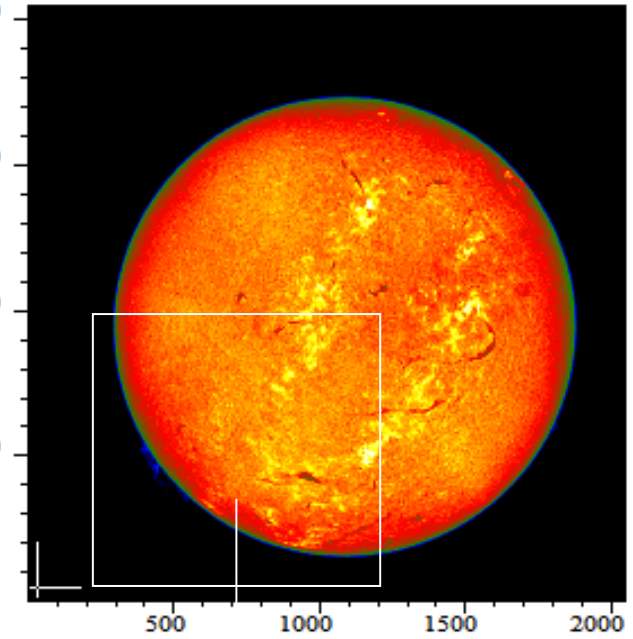


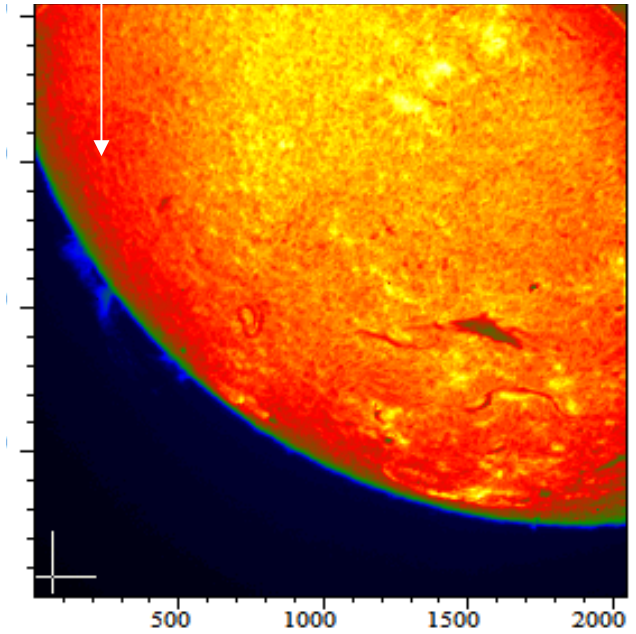
图：观测的全日面 Hα 色球单色像

Tracking, Hα, Magnetic tube



Introduction of some examples of Solar telescope made by Nanjing





3. For IIAP(India)
Chromospheric Telescope 200mm aperture 0.4A Lyot filter

Offer

1. China

1.1 Multi-Tubes Solar Telescope MAX

No.	Items	Cost FOB Shanghai in USD
1	165mm Chromosphere observing tube	100,000
2	100mm Caicium K line observing tube	30,000
3	120mm G-BANG observing tube	30,000
4	120mm Fe I line observing Magnetic tube	50,000
5	Há birefringence filter	250,000
6	K line birefringence filter	180,000
7	Fe I line birefringence filter	350,000
4	Equatorial mount	220,000
5	Electric control system	160,000
Total		**1,370,000**

1.2. Multi-Tubes Solar Telescope MIN

No.	Items	Cost FOB Shanghai in USD
1	165mm Chromosphere observing tube	100,000
2	120mm G-BANG observing tube	30,000
3	Há birefringence filter	250,000
4	Equatorial mount	200,000
5	Electric control system	150,000
Total		**730,000**

+ value added tax (~13%), + duty

2. USA

Offer

2.1 Research Solar System Filter Wheel

DayStar: http://www.daystarfilters.com/SolarSystem.shtml

Telescope Manufacturer	Model / aperture	F/ratio	Focal Length	Price
Takahashi	TOA-130S	F/7.7	EFL: 1000	$6,925.00 USD

Emission Line	Center Wavelength	FWHM	Price
G Band	4305.4 Å	8.0 Å (0.8nm)	
Ca II H-Line	3968.5 Å	2.0 Å (0.2nm)	
Ca II K-Line	3933.7 Å	2.0 Å (0.2nm)	
He D3 PE grade	5875.65Å	0.3 Å (0.03nm)	
			$40,882.50 USD

CCD Camera Manufacturer	Series	Model	Sensor	Price
Point Grey	Grasshopper	GS3-U3-123S6M-C **30 Frames/sec**	Sony IMX253 **Chip: 14 x 10mm** 4096 x 3000 pixel	$3,995.00 USD

2. USA

Offer

2.1 Research Solar System Filter Wheel

DayStar: http://www.daystarfilters.com/SolarSystem.shtml

Adapters and Accessories		Price
UV/IR blocking	2" / 50.8mm Pre-filter	$129.00 USD
Telecentric Barlow	Oversized Aperture, Likely a custom barlow	$2445.00 USD
Female drawtube adapter	SCT-2"	$50.00 USD
Dielectric Coated Diagonal	2"	$149.00 USD
Imaging Focal reducer	Non-spherically aberrated Variable image reduction .5x, .33x	$323.50 USD
remote/motor focuser	QuickSync FSQ Motor for the Takahashi MEF focuser	$335.00 USD
Focus Lynx focuser Controlling Hub	Focus controller capable of controlling two separate stepper driven focusers with Cat5 Ethernet, Wireless 802.11, and serial /USB computer input. Includes built-in step driver board for Focuser 1, universal power supply, and 7-ft. Cat-5e network cable.	$325.00 USD
	Total Adapters and Accessories	$3,756.50 USD

APO telescope, Filter Wheel, CCD Camera and all Adapters	Total Price: $55,559.00 USD

Total		**~56,000 USD**

+ value added tax (~20%), + duty

2. USA

Offer

2.2 DayStar DUAL BANDPASS TELESCOPE

DayStar: http://www.daystarfilters.com/SolarSystem.shtml

DayStar 127mm DUAL BANDPASS TELESCOPE:			
Suggested Emission Line	**Center Wavelength**	**FWHM**	**Price**
Hydrogen Alpha Line	6562.82 Å	**0.2 Å (0.02nm) PE grade**	$41,400.00 USD
Wing shift of fast moving chromosphere		Polarizing Beamsplitter & Mountings	$ 849.00 USD
Focus Lynx motor			$375.00 USD
Focus Lynx motor controller			$325.00 USD
		Total	**$42,949.00 USD**
		(note: in 0.3Å, the dual bandpass telescope is $33,769.00 USD)	

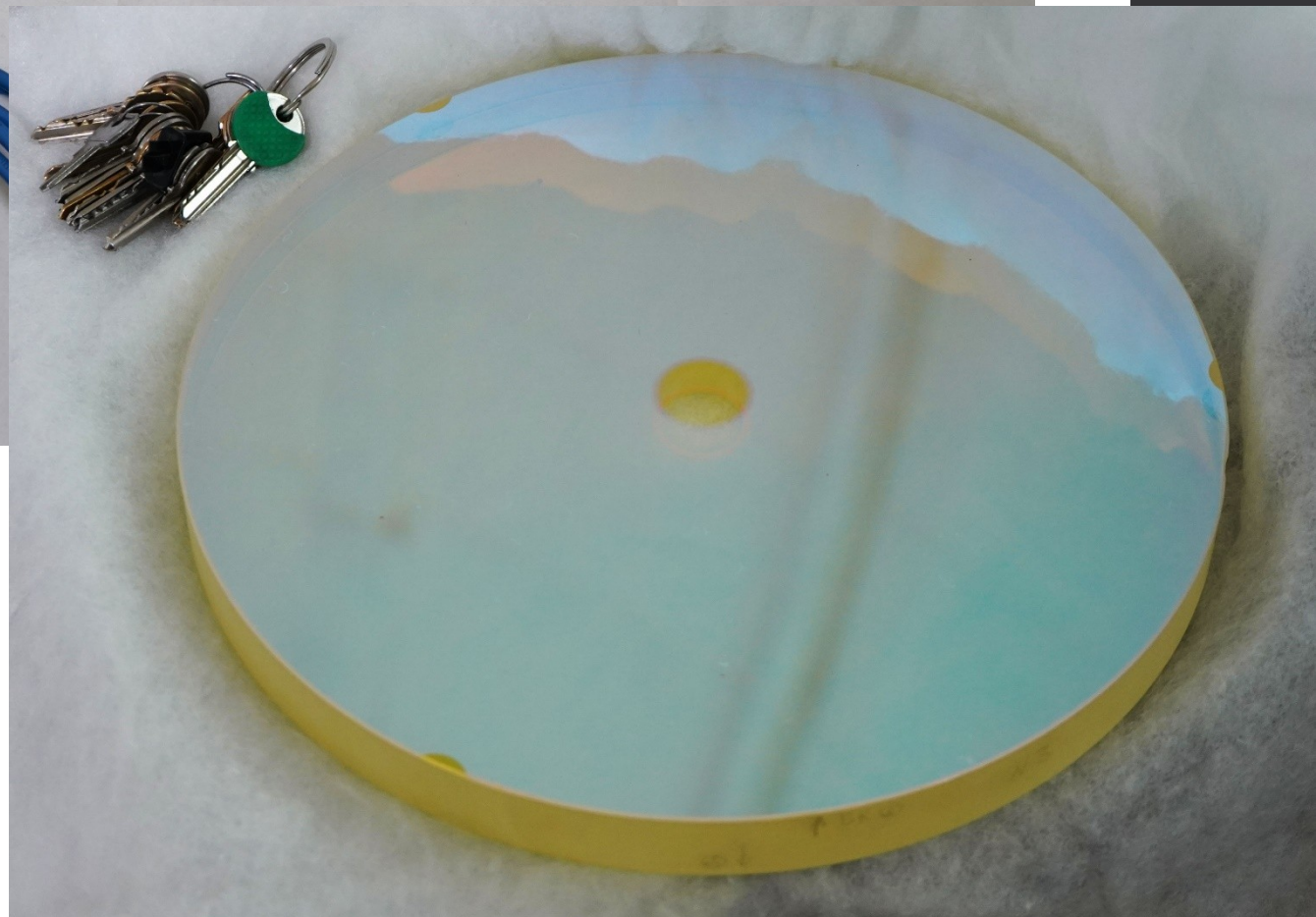
CCD Camera Manufacturer	**Series**	**Model**	**Sensor**	**Price**
Point Grey *(Recommended)*	Grasshopper	GS3-U3-123S6M-C **30 Frames/sec**	Sony IMX253 **Chip: 14 x 10mm** 4096 x 3000 pixel	$3,995.00 USD x 2
				$7,990.00 USD

2 Dual Bandpass Telescope with 2 CCD cameras & adapters:	**Total Price: $50,939.00**

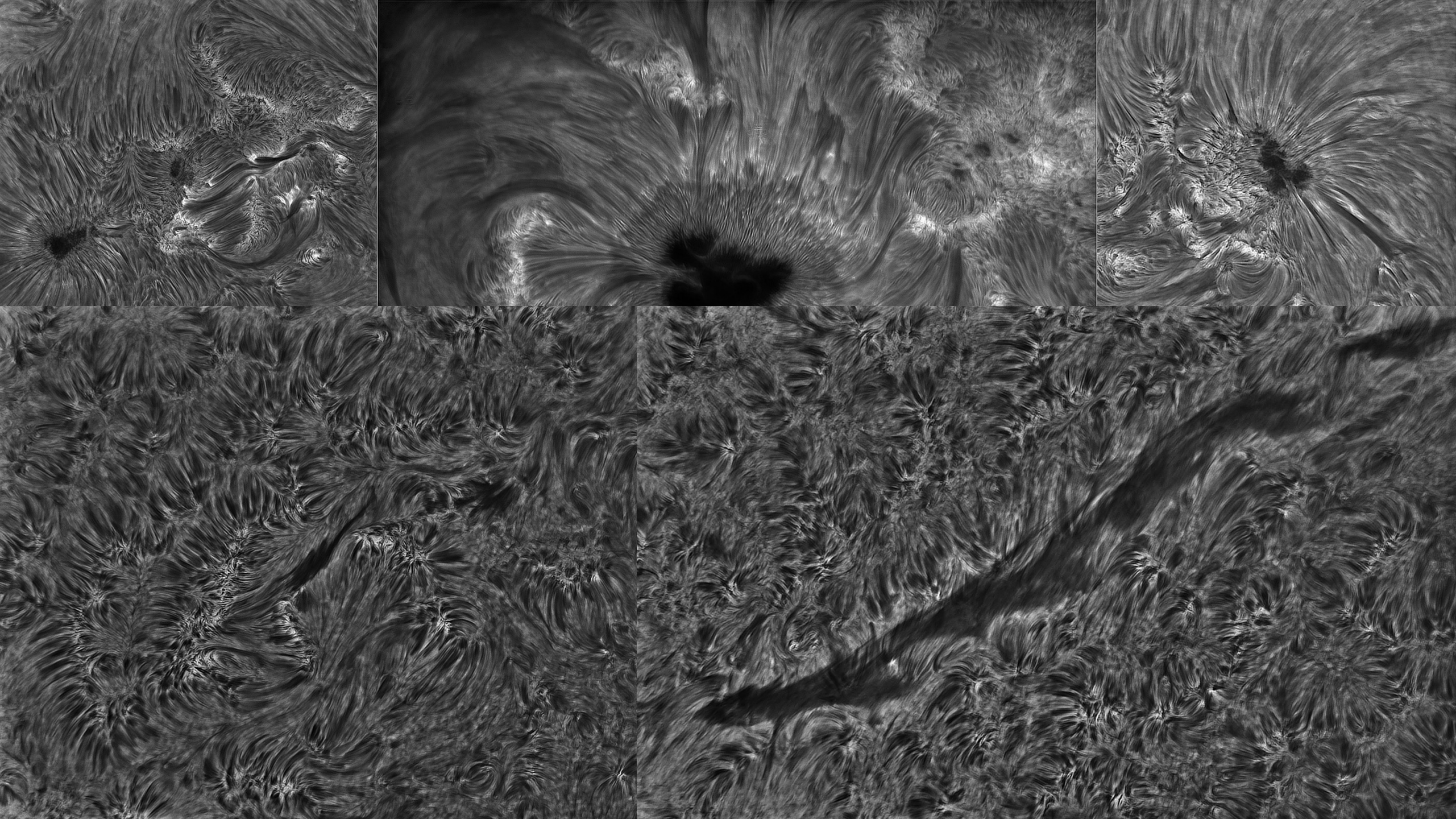
3. Ukraine

Offer

3.1. Chromosphere solar telescope



Total: 25, 000.00 Euro
+ value added tax (~20%), + duty



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$895 - Dual Servo Telescope Controller II

Febuary, 2012!!! Finally, SiTechExe version 0.90A is released! Go to the download page to read about it!

Thank you for attention

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