



A network for solar optical observations in Bulgaria

Rositsa Miteva [1]

rmiteva@nao-rozhen.org

Pencho Markishki [1]

Werner Pötzi [2]

Momchil Dechev [1]

Dragomir Marchev [3]

Samuil Petrov [3]

Georgi Latev [1]

Hristo Kirov [4]

Kamen Kozarev [1]

[1] IANAO-BAS

**[2] Kanzelhöhe Observatory,
University of Graz**

**[3] Astronomical Center -
Shumen University**

**[4] St. George Private
School & Preschool**



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First images

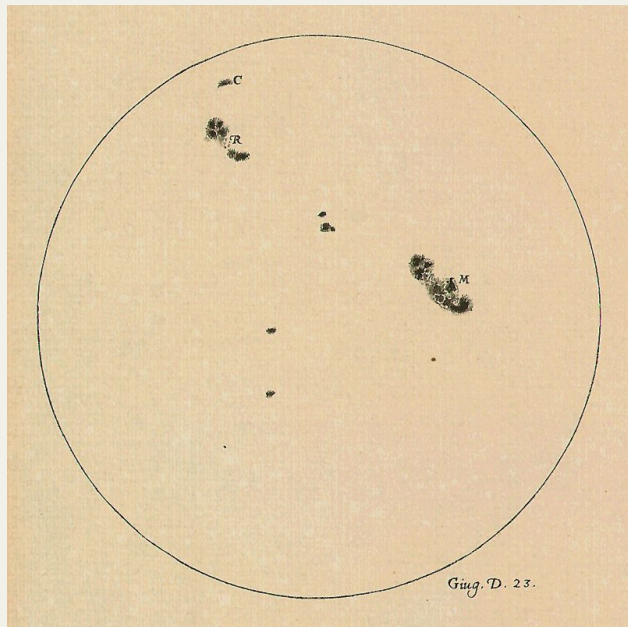
Outlook



General information

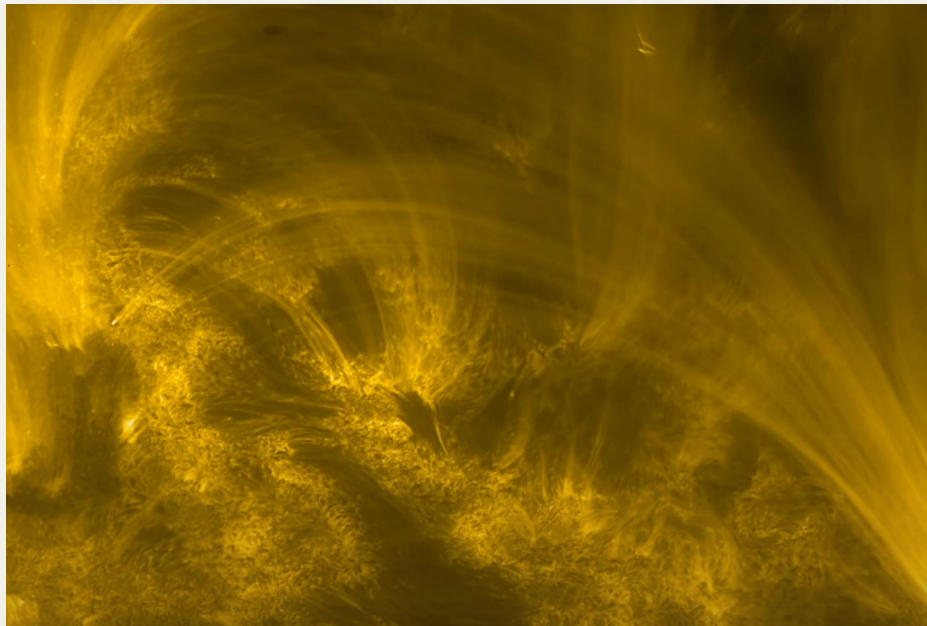
from Galileo to Solar Orbiter

2022-03-26 @ 0.32 AU



visible

https://galileo.library.rice.edu/sci/observations/sunspot_drawings.html



EUV

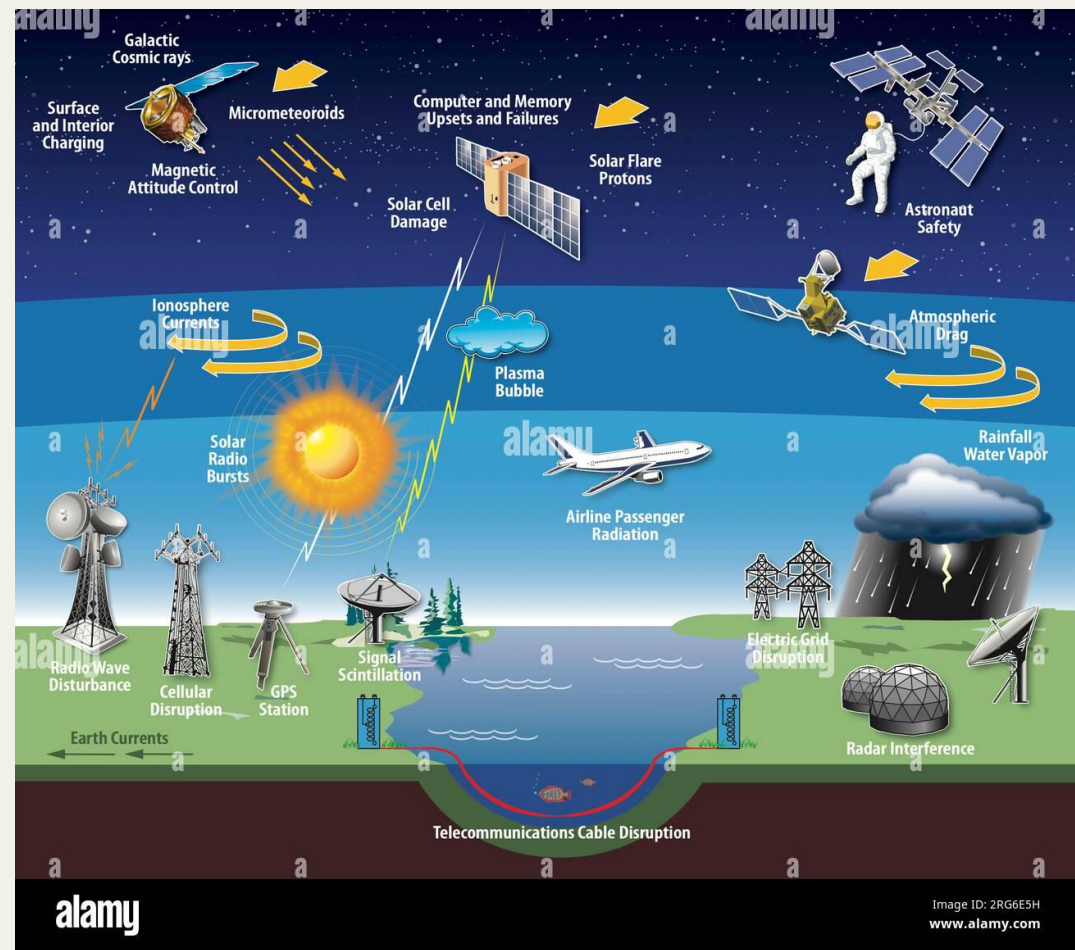
https://www.youtube.com/watch?v=L00J3hZCdFs&ab_channel=SciNews

Space weather

SW is the influence of solar magnetized plasma (solar wind streams, CMEs), radiation and energetic particles on the planetary systems, technology and human health and life

Impacts:

- Satellites
- Power grids
- Radio communications
- Navigation systems
- Radiation exposure



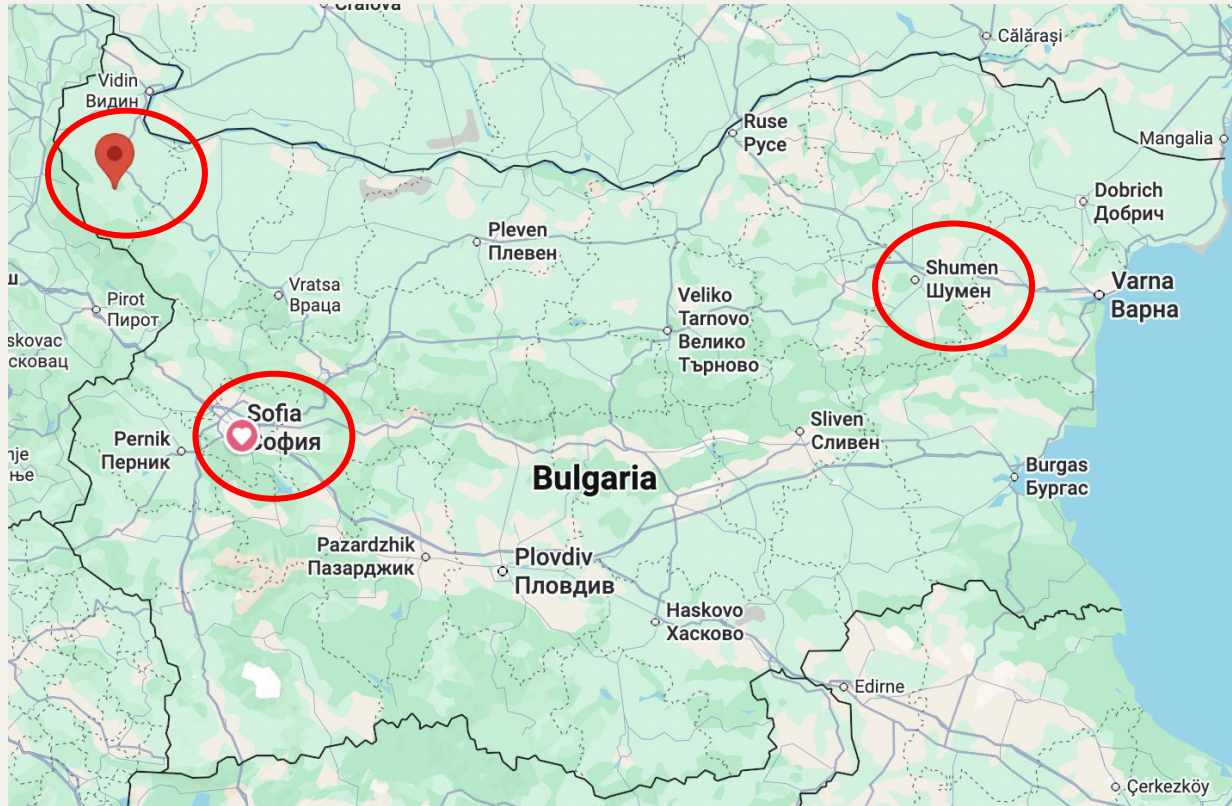
Aim

Solar observations in Bulgaria

- **Coordination: instruments, filters, data**
- **Setup: monitoring program & online catalog**
- **Results: science & education**



Participants



**I. AO-Belogradchik
~520 m**

**II. AO-Shumen
University
~500 m**

**III. St. George PSP -
Observatory (Sofia)
~600 m**

City-like conditions

I. AO-Belogradchik



2.1 Telescope

For the purpose of solar monitoring we use Celestron C11 Schmidt-Cassegrain SC 279/2800 C11 Optical Tube Assembly (OTA)⁴ (Fig. 1). The technical parameters of the telescope are shown in Table 1.

Parameter	Value
Aperture (mm)	279
Focal length (mm)	2800
Aperture ratio (f/)	10
Tube length (mm)	610
Tube weight (kg)	12.5

Table 1. Celestron C11 Schmidt-Cassegrain Parameters

An advanced VX AVX GoTo⁵ equatorial mount for stable tracking was used as the mounting. The system is located in the dome of AO-Belogradchik.

Parameter	Value
Sensor	Sony IMX304
Light Spectrum	Visible + NIR
Resolution	12.4 MP
Resolution WxH	4112 x 3008 px
Frame rate	23 fps
Cell Size WxH	3.45 x 3.45 μ m
Weight	130 g
Video Output	8/10/12-bit
Operating Temperature	-5°C to +45°C

Table 2. Camera parameters

<https://astro.bas.bg/AIJ/issues/n43/PMarkishki.pdf>

+ **off-axis rejection/Lunt
H-alpha filter; reflector**

I. AO-Belogradchik

(I) Rejection filter H-alpha



(II) new Lunt H-alpha



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Results (1): AO-Belogradchik

Markishki et al.

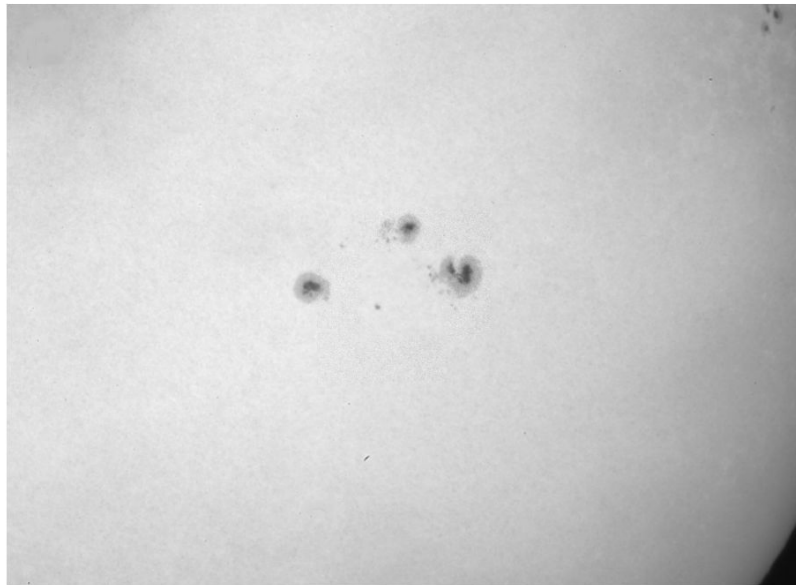


Fig. 3. White-light image of the sunspot groups observed on 2024-10-14 at 10:47 UT from AO-Belogradchik (exposure time 14 ms).

Rejection filter
White light

Results (1): AO-Belogradchik

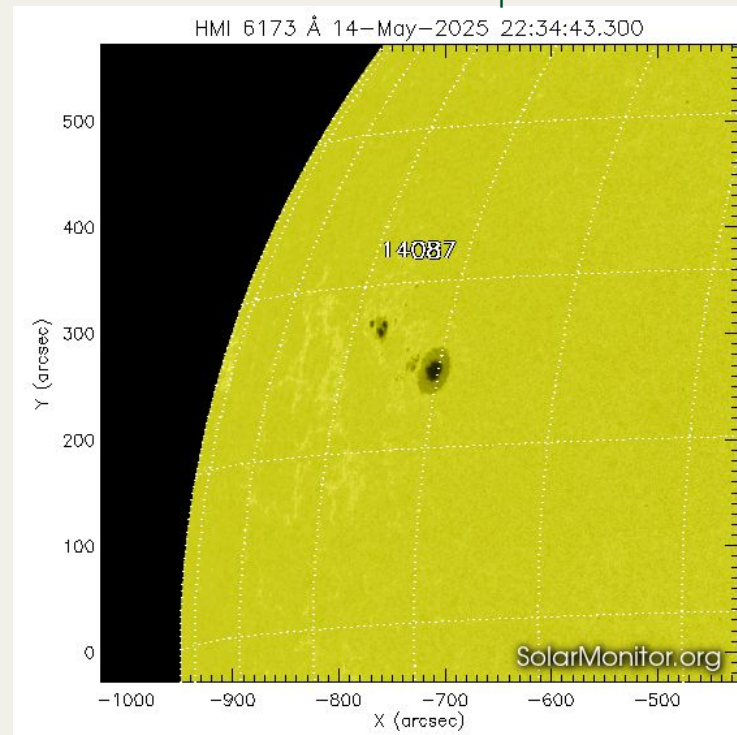
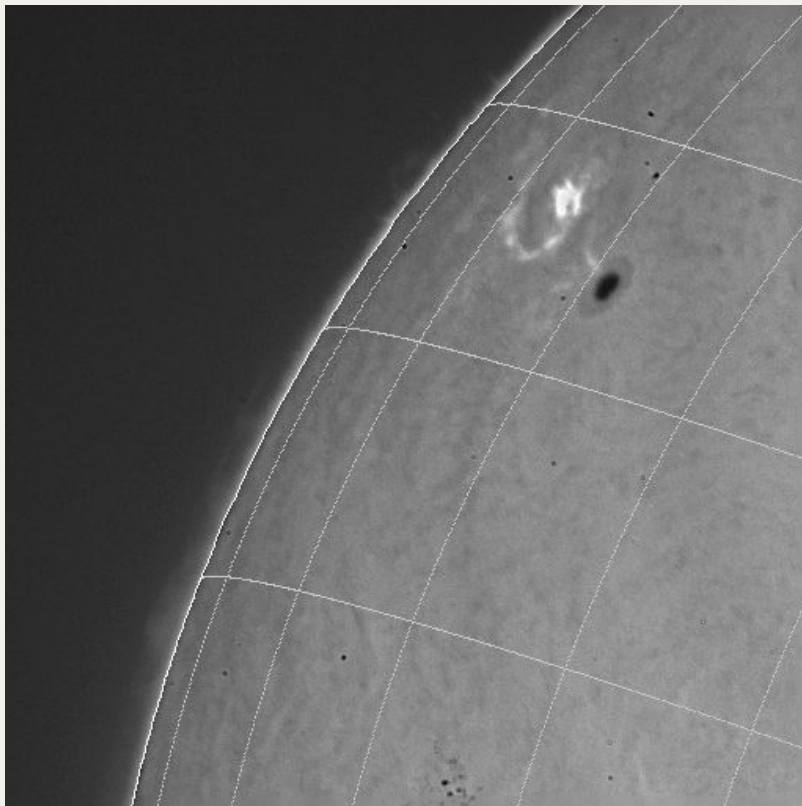
Rejection filter
H-alpha



Fig. 4. H_{α} images of a prominence in a close succession, observed from AO-Belogradchik on 2024-10-14 at 08:38 UT (exposure time 42 ms each).

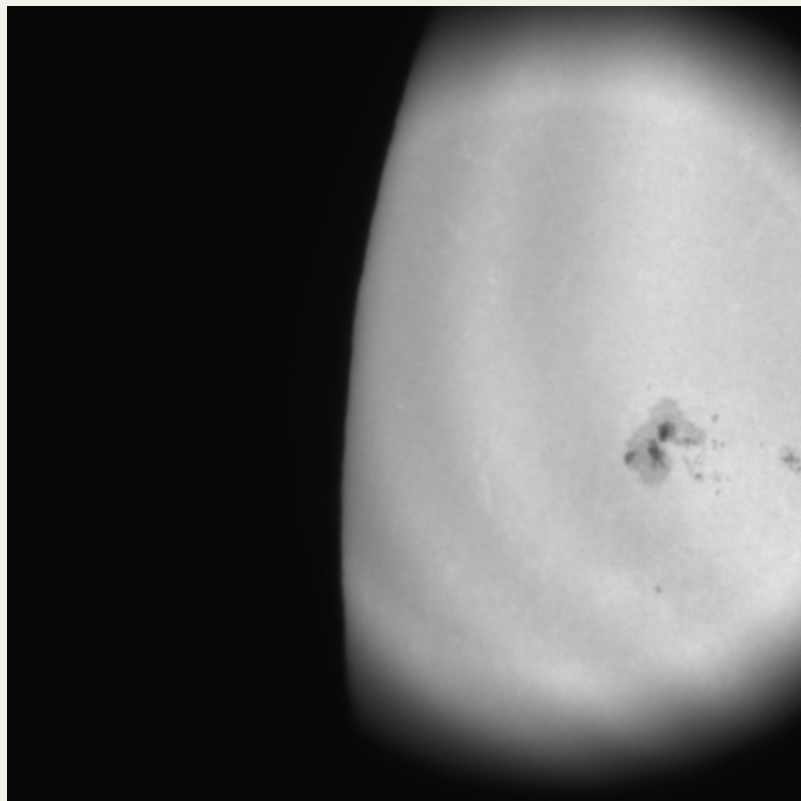
Results (1): AO-Belogradchik

Rejection filter
H-alpha

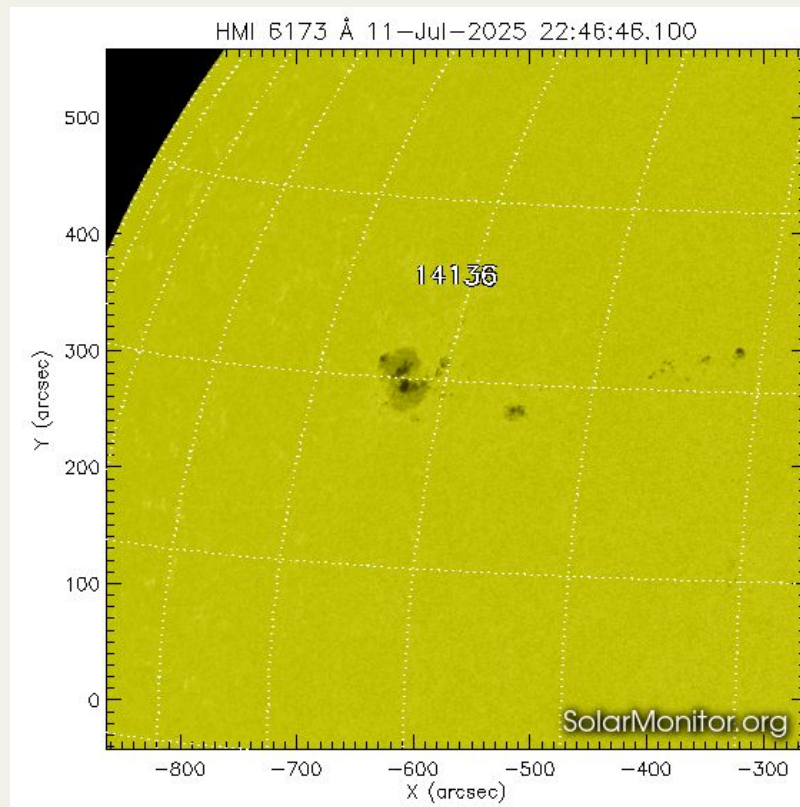


14-05-2025

Results (2): AO-Belogradchik



11-07-2025



II. AO-Shumen Uni

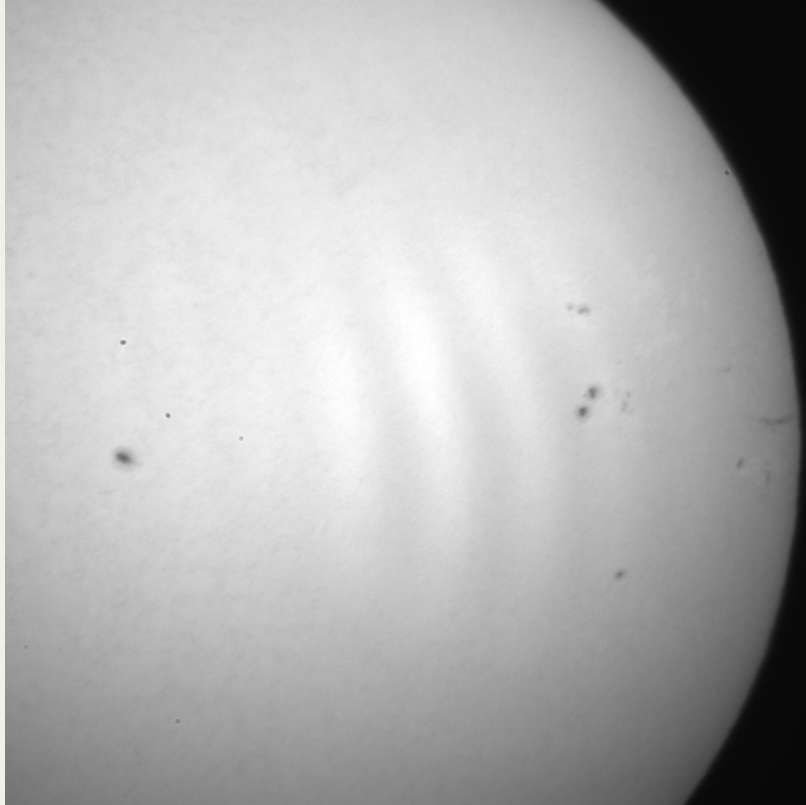
- **Telescope:** Coronado ST 40/400 PST Personal Solar Telescope OTA, D = 40 mm, focal ratio: f/10
- **Mount/guiding:** azimuthal, 'HelioFind' automatic Sun-guiding system
- **Camera:** NexImage 5 CCD camera
- **Filter:** integrated H-alpha

<https://astro.shu.bg/>

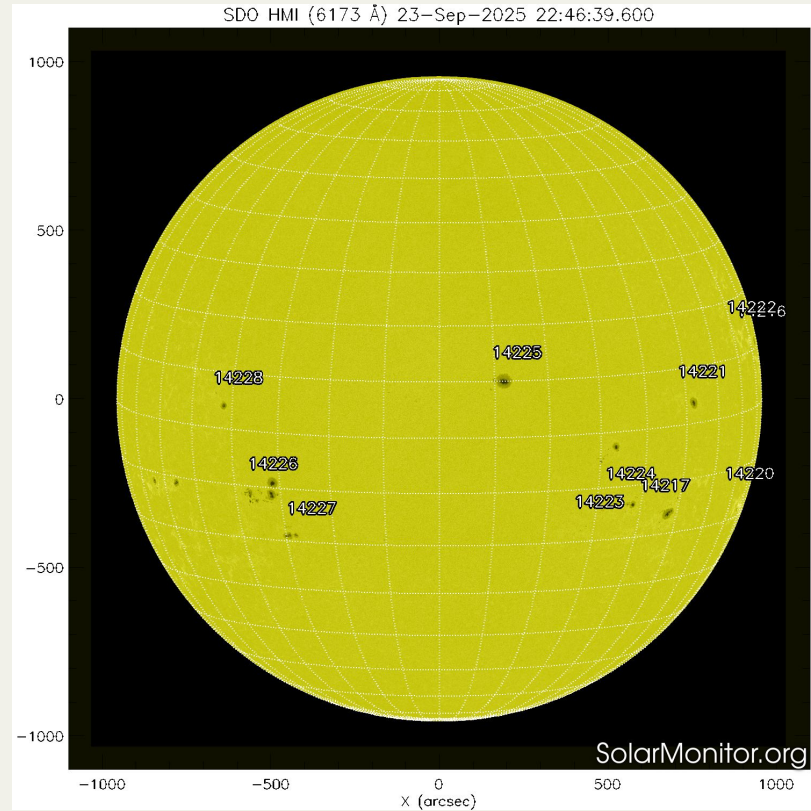
<https://astro.shu.bg/AO/index.php>



Results: AO-Shumen Uni



23-09-2025



III. St. George PSP Observatory



https://astro.bas.bg/project-sun/Files/Latev_SAB_2025.pdf



III. St. George PSP Observatory

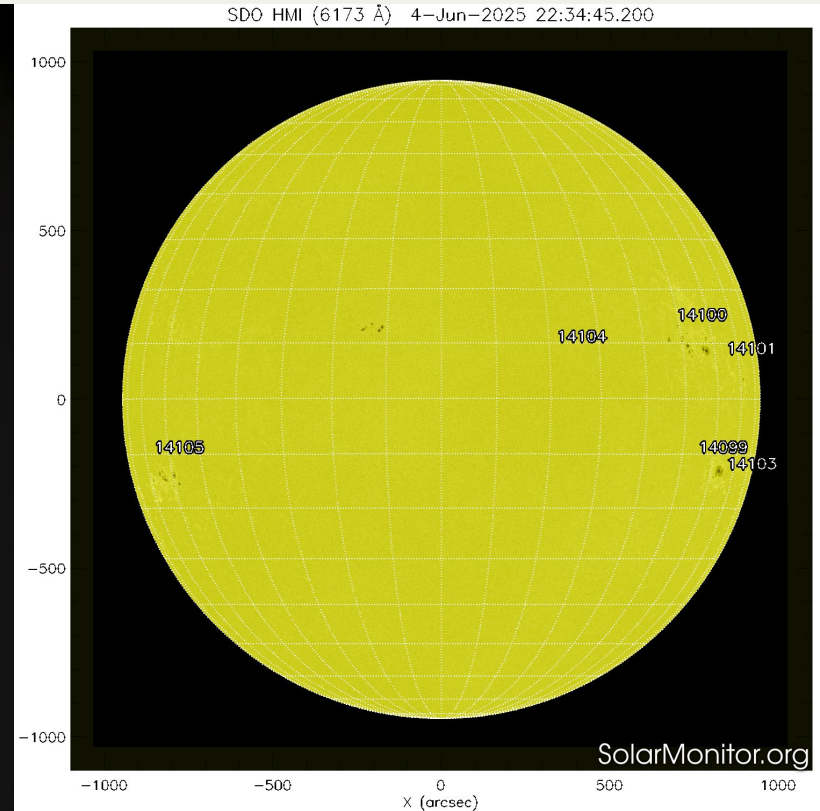
- **Guiding telescope: Refractor Celestron Omni XLT 120, D = 120 mm, f = 1000 mm, focal ratio: f/8.3**
- **Mount/guiding: 10Micron**
- **Camera: Atik Horizon Color CMOS Panasonic MN34230, chip size: 17.6 x 13.3 mm (22 mm diagonal), pixel size: 3.8 μm , pixel area: 4644 x 3506**
- **Filter: various metallized filters, glass and special film, for example AstroSolar Photo Film OD 5 from Baader**



Results: St.George PSP Observatory



04-06-2025



Outlook

- **Instrument improvement**
- **Campaign observations**
- **Coordinated monitoring program: semi-automatic routines**
- **Database: upload, storage and search options**



Acknowledgements

(1) Bulgarian-Austrian bilateral project '**Joint Observations and Investigations of Solar Chromospheric and Coronal Activity**', supported by Bulgarian National Science Foundation project No. KP-06-Austria/5 (14-08-2023) and Austria's Agency for Education and Internationalisation (OeAD) project No. BG 04/2023

(2) project RACIO supported by the Ministry of Education and Science of Bulgaria (Bulgarian National Roadmap for Research Infrastructure)

Publications

<https://astro.bas.bg/AIJ/issues/n43/PMarkishki.pdf>

<https://astro.bas.bg/project-sun/>

