The new 1.5-meter robotic telescope for the Rozhen Observatory

Evgeni Semkov

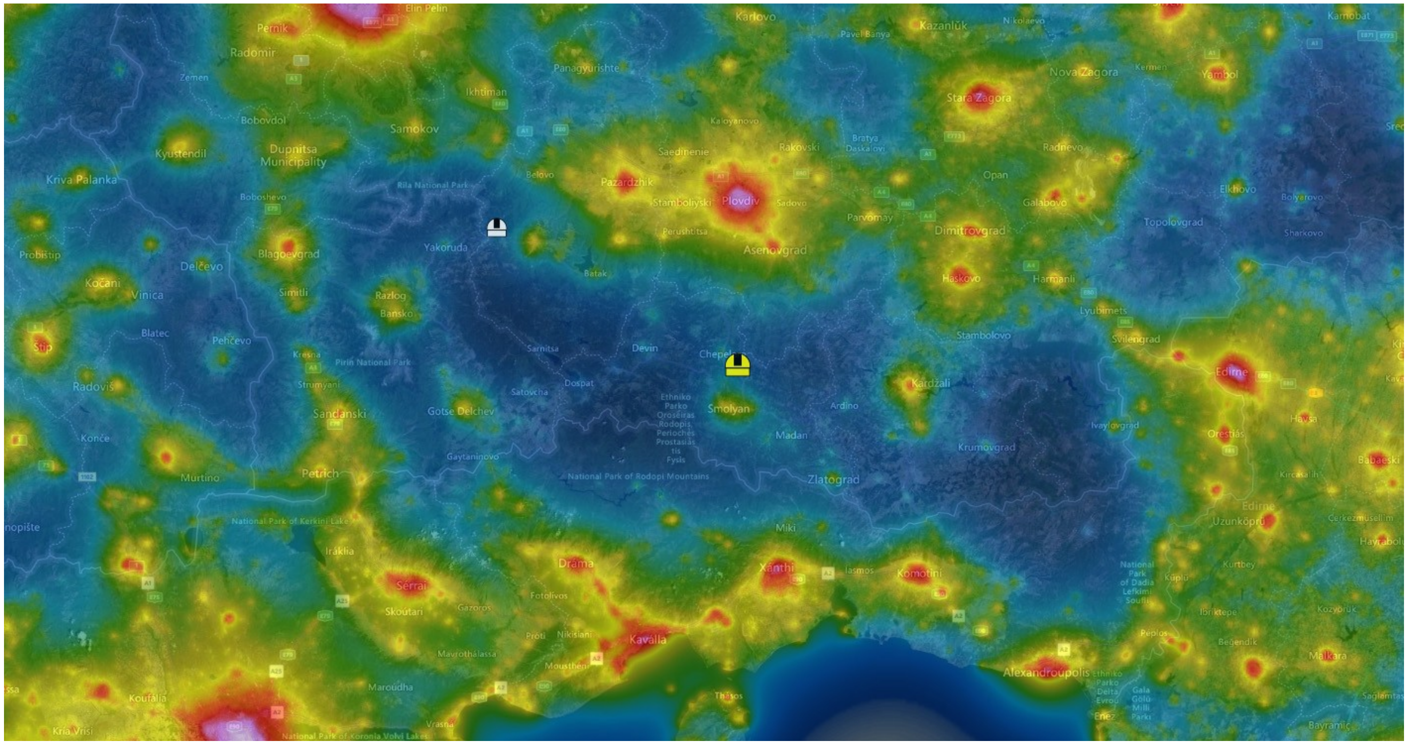
Institute of Astronomy and

National Astronomical Observatory,

Bulgarian Academy of Sciences,

Sofia, Bulgaria

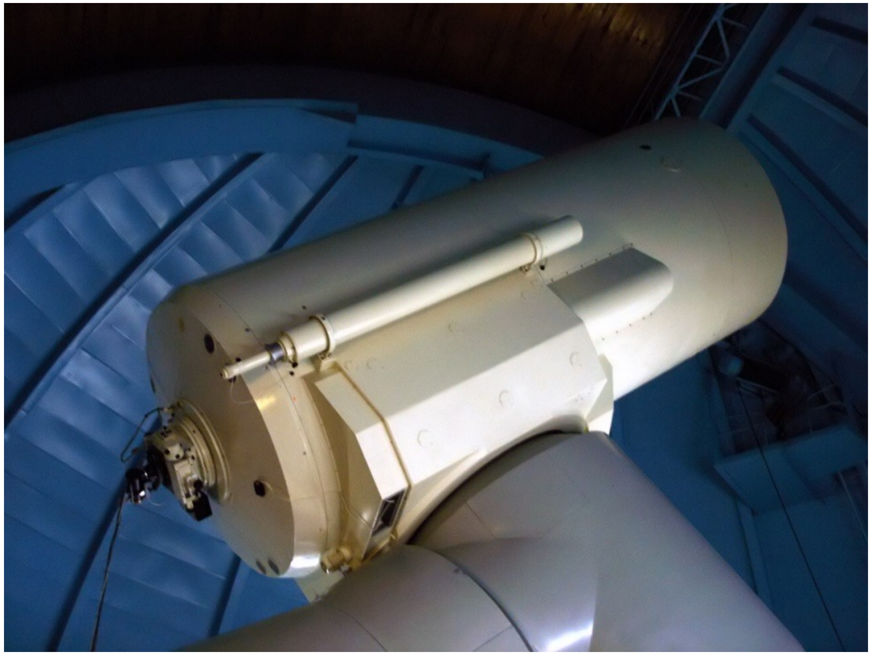
National Astronomical Observatory Rozhen



NAO Rozhen is situated in the Rhodope Mountains at 1750 m altitude and coordinates: longitude: $1^h\ 38^m\ 58^s$ and latitude: 41° 41′ 48”. The astronomical observatory is the biggest one-time Bulgarian investment in scientific infrastructure and a leading astronomical center in the South-East Europe.

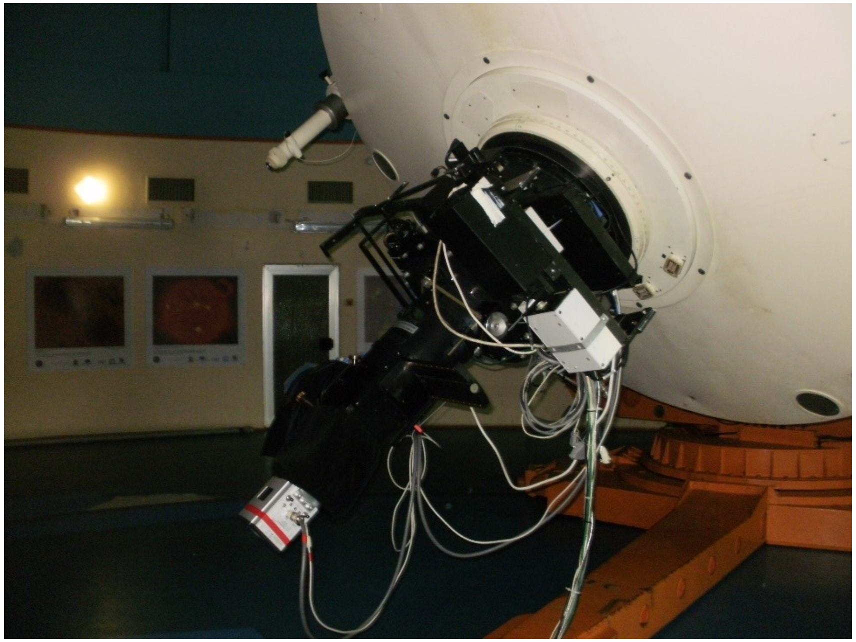
NAO Rozhen

The NAO - Rozhen is an astronomical complex with four optical telescopes situated in the Rhodope Mountains.

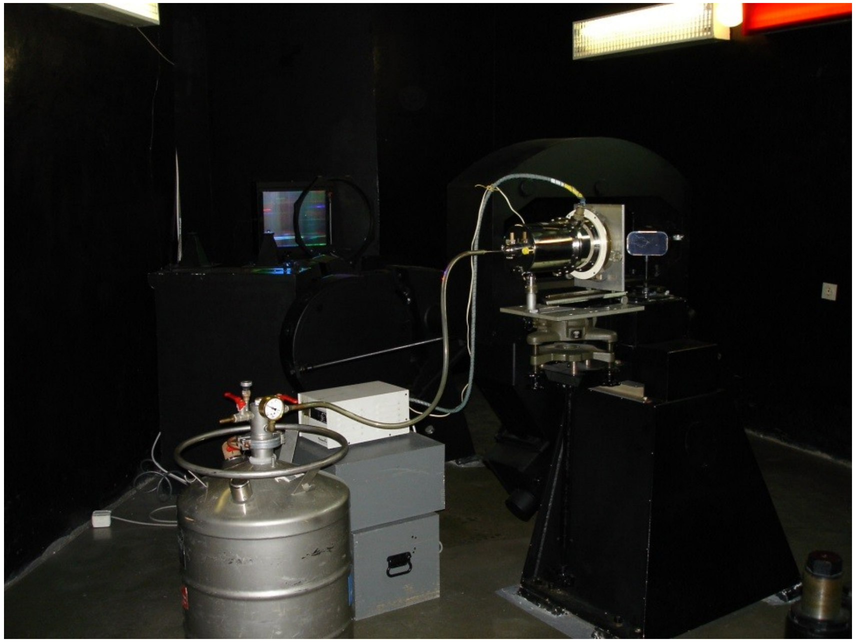


The 2-m telescope of Rozhen observatory is equipped with a Coudé-spectrograph, 3 CCD cameras and two-channel focal reducer.

The 2-m RCC telescope

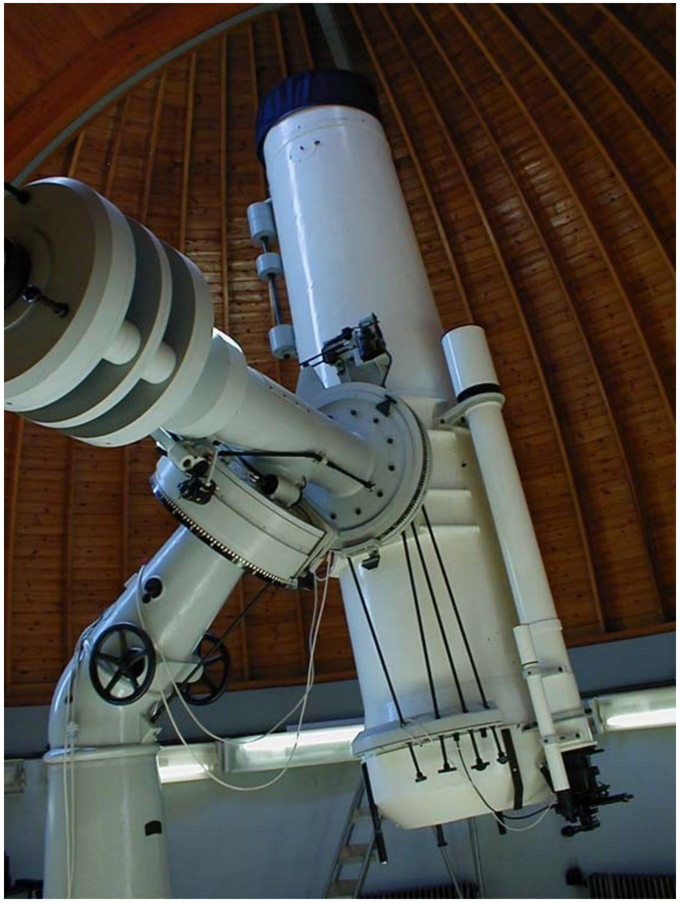


Observations with the focal reducer and in direct RC focus are carried out with ANDOR iKon-L BEX2-DD and ANDOR iKon-L E2V 42-40 CCD cameras (2048×2048 pixels, 13.5×13.5 μm size).



The Coudé-spectrograph allows us to obtain stellar spectra with a high resolution and “signal-to-noise” ratio of about 1000 and velocities in space with an accuracy of 500 m/s. It is equipped with ANDOR Newton 940 CCD camera (2048×512 ps, 13.5×13.5 μm).

The Schmidt telescope



The 50/70/172 cm Schmidt telescope of NAO is equipped with FLI PL 16803 (4096×4096 pixels, 9×9 μm size) CCD camera.

The relatively big field of observation makes the telescope suitable for photometry of variable and fast moving objects.

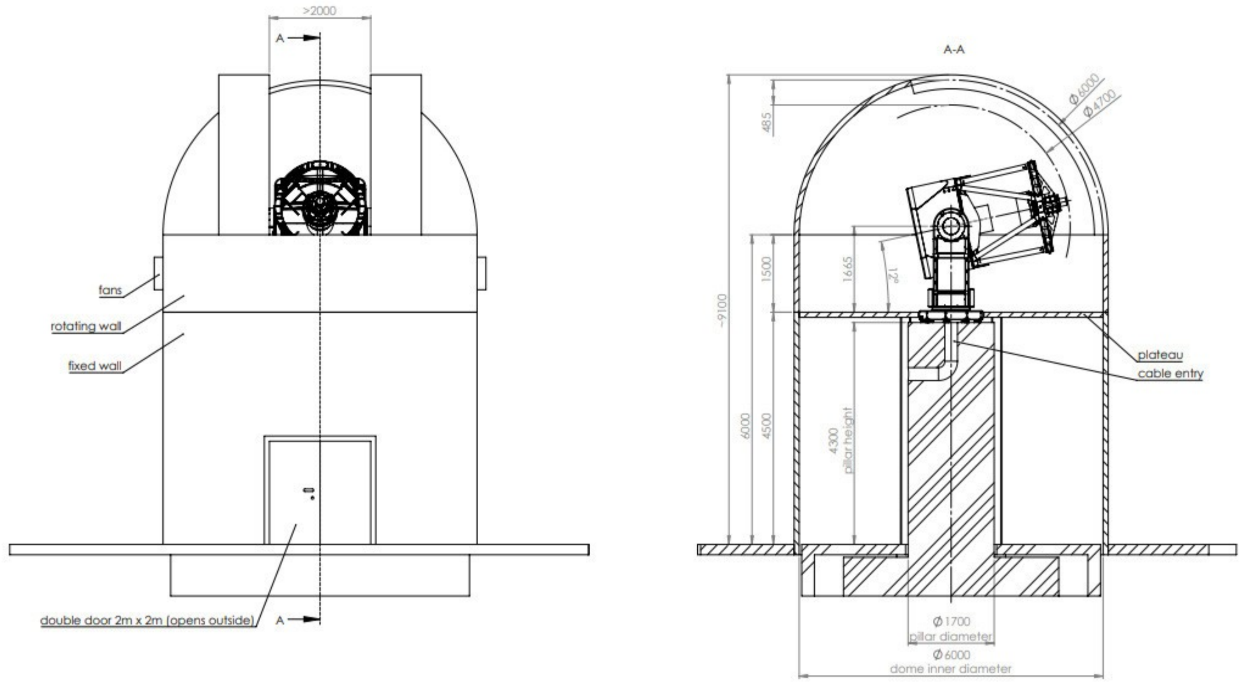
The 60-cm Cassegrain telescope

The 60-cm Cassegrain telescope of NAO Rozhen is equipped with FLI PL 9000 CCD camera (3056x3056 pixels, 12x12 μm).

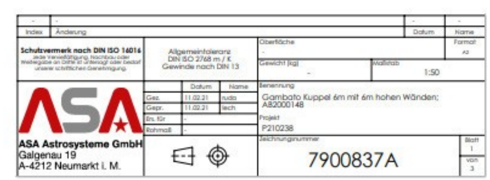
The Solar dome and the 15 cm coronagraph

From 2005 NAO Rozhen has also a 15 cm Lyot-coronagraph with Hα filter, designed for observations of quiescent, eruptive, and active prominences in the low solar corona.

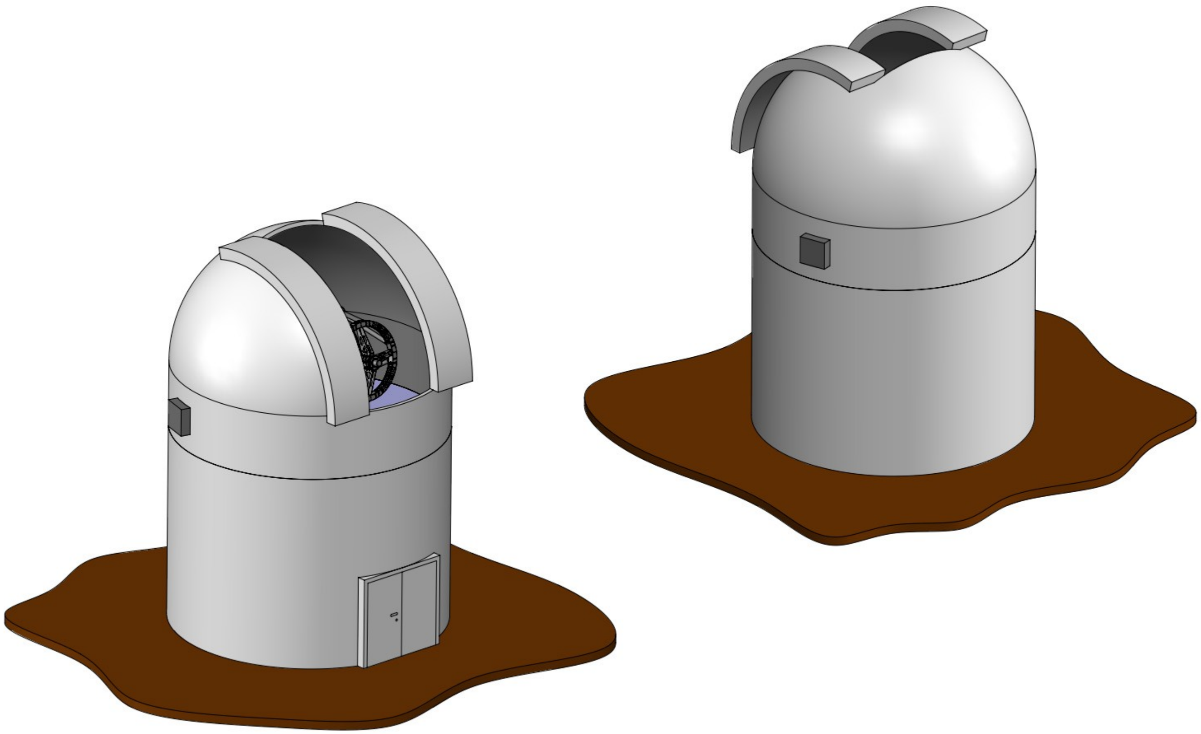
Plan for the new robotic telescope at NAO Rozhen



- System Type: Ritchey Chretien
- Clear Aperture ≥1500mm
- Main mirror focal ratio f/2 (R=6000mm)
- System focal ratio f/6 (f=9000mm)
- Field of View ≥ 200mm (>1.25 degree)
- Material M1, M2, M3 Fused Silica

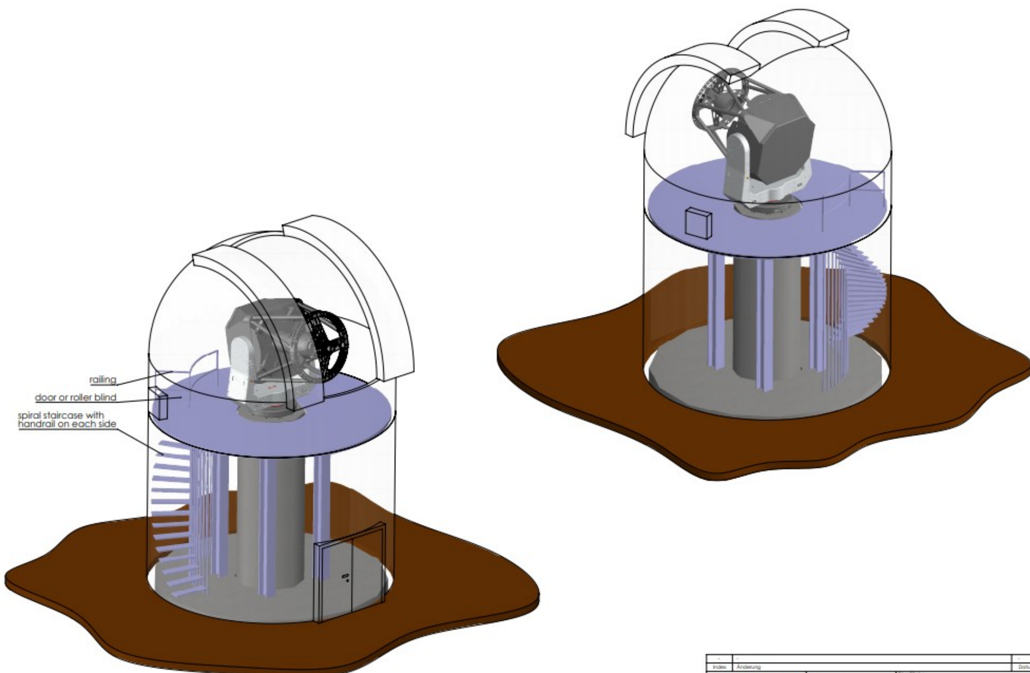


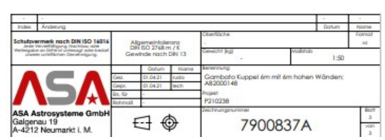
Plan for the new robotic telescope at NAO Rozhen



- Pointing accuracy < 8” RMS with pointing model (for altitude 20° to 85°)
- Pointing model must be supplied with the telescope control software
- Tracking accuracy < 0.25” RMS within 5 minutes (at good ambient and sky conditions) over 5 min 0.05” RMS/min
- Slewing speed 4°/sec
- Settle time after a slew < 3 seconds

Plan for the new robotic telescope at NAO Rozhen





List of included equipment:

- CCD CMOS C3-61000 camera (36x24mm) format Sony IMX455 Pixel size 3.76 × 3.76 µm Resolution 9576 × 6388
- External Filter Wheel for G3 cameras Mark II with 7 positions (50x50mm)
- Mirrors, guiders, covers,
- Mount slewing/tracking/pointing
- Derotators
- Foci section
- Focuser
- Guider
- Dome rotation
- Dome Ventilation
- Weather station

The telescope in the factory of ASA in Austria

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Preparation of the base of the new telescope

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First test observations with the telescope – M101

Future plans for a new CCD camera

ANDOR XL-EA05-DS

• iKon XL 231 BEX2, Compact Shutter
• 16.8 Megapixel CCD231-84 Back Illuminated Sensor. EX2 dual AR coating
• Deep Cooled model (max. cooling -100°C @ coolant temp of 10°C)
• With Standard Shutter (0°C to +30°C)
• Total price ~ 239,000 €

Blazar spectral variability as explained by a twisting in-homogeneous jet (Raiteri et al. 2017, Nature, 552, 374)

LETTER

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Blazar spectral variability as explained by a twisted inhomogeneous jet

C. M. Raiteri[1], M. Villata[1], J. A. Acosta-Pulido[2,3], I. Agudo[4], A. A. Arkharov[5], R. Bachev[6], G. V. Baida[7], E. Benítez[8], G. A. Borman[7], W. Boschin[2,3,9], V. Bozhilov[10], M. S. Butuzova[7], P. Calcidese[11], M. I. Carnerero[1], D. Carosati[9,12], C. Casadio[4,13], N. Castro-Segura[3,14], W.-P. Chen[15], G. Damljanovic[16], F. D'Ammando[17,18], A. Di Paola[19], J. Echevarría[8], N. V. Efimova[5], Sh. A. Ehgamberdiev[20], C. Espinosa[8], A. Fuentes[4], A. Giunta[19], J. L. Gómez[4], T. S. Grishina[21], M. A. Gurwell[22], D. Hiriart[8], H. Jermak[23], B. Jordan[24], S. G. Jorstad[21,25], M. Joshi[25], E. N. Kopatskaya[21], K. Kuratov[26,27], O. M. Kurtanidze[28,29,30,31], S. O. Kurtanidze[28], A. Lähteenmäki[32,33,34], V. M. Larionov[5,21], E. G. Larionova[21], L. V. Larionova[21], C. Lázaro[2,3], C. S. Lin[15], M. P. Malmrose[25], A. P. Marscher[25], K. Matsumoto[35], B. McBreen[36], R. Michel[8], B. Mihov[6], M. Minev[10], D. O. Mirzaqulov[20], A. A. Mokrushina[5,21], S. N. Molina[4], J. W. Moody[37], D. A. Morozova[21], S. V. Nazarov[7], M. G. Nikolashvili[28], J. M. Ohlert[38,39], D. N. Okhmat[7], E. Ovcharov[10], F. Pinna[2,3], T. A. Polakis[40], C. Protasio[2,3], T. Pursimo[41], F. J. Redondo-Lorenzo[2,3], N. Rizzi[42], G. Rodriguez-Coira[2,3], K. Sadakane[35], A. C. Sadun[43], M. R. Samal[15], S. S. Savchenko[21], E. Semkov[6], B. A. Skiff[44], L. Slavcheva-Mihova[6], P. S. Smith[45], I. A. Steele[23], A. Strigachev[6], J. Tammi[32], C. Thum[46], M. Tornikoski[32], Yu. V. Troitskaya[21], I. S. Troitsky[21], A. A. Vasilyev[21] & O. Vince[16]

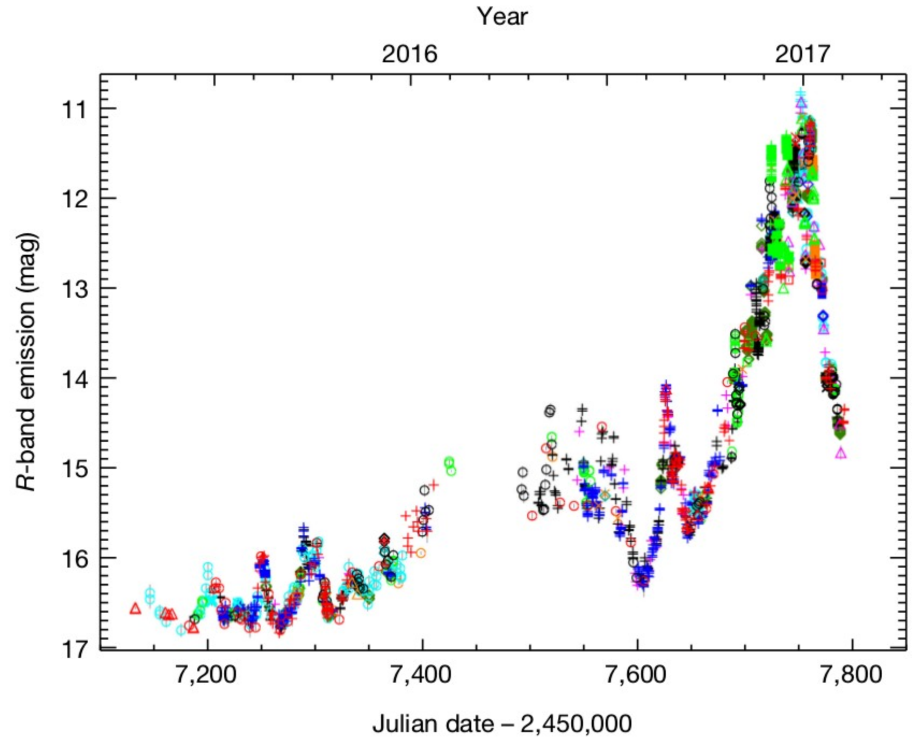
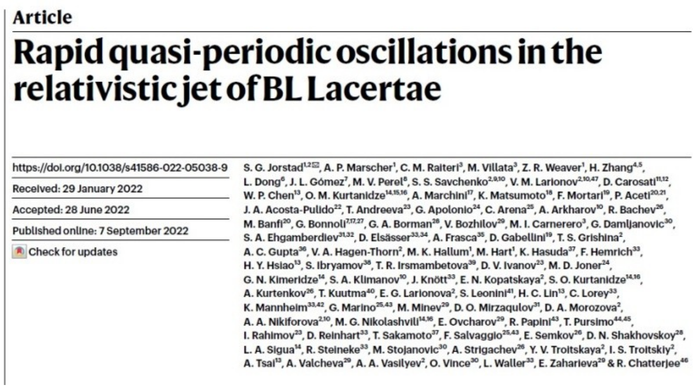


Figure 1 | Observed optical light curve of CTA 102 in the last two observing seasons of the WEBT campaign. *R*-band magnitudes are shown as a function of the Julian date (JD). Different colours and symbols correspond to the various telescopes contributing to the WEBT campaign. Error bars represent 1 s.d. measurement errors. The peak of the 2016–2017 outburst was observed on 28 December 2016 and indicates a brightness increase of about 6 mag with respect to the faintest state.

Rapid quasi-periodic oscillations in the relativistic jet of BL Lacertae, *(Jorstad et al. 2022, Nature, 7926, 265)*



Article

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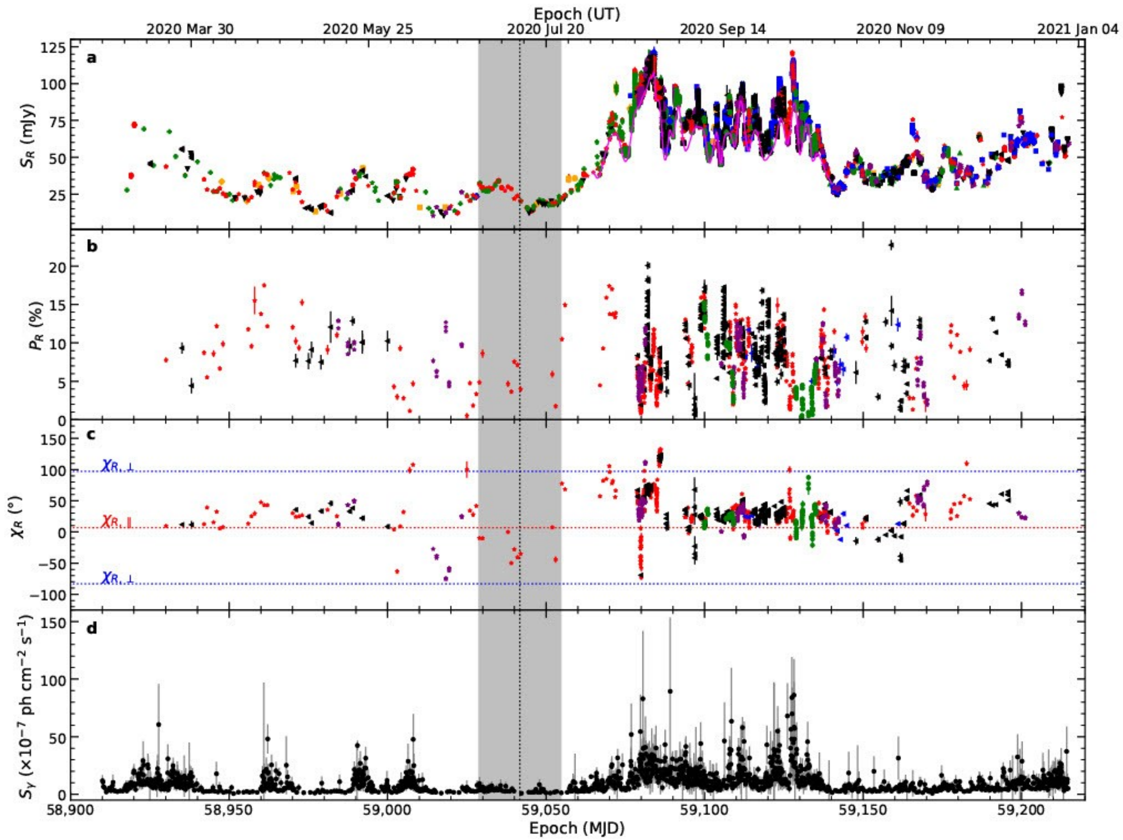
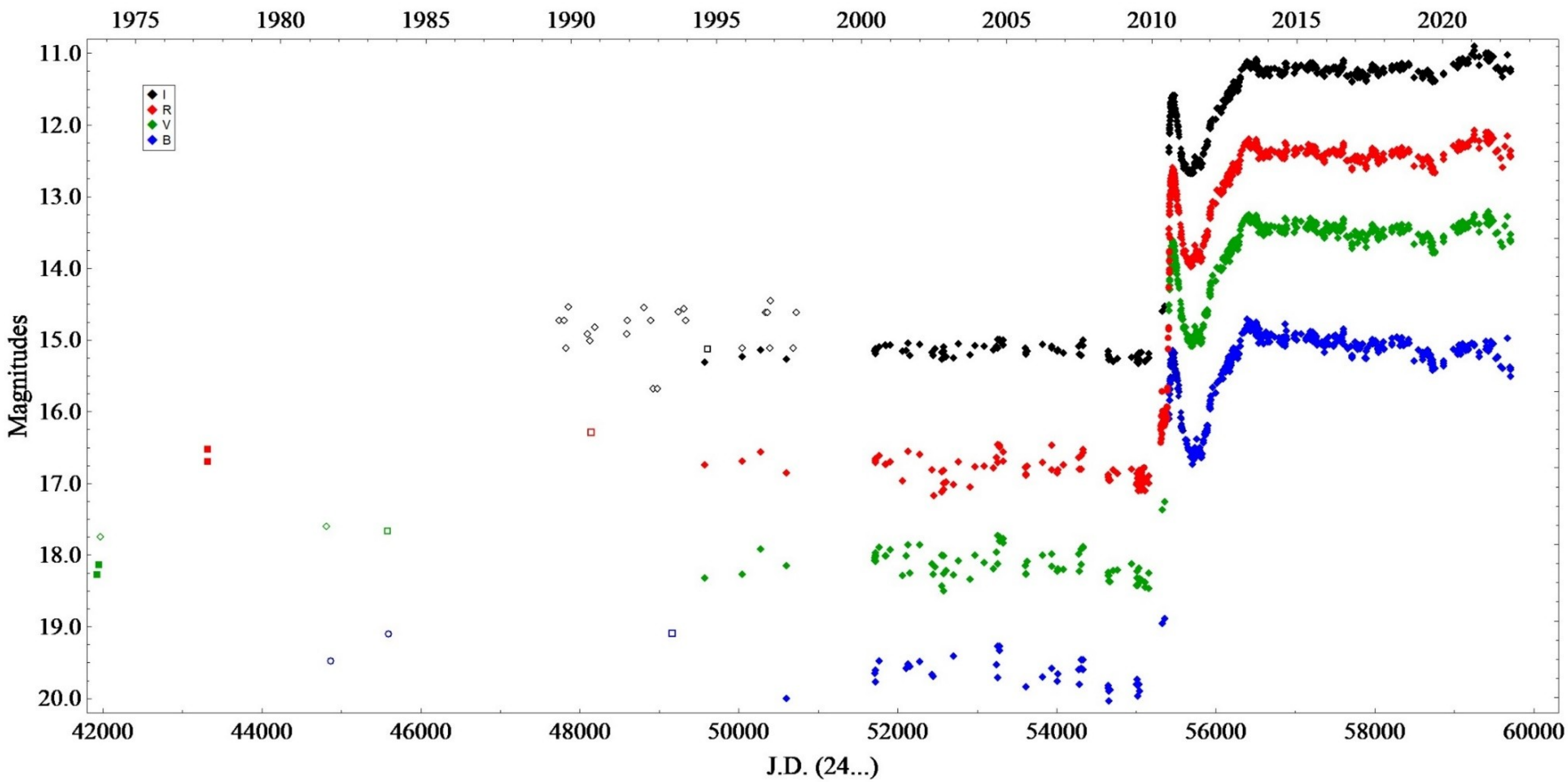
S. G. Jorstad[1,2]✉, A. P. Marscher[1], C. M. Raiteri[3], M. Villata[3], Z. R. Weaver[1], H. Zhang[4,5], L. Dong[6], J. L. Gómez[7], M. V. Perel[8], S. S. Savchenko[2,9,10], V. M. Larionov[2,10,47], D. Carosati[11,12], W. P. Chen[13], O. M. Kurtanidze[14,15,16], A. Marchini[17], K. Matsumoto[18], F. Mortari[19], P. Aceti[20,21], J. A. Acosta-Pulido[22], T. Andreeva[23], G. Apolonio[24], C. Arena[25], A. Arkharov[10], R. Bachev[26], M. Banfi[20], G. Bonnoli[7,17,27], G. A. Borman[28], V. Bozhilov[29], M. I. Carnerero[3], G. Damljanovic[30], S. A. Ehgamberdiev[31,32], D. Elsässer[33,34], A. Frasca[35], D. Gabellini[19], T. S. Grishina[2], A. C. Gupta[36], V. A. Hagen-Thorn[2], M. K. Hallum[1], M. Hart[1], K. Hasuda[37], F. Hemrich[33], H. Y. Hsiao[13], S. Ibryamov[38], T. R. Irsmambetova[39], D. V. Ivanov[23], M. D. Joner[24], G. N. Kimeridze[14], S. A. Klimanov[10], J. Knött[33], E. N. Kopatskaya[2], S. O. Kurtanidze[14,16], A. Kurtenkov[26], T. Kuutma[40], E. G. Larionova[2], S. Leonini[41], H. C. Lin[13], C. Lorey[33], K. Mannheim[33,42], G. Marino[25,43], M. Minev[29], D. O. Mirzaqulov[31], D. A. Morozova[2], A. A. Nikiforova[2,10], M. G. Nikolashvili[14,16], E. Ovcharov[29], R. Papini[43], T. Pursimo[44,45], I. Rahimov[23], D. Reinhart[33], T. Sakamoto[37], F. Salvaggio[25,43], E. Semkov[26], D. N. Shakhovskoy[28], L. A. Sigua[14], R. Steineke[33], M. Stojanovic[30], A. Strigachev[26], Y. V. Troitskaya[2], I. S. Troitskiy[2], A. Tsai[13], A. Valcheva[29], A. A. Vasilyev[2], O. Vince[30], L. Waller[33], E. Zaharieva[29] & R. Chatterjee[46]



Extended Data Fig. 1 | BL Lac *R*-band optical and γ-ray data in 2020.
a, *R*-band flux density light curve (*n* = 16,497). The solid magenta curve during the outburst plots a spline approximation of the long-term trend. **b**, Degree of polarization versus time (*n* = 1,285). **c**, Position angle of polarization versus time (*n* = 1,285). The red and blue dotted lines mark directions along and transverse to the jet axis, respectively. **d**, γ-Ray light curve (*n* = 1,398). The grey area denotes the 1*σ* uncertainty in the time of ejection of superluminal knot K (dotted grey line). Different symbols and colours indicate observations conducted by different telescopes, designations of which are given in Extended Data Table 1. The error bars are 1*σ* uncertainties (in plot **a**, they are smaller than the symbols).

The large amplitude outburst of the young star HBC 722 in NGC 7000/IC 5070, a new FU Orionis candidate (Semkov et al., 2010, A&A, 523, L3, Semkov et al., 2012, A&A, 542, A43, Semkov at al., 2021, Symmetry, 13, 2433)



Thank you for your attention!