CREMLIN PLUS

Connecting Russian and European Measures
for Large-scale Research Infrastructures

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 871072

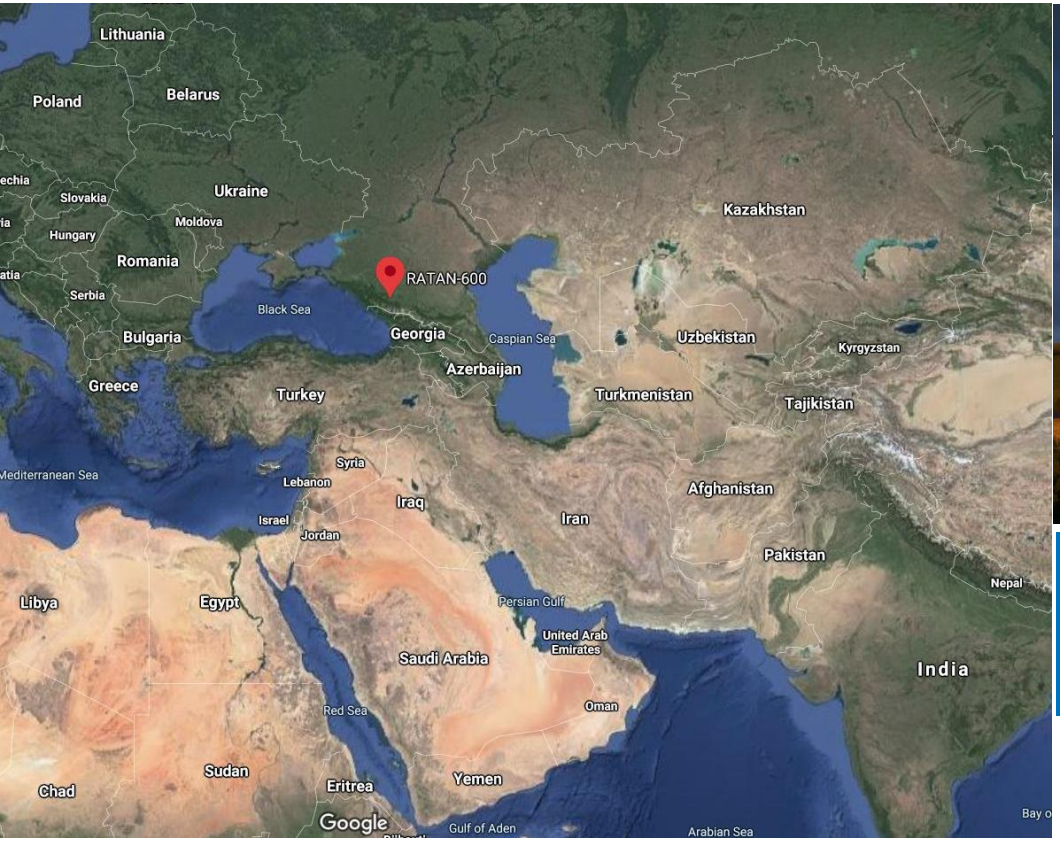
Special Astrophysical Observatory of RAS

the open access center

BTA & RATAN-600

Sotnikova Yulia V., Deputy Director

1. A location and the facility



610
Collective use centers

360
Unique scientific facilities

7
Megascience class facilities

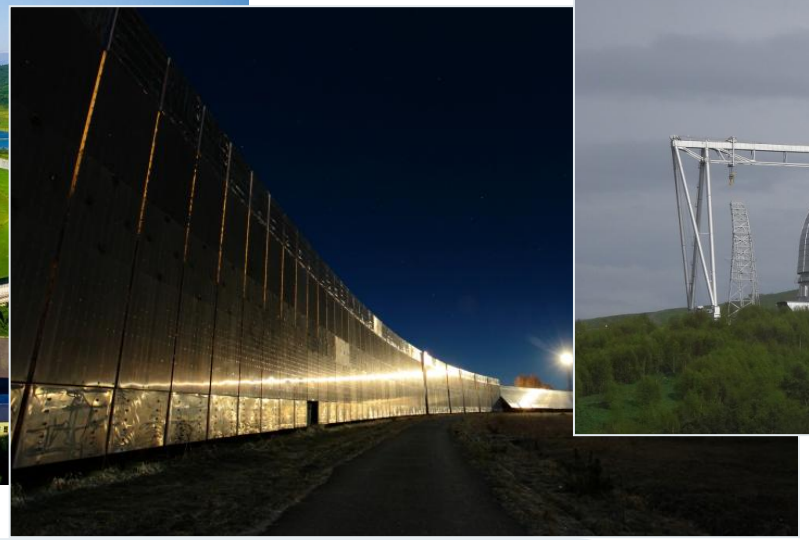
- **The Big Telescope Azimuthal (BTA): 6 m**
- **The RATAN-600 radio telescope: 600 m**

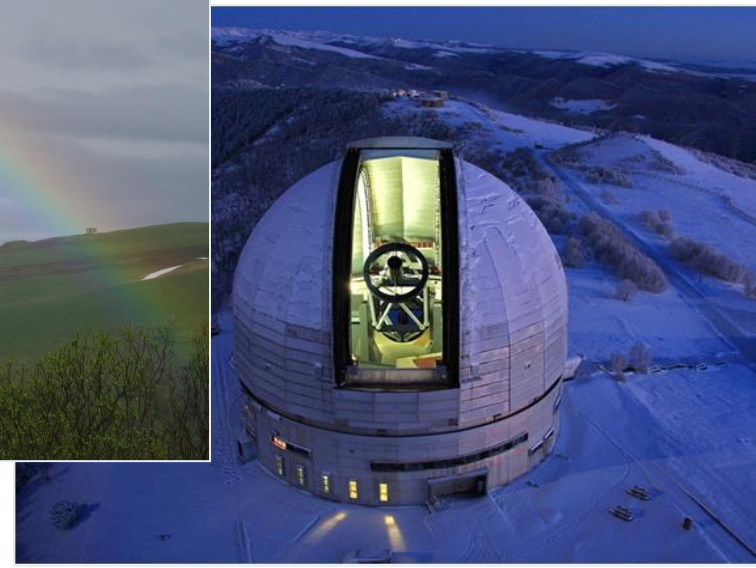
Research: stars, planets and protoplanet systems, the Solar system and the Sun, the Galaxy, galaxies, CMB, the interstellar medium, Instruments and Methods.

Nizhny Arkhyz, Karachai-Cherkessian Republic
Russia 369167
admsao@sao.ru

www.sao.ru
+7(87878) 46336
+7(87878) 46315

2. The facility uniqueness





The RATAN-600 is the world largest radio telescope with the variable profile antenna:
- a large geometric area and a high angular resolution;
- instantaneous radio spectra 1-30 GHz.

Methods:
- the flux density measurements at 1-30 GHz;
- the radio emission intensity and polarization measurements at 3-18 GHz;
- the flux density measurements at 5 GHz with a high time resolution.

The BTA is the largest Russian optical telescope:
- the mirror size;
- the relevant scientific equipment and methods;
- a geographical location.

Methods:
- the galaxies' 3D panoramic spectroscopy;
- the speckle interferometry method;
- the high-resolution spectroscopy;
- the ultra-high time resolution photospectropolarimetry.

https://www.sao.ru/Doc-en/Telescopes/

3. Existing types of an access to the facility

- ✓ **The Responsible Observer (RO)** is the SAO scientific staff member who is in charge of the scientific method/methods.
- ✓ **The Principal Investigator (PI)** is a telescope user (both internal and external one).

The Responsible Observer rights:

- ✓ **A direct or remote access to the facilities;**
- ✓ **The equipment management;**
- ✓ **The telescope systems monitor (website, server);**
- ✓ **Make responsible technical decisions.**

The Principal Investigator rights:

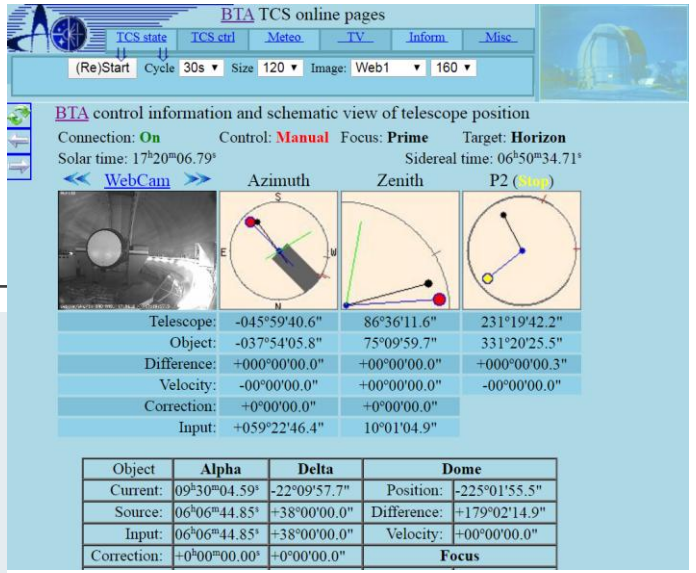
- ✓ **Prepare the observational files/materials;**
- ✓ **Monitor telescope systems (the website, the server);**
- ✓ **Make responsible scientific decision (the observation strategy).**

Access:

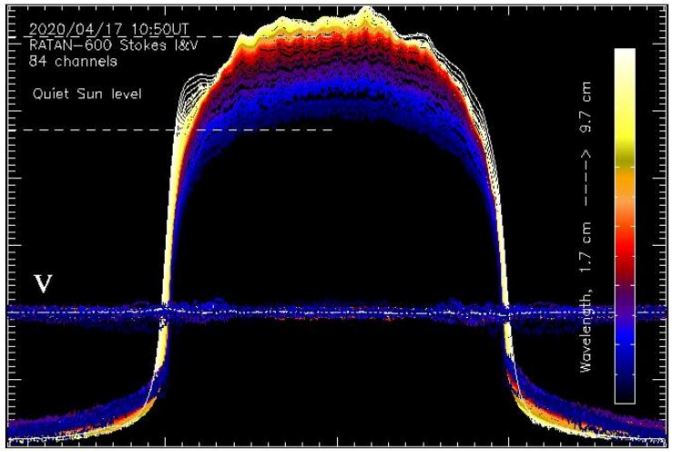
- **the computers and local network;**
- **the software;**
- **the archive and the database;**
- **a transport and an accommodation.**

The PI responsibility:

- ✓ **The observational results reporting and publications;**
- ✓ **A reference to the using equipment.**



Available resource: the BTA control information (website)



Available resource: the RATAN observation information (website)

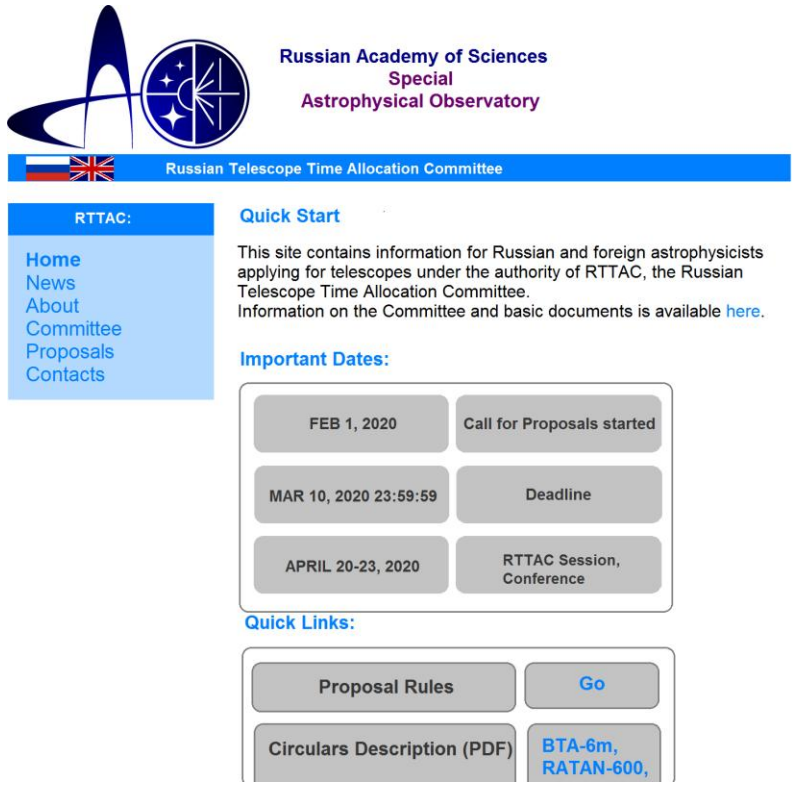
4. A regulated access to the facility

Special Astrophysical Observatory of RAS

The Russian Telescope Time Allocation Committee (RTTAC)

https://www.sao.ru/hq/Komitet/index-en.html

Observational requests are supported twice a year on the competitive basis only (for any users).



The RTTAC (by the Ministry of Science and Higher Education):

- The Committee Regulations.
- The Procedure rules.
- The Proposal Submission Regulations.
- Access to the scientific facility.
- The Observed Data Archives Regulations.

The Committee standard principles:

- positive decision of technical experts;
- scientific importance;
- efficiency of a program, publication;
- multi-wave and cooperative programs;
- development of new methods;
- support of young scientists.

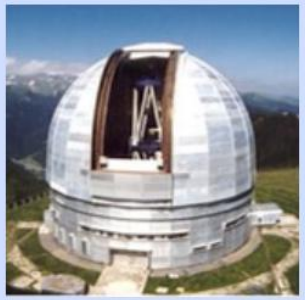
Technical expertise

- ✓ the proposal technical feasibility;
- ✓ restrictions & risks;
- ✓ a validation of the requested time.

The RTTAC activity

- ✓ the sessions, twice a year;
- ✓ the Telescope user conferences, twice a year.

5. Procedures and an internal access policies for external users

Big Telescopes	The online proposal system
	
BTA 6m	RATAN 600m
Online form	Online form
Information	Information

Key points

- ✓ free of charge, the competitive basis, twice a year;
- ✓ the same rules for all users;
- ✓ A, B, C and D priority of the proposal (the highest, high, low and rejected);
- ✓ the top priority of the alert observations;
- ✓ the Telescope Users Conference;
- ✓ the access unit is 1 night or 1 day (BTA, RATAN-600);
- ✓ the compensation of lost observations is possible (the reserved time ~5-15%).
- ✓ the technical period (~5-15%) for the telescopes maintenance.

Access procedure

- ✓ The User registration (online proposal system);
- ✓ The Proposal registration (online proposal system);
- ✓ The technical expertise (the SAO technical expert);
- ✓ The scientific expertise (the RTTAC);
- ✓ A creation of a half year protocol for Telescopes observations (the RTTAC);
- ✓ A creation of a half year schedule (the SAO administration);
- ✓ Observations;
- ✓ Reporting/Publication.

The proposal

- ✓ **A technical part**: Title, Brief description, PI, Co-I, Proposal type (long-term, short-term, one-time), Period of time, Mode of observation, List of objects.
- ✓ **A scientific part**: Title, PI, Annotation, Type of objects, Scientific problem, Methods, Motivation, Publication.

https://www.sao.ru/hq/Komitet/requests-en.html#

5. Procedures and an internal access policies for external users

RATAN-600 Observation Schedule from January 1 to June 30, 2020. Executive Secretary: request@sao.ru

	North sector	South+Flat	South sector
JANUARY	**Feed-cabin 1** **(01-31):** Radio variability of the Galactic X-ray binaries with relativistic jets[1], Trushkin S. (SAO RAS). Responsible Erkenov A.K. **(01-24):** Radio properties of the Narrow-Line Seyfert 1 Galaxies, Lahteenmaki Anne (Metsahovi Radio Observatory, Finland). Responsible: Erkenov A.K. **(01-24):** Radio properties of the blazars on the long time scales, Mufakharov T. (Shanghai Astronomical Observatory, China). Responsible Erkenov A.K. **(25-31):** Radio properties of OH Megamaser (OHM) galaxies, Zhongzu Wu (Guizhou University, China). Responsible Erkenov A.K.	**Feed-cabin 3** **(01-31):** The Sun five-azimuth observations 4. Responsible Milenko V.S. **Feed-cabin 2** **(01-31):** Radio variability of the Galactic X-ray binaries with relativistic jets[1], Trushkin S. (SAO RAS). Responsible Erkenov A.K. **(01-31):** Radio properties of the blazars on the long time scales, Mufakharov T. (Shanghai Astronomical Observatory, China). Responsible: Erkenov A.K. **(01-31):** Radio properties of the Narrow-Line Seyfert 1 Galaxies, Lahteenmaki Anne (Metsahovi Radio Observatory, Finland). Responsible Erkenov A.K. **Feed-cabin 3** **(10-31):** The Sun multi-azimuth observations [5]. Responsible Milenko V.S.	**Feed-cabin 2** **(01-31):** Radio variability of the Galactic X-ray binaries with relativistic jets1, Trushkin S. (SAO RAS). Responsible Erkenov A.K.

Responsible observer
Method
Principal Investigator
Date
Organization, country

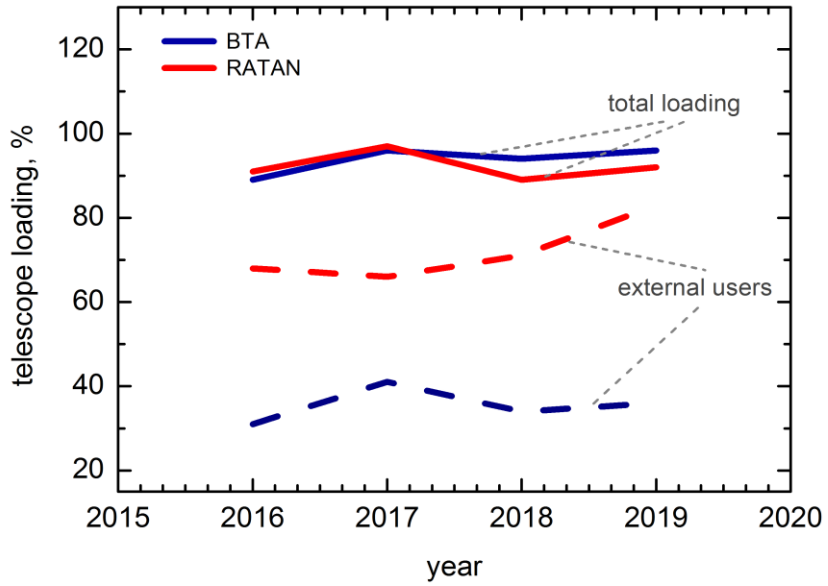
schedule fragment

https://www.sao.ru/ratan/schedule/2020/half1.html

5. Telescope loading statistics

BTA

year	max., h	Real time, h		loading	external users
		overall	external		
2016	2851	2542	790	89%	31%
2017	3323	3175	1309	96%	41%
2018	2397	2260	772	94%	34%
2019	3128	3007	1083	96%	36%



RATAN-600

year	max., h	Real time, h		loading	external users
		overall	external		
2014	8784	8022	4600	91%	57%
2015	8760	8054	4228	92%	52%
2016	8784	7992	5415	91%	68%
2017	8231	7973	5230	97%	66%
2018	8760	7812	5602	89%	71%
2019	6445	5968	5009	92%	83%

The reserved telescope time is ~5-15%;

The telescopes maintenance is ~5-15%.

6. Main users of the facility

About 30 international users (for the last 3 years)

The principal reasons for joined foreign users:

- ✓ **A solution of real astrophysical problems. The study involved two or more countries.**
- ✓ **The targeted grants and funded programs among countries (often for universities).**
- ✓ **The alert events in cosmic objects when multi-wavelength studies are necessary;**
- ✓ **The multichannel astronomy research when research in different channels are necessary (an electromagnetic and gravitational ones and elementary particles).**

Curtin University

Special Astrophysical Observatory of RAS

ASU ALABAMA STATE UNIVERSITY

EUROPEAN VLBI NETWORK

UNIVERSITY OF OXFORD

Shanghai Astronomical Observatory

Shanghai Astronomical Observatory

ICRANet

National Institute for Astrophysics

FINCA Finnish Centre for Astronomy with ESO

Max-Planck Institute for Radio AStronomy

Metsahovi Radio Observatory

University of Ioannina

INAF ISTITUTO NAZIONALE DI ASTROFISICA

SKALNATÉ PLESO

International Center for Relativistic Astrophysics Network

NRAO

National Radio Astronomy Observatory

OMNIA IN NUMERO ET MENSURA 1887

BYURAKAN Astrophysical Observatory

SMITHSONIAN INSTITUTION WASHINGTON, D.C.

asu

GUANGZHOU UNIVERSITY

ARIES ऐरीज

Aryabhatta Research Institute

Astronomical Observatory of Belgrade

Astronomical Institute of the Czech Academy of Sciences

TARTU OBSERVATORY space research centre

7. Cooperation with the European RI facilities

Lists of the foreign RI facilities: https://www.sao.ru/Doc-k8/Science/Public/

The visit statistics

The international cooperation as a part of joint observations:

- ✓ **the SAO employees' visits of foreign observatories for observations or for the experience exchanging (~240);**
- ✓ **the SAO employees' visits of foreign organizations to participate in international conferences (~200);**
- ✓ **the international astrophysical conferences on the SAO RAS basis (18 ones since 2016, www.sao.ru) .**

years	foreign visitors/institutions	foreign conferences	visits to the foreign institutes
2010	66/42	24	33
2011	53/33	33	32
2012	19/11	43	39
2013	12/7	18	27
2014	26/15	26	15
2015	16/13	11	20
2016	34/26	26	
2017	16/11	26	
2018	23/?	15	44

GMRT - Giant Metrewave Radio Telescope

National Radio Astronomy Observatory

Radio Telescope Effelsberg

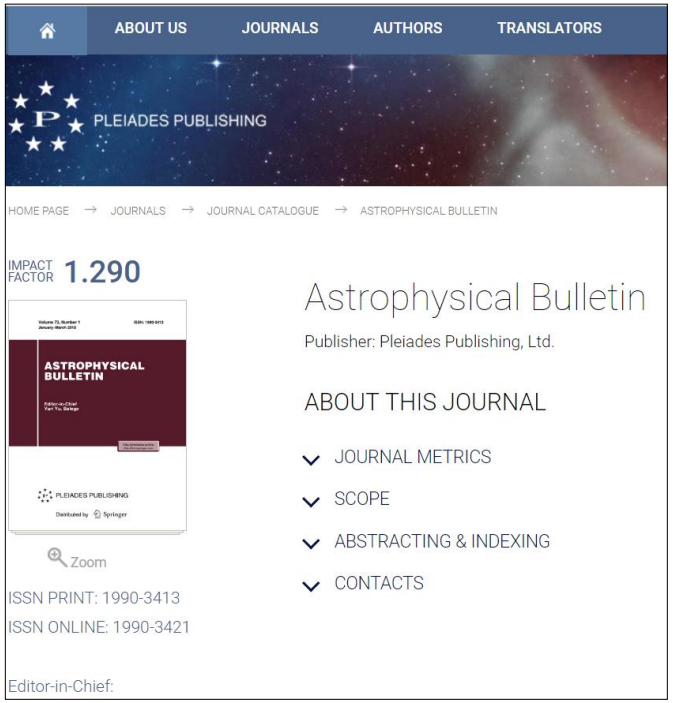
Metsähovi Radio Observatory

Atacama Large Millimeter Array

8. Brief analyses of the facility

Strengths:

- the largest Russian ground-based astronomical center;
- two large telescopes, both optical and radio ones;
- the unique methods and the equipment;
- the large scientific and engineering staff;
- the observatory edition “Astrophysical Bulletin”.



Needs:

- the scientific cooperation expansion with international researchers;
- the long-term and close scientific links;
- the engineering staff supporting.

RSF Russian Science Foundation

RFBR RUSSIAN FOUNDATION FOR BASIC RESEARCH

ESO European Southern Observatory www.eso.org

9. The facility website

https://www.sao.ru

Sections:

- ✓Telescopes
- ✓Open access center/Unique scientific equipment
- ✓Russian Telescope Time Allocation Committee
- ✓Online forms for proposals
- ✓Schedule of observations
- ✓Instrumentation and methods
- ✓General observation data archive of SAO RAS
- ✓Telescopes observational reports
- ✓ Science
- ✓ Publications

Russian Academy of Sciences
Special
Astrophysical Observatory

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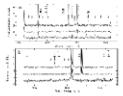
Events

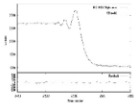
- The XV Russian-Finnish Radio Astronomy Symposium "Multi-Wavelength Investigations of Solar and Stellar Activity and Active Galactic Nuclei" (September 14-18, 2020)

Archive

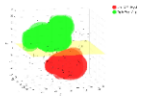
News



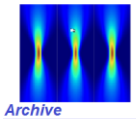
New luminous blue variables (LBV) in star-forming galaxy NGC4736. More...



Radius of the M giant IRC+00213 Measured for the First Time. More...



Formation of the Nearby Void catalog and a sample of Galaxies residing in them. More...



In 2018, we implemented the mode of fast radiometry with a discretization interval from 60 to 490 Î¼s at the 4.7 GHz sensitive radiometer for the first time. More...

Archive

Update

Telescopes:

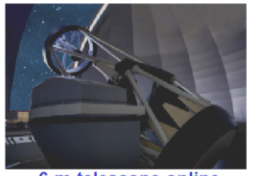
30.12.19 A new schedule of the Zeiss-1000 observations (the first half of 2020)
13.12.19 A new schedule of the RATAN-600 observations (the first half of 2020)
26.12.19 A new schedule of the BTA observations (the first half of 2020)

Publications:

10.02.20 Astrophysical Bulletin, vol. 75, number 1 is published. (Russian version)

Service:

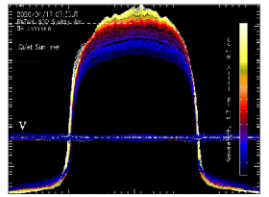
17.04.20 Announce, news, discussion (restricted)



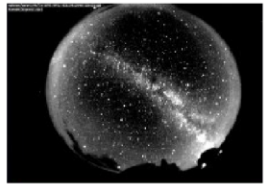
6-m telescope online

Radio telescope

Telescope Zeiss-1000 online



Daily Monitoring of the Sun



All-Sky online

11. Contact details

Head of the Open Access Center: Vlasyuk Valeri V., Director, vvlas@sao.ru
Head of the BTA: Kudryavtsev Dmitry O., Deputy Director, dkudr@sao.ru
Head of the RATAN-600: Sotnikova Yulia V., Deputy Director, lacerta999@gmail.com

SAO RAS, www.sao.ru
Nizhny Arkhyz, Karachai-Cherkessian Republic
Russia 369167
admsao@sao.ru, +7(87878) 46336 , +7(87878) 46315