

**Сведения по оппонентам и ведущей организации по диссертации
Плавина Александра Викторовича**

Ведущая организация

Полное название: Федеральное государственное бюджетное учреждение науки “Крымская астрофизическая обсерватория РАН”.

Сокращенное название: КрАО РАН.

Полное название (англ.): Crimean astrophysical observatory.

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Публикации сотрудников ведущей организации, близкие к теме диссертации

A.В. Плавина:

1. Raiteri C.M., Villata M., Carosati D., et al. 2021, "The dual nature of blazar fast variability: Space and ground observations of S5 0716+714", Monthly Notices of the Royal Astronomical Society, 501, p.1100-1115
2. Weaver Z.R., Williamson K.E., Jorstad S.G., et al. 2020, "Multiwavelength Variability of BL Lacertae Measured with High Time Resolution", Astrophysical Journal, 900, p.133-170
3. Valverde J., Horan D., Bernard D. et al. 2020, "A Decade of Multiwavelength Observations of the TeV Blazar 1ES 1215+303: Extreme Shift of the Synchrotron Peak Frequency and Long-term Optical-Gamma-Ray Flux Increase", Astrophysical Journal, 891, p.170-194
4. Sergeev S.G. 2020, "Spectral variability of the 3C 390.3 nucleus for more than 20 years - II. Variability of the broad emission-line profiles and He II 4686A emission-line fluxes", Monthly Notices of the Royal Astronomical Society, 495, p.971-980
5. Pasierb M., Goyal A., Ostrowski M., et al. 2020, "Multiband optical flux density and polarization microvariability study of optically bright blazars", Monthly Notices of the Royal Astronomical Society, 492, p.1295-1317
6. Otero-Santos J., Acosta-Pulido J.A., Becerra G.J., et al. 2020, "Quasi-periodic behaviour in the optical and γ-ray light curves of blazars 3C 66A and B2 1633+38", Monthly Notices of the Royal Astronomical Society, 492, p.5524-5539
7. Nokhrina E.E., Kovalev Y.Y., and Pushkarev A.B. 2020, "Physical parameters of active galactic nuclei derived from properties of the jet geometry transition region", Monthly Notices of the Royal Astronomical Society, 498, p.2532-2543
8. Lister M.L., Homan D.C., Kovalev Y.Y., Mandal S., Pushkarev A.B., and Siemiginowska A. 2020, "TXS 0128+554: A Young Gamma-Ray-emitting Active Galactic Nucleus with Episodic Jet Activity", Astrophysical Journal, 899, p.141-162
9. Larionov V.M., Jorstad S.G., Marscher A.P., et al. 2020, "Multiwavelength behaviour of the blazar 3C 279: decade-long study from γ-ray to radio", Monthly Notices of the Royal Astronomical Society, 492, p.3829-3848
10. Kovalev Y.Y., Pushkarev A.B., Nokhrina E.E., Plavin A.V., Beskin V.S., Chernoglazov A.V., Lister M.L., and Savolainen T. 2020, "A transition from parabolic to conical shape as a common effect in nearby AGN jets", Monthly Notices of the Royal Astronomical Society, 495, p.3576-3591
11. Kovalev Y.Y., Kardashev N.S., Sokolovsky K.V., and 57 more 2020, "Detection statistics of the RadioAstron AGN survey", Advances in Space Research, 65, p.705-711

12. Butuzova M.S., Pushkarev A.B., Shablovinskaya E.S., Nazarov S.V. 2020, "Inverse Compton Scattering of Radiation from a Central Source as a Possible Mechanism for the Formation of X-Ray Radiation from Kiloparsec Jets of Core-Dominated Quasars", *Astronomy Reports*, 64, p.894-914
13. Butuzova M.S., Pushkarev A.B. 2020, "Is OJ 287 a Single Supermassive Black Hole?", *Universe*, 6, p.191
14. Arshakian T.G., Pushkarev A.B., Lister M.L., and Savolainen T. 2020, "Studies of stationary features in jets: BL Lacertae. I. The dynamics and brightness asymmetry on sub-parsec scales", *Astronomy and Astrophysics*, 640, p.A62-A79
15. Weaver Z.R., Balonek T.J., Jorstad S.G., et al. 2019, "The 2016 June Optical and Gamma-Ray Outburst and Optical Microvariability of the Blazar 3C 454.3", *Astrophysical Journal*, 875, p.15
16. Vercellone S., Romano P., Piano G., et al. 2019, "AGILE, Fermi, Swift, and GASP/WEBT multi-wavelength observations of the high-redshift blazar 4C +71.07 in outburst", *Astronomy and Astrophysics*, 621, p.A82
17. Strigunov K.S., Zhovtan A.V., Neshpor Yu.I., Borman G.A. 2019, "Long-Term Observations of the Blazar Mrk 501 with the GT-48 Cherenkov Telescope", *Astronomy Letters*, 45, p.1-9
18. Raiteri C.M., Villata M., Carnerero M.I., et al. 2019, "The beamed jet and quasar core of the distant blazar 4C 71.07", *Monthly Notices of the Royal Astronomical Society*, 489, p.1837-1849
19. Pushkarev A.B., Butuzova M.S., Kovalev Y.Y., Hovatta T. 2019, "Multifrequency study of the gamma-ray flaring BL Lacertae object PKS 2233-148 in 2009-2012", *Monthly Notices of the Royal Astronomical Society*, 482, p.2336-2353
20. Lister M.L., Homan D.C., Hovatta T., et al. 2019, "MOJAVE. XVII. Jet Kinematics and Parent Population Properties of Relativistically Beamed Radio-loud Blazars", *Astrophysical Journal*, 874, p.43
21. Ivanov M.M., Kovalev Y.Y., Lister M.L., Panin A.G., Pushkarev A.B., Savolainen T., Troitsky S.V. 2019, "Constraining the photon coupling of ultra-light dark-matter axion-like particles by polarization variations of parsec-scale jets in active galaxies", *Journal of Cosmology and Astroparticle Physics*, 2019, p.059
22. D'Ammando F., Raiteri C.M., Villata M., et al. 2019, "Investigating the multiwavelength behaviour of the flat spectrum radio quasar CTA 102 during 2013-2017", *Monthly Notices of the Royal Astronomical Society*, 490, p.5300-5316
23. Butuzova M.S., Pushkarev A.B. 2019, "Inverse Compton Scattering of the Central Source Photons as an X-Ray Emission Mechanism on Kiloparsec Scales in PKS 1127-145", *Astrophysical Journal*, 883, p.131
24. Rani B., Jorstad S.G., Marscher A.P., et al. 2018, "Exploring the Connection between Parsec-scale Jet Activity and Broadband Outbursts in 3C 279", *Astrophysical Journal*, 858, p.80
25. Pittori C., Lucarelli F., Verrecchia F., et al. 2018, "The Bright γ -ray Flare of 3C 279 in 2015 June: AGILE Detection and Multifrequency Follow-up Observations", *Astrophysical Journal*, 856, p.99
26. Butuzova M.S. 2018, "Geometrical and Kinematic Parameters of the Jet of the Blazar S5 0716+71 in a Helical-Jet Model", *Astronomy Reports*, 62, p.116-122
27. Butuzova M.S. 2018, "Periods of the Long-Term Variability of the Blazar 0716+714 and Their Inter-Correlations in a Helical Jet Model", *Astronomy Reports*, 62, p.654-663
28. Sergeev S.G., Nazarov S.V., & Borman G.A. 2017, "Spectral variability of the 3C 390.3 nucleus for more than 20 yr - I. Variability of the broad and narrow emission line fluxes", *Monthly Notices of the Royal Astronomical Society*, 465, p.1898-1909 [Data]
29. Raiteri C.M., Villata M., Acosta-Pulido J.A., et al. 2017, "Blazar spectral variability as explained by a twisted inhomogeneous jet", *Nature*, 552, p.374-377
30. Raiteri C.M., Nicastro F., Stamerra A., et al. 2017, "Synchrotron emission from the blazar PG 1553+113. An analysis of its flux and polarization variability", *Monthly Notices of the Royal Astronomical Society*, 466, p.3762-3774

Официальные оппоненты

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Публикации Байковой А.Т., близкие к теме диссертации А.В. Плавина:

- [1] Bajkova, A. T. and Bobylev, V. V., “Comparison of the Orbital Properties of the Milky Way Globular Clusters from the Data of the Gaia DR2 and EDR3 Catalogs”, *Astronomy Reports*, vol. 65, no. 9, pp. 737–754, 2021. doi:10.1134/S1063772921090018.
- [2] Bajkova, A. T. and Bobylev, V. V., “Orbits of 152 globular clusters of the MilkyWay galaxy constructed from Gaia DR2”, *Research in Astronomy and Astrophysics*, vol. 21, no. 7, 2021. doi:10.1088/1674-4527/21/7/173.
- [3] Bajkova, A. T., Smirnov, A. A., and Bobylev, V. V., “Study of the Influence of an Evolving Galactic Potential on the Orbital Properties of 152 Globular Clusters with Data from the Gaia EDR3 Catalogue”, *Astronomy Letters*, vol. 47, no. 7, pp. 454–473, 2021. doi:10.1134/S106377372107001X.
- [4] Bobylev, V. V., Bajkova, A. T., Rastorguev, A. S., and Zabolotskikh, M. V., “Analysis of galaxy kinematics based on Cepheids from the Gaia DR2 Catalogue”, *Monthly Notices of the Royal Astronomical Society*, vol. 502, no. 3, pp. 4377–4391, 2021. doi:10.1093/mnras/stab074.
- [5] Bobylev, V. V. and Bajkova, A. T., “Analysis of Selected Runaway Stars in the Orion Nebula Based on Data from the Gaia EDR3 Catalogue”, *Astronomy Letters*, vol. 47, no. 4, pp. 224–234, 2021. doi:10.1134/S1063773721040022.
- [6] Bobylev, V. V. and Bajkova, A. T., “Study of Close Stellar Encounters with the Solar System Based on Data from the Gaia EDR3 Catalogue”, *Astronomy Letters*, vol. 47, no. 3, pp. 180–187, 2021. doi:10.1134/S1063773721020031.
- [7] Bobylev, V. V. and Bajkova, A. T., “Kinematic Properties of Young Intermediate- and Low-Mass Stars from the Gaia DR2 Catalogue”, *Astronomy Reports*, vol. 64, no. 12, pp. 1042–1049, 2020. doi:10.1134/S1063772920120033.
- [8] Bobylev, V. V. and Bajkova, A. T., “Estimation of the Gould Belt Scale Height from T Tauri Type Stars in the Gaia DR2 Catalog”, *Astrophysical Bulletin*, vol. 75, no. 3, pp. 267–277, 2020. doi:10.1134/S1990341320030025.
- [9] Bobylev, V. V., Krisanova, O. I., and Bajkova, A. T., “Study of the Galactic Rotation Based on Masers and Radio Stars with VLBI Measurements of Their Parallaxes”, *Astronomy Letters*, vol. 46, no. 7, pp. 439–448, 2020. doi:10.1134/S1063773720070038.
- [10] Krisanova, O. I., Bobylev, V. V., and Bajkova, A. T., “Galactic Rotation Parameters Based on Stars from Active Star-Forming Regions with Data from the Gaia DR2 Catalogue”, *Astronomy Letters*, vol. 46, no. 6, pp. 370–378, 2020. doi:10.1134/S1063773720060067.
- [11] Bajkova, A. T., Carraro, G., Korchagin, V. I., Budanova, N. O., and Bobylev, V. V., “Milky Way Subsystems from Globular Cluster Kinematics Using Gaia DR2 and HST Data”, *The Astrophysical Journal*, vol. 895, no. 1, 2020. doi:10.3847/1538-4357/ab8ea7.
- [12] Budanova, N. O., Bajkova, A. T., Bobylev, V. V., and Korchagin, V. I., “Chemical Composition of Globular Clusters of Milky Way Subsystems from Gaia DR2 Data”, *Astronomy Reports*, vol. 63, no. 12, pp. 998–1009, 2019. doi:10.1134/S1063772919120023.
- [13] Bobylev, V. V. and Bajkova, A. T., “Features of the Residual Velocity Ellipsoid of Hot Subdwarfs from the Gaia DR2 Catalog”, *Astronomy Reports*, vol. 63, no. 11, pp. 932–943, 2019. doi:10.1134/S1063772919110027.

- [14] Bajkova, A. T. and Bobylev, V. V., “Search for the evolutionary relationship between Galactic globular and open clusters using data from the Gaia DR2 catalogue”, *Monthly Notices of the Royal Astronomical Society*, vol. 488, no. 3, pp. 3474–3481, 2019. doi:10.1093/mnras/stz2061.
- [15] Bobylev, V. V. and Bajkova, A. T., “Kinematics of Hot Subdwarfs from the Gaia DR2 Catalogue”, *Astronomy Letters*, vol. 45, no. 9, pp. 580–592, 2019. doi:10.1134/S1063773719080012.
- [16] Bobylev, V. V. and Bajkova, A. T., “Galactic Rotation Based on OB Stars from the Gaia DR2 Catalogue”, *Astronomy Letters*, vol. 45, no. 6, pp. 331–340, 2019. doi:10.1134/S106377371906001X.
- [17] Bobylev, V. V. and Bajkova, A. T., “Kinematic Properties of Open Star Clusters with Data from the Gaia DR2 Catalogue”, *Astronomy Letters*, vol. 45, no. 4, pp. 208–216, 2019. doi:10.1134/S1063773719040029.
- [18] Bobylev, V. V. and Bajkova, A. T., “Kinematics of the Galaxy from a Sample of Young Open Star Clusters with Data from the Gaia DR2 Catalogue”, *Astronomy Letters*, vol. 45, no. 3, pp. 109–119, 2019. doi:10.1134/S1063773719030010.
- [19] Bobylev, V. V. and Bajkova, A. T., “Kinematics of the Galaxy from OB Stars with Data from the Gaia DR2 Catalogue”, *Astronomy Letters*, vol. 44, no. 11, pp. 676–687, 2018. doi:10.1134/S1063773718110026.
- [20] Bajkova, A. T. and Bobylev, V. V., “Search for Stellar Streams Based on Data from the RAVE5 and Gaia TGAS Catalogues”, *Astronomy Letters*, vol. 44, no. 3, pp. 193–201, 2018. doi:10.1134/S1063773718020019.
- [21] Bobylev, V. V. and Bajkova, A. T., “Testing the Distance Scale of the Gaia TGAS Catalogue by the Kinematic Method”, *Astronomy Letters*, vol. 44, no. 3, pp. 184–192, 2018. doi:10.1134/S1063773718020020.
- [22] Vityazev, V. V., Tsvetkov, A. S., Bobylev, V. V., and Bajkova, A. T., “Galactic Kinematics Derived From Data in the RAVE5, UCAC4, PPMXL, and Gaia TGAS Catalogs”, *Astrophysics*, vol. 60, no. 4, pp. 462–483, 2017. doi:10.1007/s10511-017-9499-0.
- [23] Bobylev, V. V. and Bajkova, A. T., “Searching for stars closely encountering with the solar system based on data from the Gaia DR1 and RAVE5 catalogues”, *Astronomy Letters*, vol. 43, no. 8, pp. 559–566, 2017. doi:10.1134/S1063773717080011.
- [24] Bobylev, V. V. and Bajkova, A. T., “Kinematics of the galaxy from OB stars with proper motions from the Gaia DR1 catalogue”, *Astronomy Letters*, vol. 43, no. 3, pp. 159–166, 2017. doi:10.1134/S1063773717030021.
- [25] Bobylev, V. V., Bajkova, A. T., and Shirokova, K. S., “Galactic kinematics from data on open star clusters from the MWSC catalogue.”, *Astronomy Letters*, vol. 42, no. 11, pp. 721–733, 2016. doi:10.1134/S1063773716100030.
- [26] Bajkova, A. T. and Pushkarev, A. B., “Multifrequency synthesis algorithm based on the generalized maximum entropy method: application to 0954+658”, *Monthly Notices of the Royal Astronomical Society*, vol. 417, no. 1, pp. 434–443, 2011. doi:10.1111/j.1365-2966.2011.19280.x.
- [27] Rastorgueva, E. A., “Multi-frequency VLBA study of the blazar S5 0716+714 during the active state in 2004. II. Large-scale jet kinematics and the comparison of the different methods of VLBI data imaging as applied to kinematic studies of AGN”, *Astronomy and Astrophysics*, vol. 529, 2011. doi:10.1051/0004-6361/201015241.
- [28] Bajkova, A. T. and Pushkarev, A. B., “Multifrequency method for mapping active galactic nuclei with allowance for the frequency-dependent image shift”, *Astronomy Letters*, vol. 36, no. 7, pp. 457–466, 2010. doi:10.1134/S1063773710070017.
- [29] Bajkova, A. T., “Multi-frequency synthesis of VLBI images using a generalized maximum entropy method”, *Astronomy Reports*, vol. 52, no. 12, pp. 951–962, 2008. doi:10.1134/S1063772908120019.
- [30] Bajkova, A. T. and Pushkarev, A. B., “Structure of the radio source 3C 120 at 8.4 GHz from VLBA+ observations in 2002”, *Astronomy Reports*, vol. 52, no. 1, pp. 12–18, 2008. doi:10.1134/S1063772908010022.

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Публикации Лутовинова А.А., близкие к теме диссертации А.В. Плавина:

- [1] Krivonos, R. A., Sazonov, S. Y., Kuznetsova, E. A., Lutovinov, A. A., Mereminskiy, I. A., and Tsygankov, S. S., “INTEGRAL/IBIS 17-yr hard X-ray all-sky survey”, Monthly Notices of the Royal Astronomical Society, vol. 510, no. 4, pp. 4796–4807, 2022. doi:10.1093/mnras/stab3751.
- [2] Krivonos, R., “Wide-field X-ray observations of the supernova remnant Puppis A with the SRG/ART-XC telescope”, Monthly Notices of the Royal Astronomical Society, vol. 510, no. 3, pp. 3113–3118, 2022. doi:10.1093/mnras/stab3647.
- [3] Salganik, A., “On the nature of the X-ray pulsar XTE J1859+083 and its broad-band properties”, Monthly Notices of the Royal Astronomical Society, vol. 509, no. 4, pp. 5955–5963, 2022. doi:10.1093/mnras/stab3362.
- [4] Kuznetsova, E., Krivonos, R., Lutovinov, A., and Clavel, M., “Sgr B2 hard X-ray emission with INTEGRAL after 2009: still detectable?”, Monthly Notices of the Royal Astronomical Society, vol. 509, no. 2, pp. 1605–1613, 2022. doi:10.1093/mnras/stab3004.
- [5] Nabizadeh, A., “Broad-band analysis of X-ray pulsar 2S 1845-024”, Astronomy and Astrophysics, vol. 657, 2022. doi:10.1051/0004-6361/202141608.
- [6] Sunyaev, R., “SRG X-ray orbital observatory. Its telescopes and first scientific results”, Astronomy and Astrophysics, vol. 656, 2021. doi:10.1051/0004-6361/202141179.
- [7] Bykov, S. D., Filippova, E. V., Gilfanov, M. R., Tsygankov, S. S., Lutovinov, A. A., and Molkov, S. V., “Pulsating iron spectral features in the emission of X-ray pulsar V 0332+53”, Monthly Notices of the Royal Astronomical Society, vol. 506, no. 2, pp. 2156–2169, 2021. doi:10.1093/mnras/stab1852.
- [8] Molkov, S., “Discovery of the 5 keV Cyclotron Line Followed by Three Harmonics in Swift J1626.6-5156”, The Astrophysical Journal, vol. 915, no. 2, 2021. doi:10.3847/2041-8213/ac0c15.
- [9] Gorban, A. S., Molkov, S. V., Tsygankov, S. S., and Lutovinov, A. A., “Study of the X-ray Pulsar XTE J1946+274 with NuSTAR”, Astronomy Letters, vol. 47, no. 6, pp. 390–401, 2021. doi:10.1134/S1063773721060049.
- [10] Pavlinsky, M., “The ART-XC telescope on board the SRG observatory”, Astronomy and Astrophysics, vol. 650, 2021. doi:10.1051/0004-6361/202040265.
- [11] Lutovinov, A., “SRG/ART-XC and NuSTAR Observations of the X-Ray pulsar GRO J1008-57 in the Lowest Luminosity State”, The Astrophysical Journal, vol. 912, no. 1, 2021. doi:10.3847/1538-4357/abec43.
- [12] Kuznetsova, E. A., Lutovinov, A. A., and Semena, A. N., “Phase-Resolved Spectroscopy of the Magnetar SGR J1745-2900 Based on Data from the NuSTAR Observatory”, Astronomy Letters, vol. 47, no. 4, pp. 214–223, 2021. doi:10.1134/S106377372104006X.
- [13] Tsygankov, S. S., “X-Ray Pulsar XTE J1858+034: Discovery of the Cyclotron Line and the Revised Optical Identification”, The Astrophysical Journal, vol. 909, no. 2, 2021. doi:10.3847/1538-4357/abddbd.
- [14] Lutovinov, A., “INTEGRAL View on cataclysmic variables and symbiotic binaries”, New Astronomy Reviews, vol. 91, 2020. doi:10.1016/j.newar.2020.101547.
- [15] Larchenkova, T. I., Lyskova, N. S., Petrov, L., and Lutovinov, A. A., “Influence of the Galactic Gravitational Field on the Positional Accuracy of Extragalactic Sources. II. Observational Appearances and Detectability”, The Astrophysical Journal, vol. 898, no. 1, 2020. doi:10.3847/1538-4357/ab989b.

- [16] Semena, A. N., “Observational constraints on the magnetic field of the bright transient Be/X-ray pulsar SXP 4.78”, *Monthly Notices of the Royal Astronomical Society*, vol. 490, no. 3, pp. 3355–3364, 2019. doi:10.1093/mnras/stz2722.
- [17] Molkov, S., Lutovinov, A., Tsygankov, S., Mereminskiy, I., and Mushtukov, A., “Discovery of a Pulse-phase-transient Cyclotron Line in the X-Ray pulsar GRO J2058+42”, *The Astrophysical Journal*, vol. 883, no. 1, 2019. doi:10.3847/2041-8213/ab3e4d.
- [18] Tsygankov, S. S., Doroshenko, V., Mushtukov, A. A., Suleimanov, V. F., Lutovinov, A. A., and Poutanen, J., “Cyclotron emission, absorption, and the two faces of X-ray pulsar A 0535+262”, *Monthly Notices of the Royal Astronomical Society*, vol. 487, no. 1, pp. L30–L34, 2019. doi:10.1093/mnrasl/slz079.
- [19] Lutovinov, A. A., Tsygankov, S. S., Karasev, D. I., Molkov, S. V., and Doroshenko, V., “GRO J1750-27: A neutron star far behind the Galactic Center switching into the propeller regime”, *Monthly Notices of the Royal Astronomical Society*, vol. 485, no. 1, pp. 770–776, 2019. doi:10.1093/mnras/stz437.
- [20] Shtykovsky, A. E., Lutovinov, A. A., Tsygankov, S. S., and Molkov, S. V., “Discovery of a cyclotron absorption line in the transient X-ray pulsar XTE J1829-098”, *Monthly Notices of the Royal Astronomical Society*, vol. 482, no. 1, pp. L14–L18, 2019. doi:10.1093/mnrasl/sly182.
- [21] Karasev, D. I., “Optical Identification of X-ray Sources from the 14-Year INTEGRAL All-Sky Survey”, *Astronomy Letters*, vol. 44, no. 8–9, pp. 522–540, 2018. doi:10.1134/S1063773718090037.
- [22] Karasev, D. I. and Lutovinov, A. A., “Determining the Absolute Magnitudes of Galactic-Bulge Red Clump Giants in the Z and Y Filters of the Vista Sky Surveys and the IRAC Filters of the Spitzer Sky Surveys”, *Astronomy Letters*, vol. 44, no. 4, pp. 220–235, 2018. doi:10.1134/S1063773718040047.
- [23] Shtykovsky, A. E., Arefiev, V. A., Lutovinov, A. A., and Molkov, S. V., “Peculiarities of Super-Eddington Flares from the X-ray Pulsar LMC X-4 Based on NuSTAR Data”, *Astronomy Letters*, vol. 44, no. 3, pp. 149–161, 2018. doi:10.1134/S1063773718030015.