Nazar Budaiev

Website: nbudaiev.github.io
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Education

Ph.D. in Astronomy, University of Florida — Expected 2026
M.S. in Astronomy, University of Florida — August 2022
B.A. in Astronomy and Physics, Boston University — May 2020

Research Experience

Graduate Student, University of Florida — 2020 - present

- Investigate the star formation history in Sagittarius B2 cloud with the help of JWST NIRCam and MIRI data.
- Cataloged 500 water masers in a massive star forming cloud Sagittarius B2. Identified 144 sites of maser emission and classified them based on the corresponding physical environments: HII regions, outflows, and Young Stellar Objects. Investigated the relationship between the water masers and the cross-matched objects.
- Complete quality assessment of incoming data and analyze spatial distribution of prestellar cores in ACES – a large ALMA survey covering the Central Molecular Zone (CMZ); an international collaboration of over 100 people. Lead author on two papers: core spatial distribution & fragmentation and CMZ's present star formation rate.
- Cataloged 410 protostellar cores in a star forming cloud Sagittarius B2 using ∼500 AU resolution ALMA data. Discovered that all observed sources are optically thick, rotationally supported Stage 0/I Young Stellar Objects. Derived source masses and obtained the Core Mass Function and Star Formation Rate.

Visiting Researcher, University of Connecticut — Spring 2025

- Investigate CMZ's current star-formation rate using the ACES large ALMA survey and extrapolating from the high-resolution studies of individual clouds.

Research Assistant, BU Astronomy Department — 2018 - 2020

- Developed IDL code to analyze performance of new VEGAS receiver on Green Bank Telescope when measuring high energy level transitions.
- Examined and tested IDL code for modeling HI clouds in Milky Way interstellar medium.

Summer Student, Green Bank Observatory — Summer 2019

- Crafted a 6 GHz continuum map of inner Galactic Plane with IDL and Python using data from the GBT Diffuse Ionized Gas Survey (GDIGS).

Teaching Experience

Project advisor, Star Formation Group, UF — Fall 2024 - present

- Via weekly meetings advise an undergraduate student, Mario Daley, to catalog YSO in Sagittarius B2 Deep South with ALMA. The student received $1,750 award through UF's University Scholars Program.

Graduate student instructor, Astronomy Laboratory, UF — Fall 2020 - Spring 2021

- Taught an undergraduate non-major laboratory course. Recorded videos of labs to facilitate remote learning. Redesigned several outdated experiments.

Teaching Assistant, Stellar and Galactic Astrophysics, BU — Spring 2020

- Assisted students in an IDL programming heavy course.

Teaching Assistant, Project Accelerate, BU Fall 2018 - Spring 2020
- Lead lab section of Advanced Placement physics course for underserved students. Developed and organized review sheets for each module of the course as a personal project.
Learning Assistant, General Physics I, BU Fall 2017 - Spring 2018
- Facilitated students in various activities to succeed in introductory physics courses.

Awards

ALMA Cycle 11, 6.9 hrs, PI Summer 2024
JWST Cycle 3 GO 5365, 17.9 hrs, Co-PI Spring 2024
Certificate of Outstanding Merit, UF International Center Fall 2023
Symposium Talk Award, UF Astronomy Fall 2023
Distinguished Service & Citizenship, UF Astronomy Fall 2022
Student Observing Support (SOS) ALMA Cycle 8, **$34,955** Fall 2021
Undergraduate Research Award, BU Astronomy Spring 2020

Outreach

Webinar Writer, Competition Judge, AstroSandbox 2020 - present
- Compose study materials for Ukrainian students interested in astronomy. Promote and improve the level of astronomy education in Ukraine. Wrote and delivered six webinars: *Python in astronomy, Astronomical image processing, Multiwavelength astronomy, Radio astronomy, How to write a telescope proposal?, Imposter syndrome.*
- Served as a judge in the annual astrophysics team competition with 50 participants from 15 regions of Ukraine.
Mentor, Ukraine Global Scholars, Ukraine Achievement Fund 2020 - 2024
- Assist promising Ukrainian students to get into the world's best universities.
- Mentored four high-school students through weekly meetings. Two students were accepted to several of the top 20 US boarding schools.
Mentoring committee, UF Astronomy Department 2021 - 2023
- Serve as a graduate student representative. Share anonymized students' mentoring needs with the committee. Gather students' opinions on proposed changes.
Pen Pal, Letters to a Pre-Scientist 2021 - 2022
- Correspond with a high-school student via physical mail throughout a year.

Workshops

Code/Astro, Evanston, IL July 2024
19th Synthesis Imaging Workshop, Charlottesville, VA June 2023
Star Formation School, Granada, Spain November 2021
GBT Remote Observer Certification, Green Bank Obs., WV September 2021
Single Dish School, Green Bank Obs., WV September 2021

Publications

Papers

1. **N. Budaiev**, A. Ginsburg, et al., *JWST's first view of the most vigorously star-forming cloud in the Galactic center – Sagittarius B2*, in prep.

2. T. Yoo, A. Ginsburg, J. Braine, **N. Budaiev**, et al., *ALMA-IMF XX: Core fragmentation in the W51 high-mass star-forming region*, arXiv:2509.06749.
3. **N. Budaiev**, A. Ginsburg, et al., *Properties of H_2O masers and their associated sources in Sagittarius B2*, 2025ApJ...989...52B.
4. F. Xu, et al. including **N. Budaiev**, *Dual-band Unified Exploration of Three CMZ Clouds (DUET)*, 2025A&A...697A.164X
5. S. Zhang, X. Lu, A. Ginsburg, **N. Budaiev**, et al., *Subclustering and Star Formation Efficiency in Three Protoclusters in the Central Molecular Zone*, 2025ApJ...982L..10Z
6. A. Ginsburg, et al. including **N. Budaiev**, *A broad linewidth, compact, millimeter-bright molecular emission line source near the Galactic Center*, 2024ApJ...968L..11G
7. D. Jeff, A. Ginsburg, A. Bulatek, **N. Budaiev**, et al., *Thermal Properties of the Hot Core Population in Sagittarius B2 Deep South*, 2024ApJ...962...48J
8. **N. Budaiev**, A. Ginsburg et al., *Protostellar cores in Sagittarius B2 N and M*, 2024ApJ...961....4B
9. Y. T. Yan, et al. including **N. Budaiev**, *Discovery of non-metastable ammonia masers in Sagittarius B2*, 2022A&A...666L..15Y
10. F. Meng et al. including **N. Budaiev**, *The physical and chemical structure of Sagittarius B2 VI. UCHII regions in Sgr B2*, 2022A&A...666A..31M

Talks and Posters

"Star formation in the Galactic center," Seminar talk. Yale, New Heaven, CT Oct 2025
"Multiwavelength mysteries in Sgr B2," TUNA talk. NRAO, Charlottesville, VA Oct 2025
"Multiwavelength mysteries in Sgr B2," Seminar talk. ESO, Germany Sep 2025
"Multiwavelength mysteries in Sgr B2," Contributed talk. Stellar Origins, Austria Sep 2025
"Star formation in Sgr B2," Talk. ALMA-IMF workshop (remote) Jun 2025
"Multiwavelength mysteries in Sgr B2," Contributed talk. STScI Symposium, Baltimore, MD May 2025
"Where are the stars in Sgr B2?" Colloquium. UConn, Storrs, CT Apr 2025
"Star formation in Sgr B2," Talk. ACES meeting, Boston, MA Aug 2024
"Protostellar cores in Sgr B2," Talk. Kansas University (remote) Mar 2023
"Protostellar cores in Sgr B2," Contributed talk. Surveying the Milky Way: The Universe in Our Own Backyard, Pasadena, CA Oct 2023
"A 500 AU resolution census of protostellar cores in the giant molecular cloud Sgr B2," Poster. PPVII, Kyoto, Japan Apr 2023
"A 500 AU resolution census of pre- and protostellar cores in the giant molecular cloud Sgr B2," Poster. From Stars to Galaxies II, Gothenburg, Sweden Jun 2022
"A 500 AU resolution census of pre- and protostellar cores in the giant molecular cloud Sgr B2," Poster. Seeing the Future, Portsmouth, NH Apr 2022
"A 6 GHz Continuum Map of the Inner Galactic Plane with the Green Bank Telescope," Poster. AAS 235th Meeting, Hawaii Jan 2020