

Oleksii SOKOLIUK

PERSONAL DATA

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WORK EXPERIENCE

JUL–SEPT 2025	<i>Visiting Student – Institute of Astronomy, University of Cambridge</i> Supervisor: Prof. John Webb, Projects: <ul style="list-style-type: none">– A very generalised approach of modeling the metal content in the early and late universe– Determining Instrumental Profile of the ESPRESSO instrument for Rigorous Tests of Fundamental Constants and Redshift Drift
AUG–SEPT 2024	<i>Visiting Student – KICC, University of Cambridge</i> Supervisor: Prof. John Webb, Project: <ul style="list-style-type: none">– The cosmic web's Lyman-α glow at $z \approx 2.5$; varying hydrodynamic models, dust, and wide-field, narrow-band imaging detection
MAY 2021 – NOW	<i>Research Scholar – Main Astronomical Observatory, NAS of Ukraine</i> Supervisor: Prof. Iryna Vavilova

EDUCATION

SEPT 2023 - MAY 2027	Bachelor of Science (Hons) in PHYSICS University of Aberdeen, United Kingdom
JULY 2023	St. Joseph's College, Dumfries



TALKS & POSTER PRESENTATIONS

[1] Institute of Astronomy, University of Cambridge Wednesday Colloquia	16 Jul 2025 (invited talk)
[2] Astronomy Group, University of St. Andrews Lunchtime Talks	1 Jul 2025 (invited talk)
[3] Mullard Space Science Laboratory, University College London UCL Astrophysics seminar	23 Jan 2025 (invited talk)
[4] GRANDMA collaboration (a part of LIGO/VIRGO) Seminar/Telecon	05 Dec 2024 (invited talk)
[5] Institute for Computational Cosmology, Durham University Friday Lunchtime Astrophysics Talks (FLAT)	14 Jun 2024 (invited talk)
[6] Kobe International Conference Center, Kobe Port Island CCP2023 - 34th IUPAP Conference on Computational Physics	4 Aug - 8 Aug 2023 (contributed talk)
[7] Faculdade de Ciências da Universidade de Lisboa CosmoVerse@Lisbon, First Annual Conference	30 May - 1 Jun 2023 (poster)
[8] Faculty of Physics, Odesa I.I. Mechnikov National University XXI Gamow International Astronomical Conference-School	16 Aug - 20 Aug 2021 (contributed talk)
[9] Faculty of Physics, Taras Shevchenko National University of Kyiv 27-th Young Scientists' Conference on Astronomy and Space Physics	26 Apr - 30 Apr 2021 (contributed talk)

SELECTED PUBLICATIONS

As of Sept 2025, 24 papers were published in international, peer reviewed journals with 14 papers published as a first author, 2 as a second author. In total, those papers have >560 citations and h -index of 12 according to [NASA ads](#) and >370 citations, h -index of 11 according to [Web of Science](#). Here are some selected publications:

- [1] [Oleksii Sokoliuk](#). “Explaining JWST star formation history at $z \sim 17$ by modifying Λ CDM”. In: *Astron. Astrophys.* 699 (2025), A59.
- [2] Fabiano F. Santos (including [Oleksii Sokoliuk](#)) et al. “Holographic boundary conformal field theory within Horndeski gravity”. In: *JHEP* 12 (2025), p. 217.
- [3] [Oleksii Sokoliuk](#) et al. “AdS Black Hole Thermodynamics and Microstructures from $f(Q)$ Gravitation”. In: *Fortschritte der Physik* 72.1 (2024), p. 2300043.
- [4] Sanjay Mandal, [Oleksii Sokoliuk](#), et al. “ H_0 tension in torsion-based modified gravity”. In: *Nucl. Phys. B* 993 (2023), p. 116285.
- [5] [Oleksii Sokoliuk](#), Simran Arora, et al. “On the impact of $f(Q)$ gravity on the large scale structure”. In: *Mon. Not. Roy. Astron. Soc.* 522.1 (2023), pp. 252–267.
- [6] [Oleksii Sokoliuk](#), Alexander Baransky, and P. K. Sahoo. “Compact stars admitting Finch-Skea symmetry in the presence of various matter fields”. In: *Chin. Phys. C* 47.1 (2023), p. 015104.
- [7] Fabiano F. Santos, [Oleksii Sokoliuk](#), and Alexander Baransky. “Holographic Complexity of Brane-world in Horndeski Gravity”. In: *Fortschritte der Physik* 71.2-3 (2023), p. 2200141.
- [8] Fabiano F. Santos (including [Oleksii Sokoliuk](#)) et al. “AdS/BCFT Correspondence and Horndeski Gravity in the Presence of Gauge Fields: Holographic Paramagnetism/ Ferromagnetism Phase Transition”. In: *Fortschritte der Physik* 71.12 (2023), p. 2300008.
- [9] [Oleksii Sokoliuk](#) and Alexander Baransky. “Cosmological constraints on bulk viscous $f(Q, T)$ gravity”. In: *Astron. Nachr.* 343.5 (2022), e220003.
- [10] [Oleksii Sokoliuk](#), Alexander Baransky, Andrew Khorolskiy, et al. “An X-Ray and Optical Study of the UGSU-Type Dwarf Nova Gaia18awg”. In: *Journal of Physical Studies* 26.3 (Sept. 2022), pp. 3901–3909.
- [11] [Oleksii Sokoliuk](#), Alexander Baransky, and P. K. Sahoo. “Kuchowicz gravastars in the braneworld formalism”. In: *Phys. Lett. B* 829 (2022), p. 137048.
- [12] [Oleksii Sokoliuk](#), Alexander Baransky, and P. K. Sahoo. “Probing the existence of the ZTF Casimir wormholes in the framework of $f(R)$ gravity”. In: *Nucl. Phys. B* 980 (2022), p. 115845.
- [13] [Oleksii Sokoliuk](#), Alexander Baransky, and Pradyumn Kumar Sahoo. “Non-singular T-K axion stars with/without the dynamical bosonic field in the presence of negative Λ term”. In: *Phys. Dark Univ.* 35 (2022), p. 100972.
- [14] [Oleksii Sokoliuk](#), Zinnat Hassan, et al. “Traversable wormholes with charge and non-commutative geometry in the $f(Q)$ gravity”. In: *Annals Phys.* 443 (2022), p. 168968.
- [15] [Oleksii Sokoliuk](#), Sanjay Mandal, et al. “Generalised Ellis-Bronnikov wormholes in $f(R)$ gravity”. In: *Eur. Phys. J. C* 82.4 (2022), p. 280.
- [16] [Oleksii Sokoliuk](#), Sneha Pradhan, et al. “Buchdahl quark stars within $f(Q)$ theory”. In: *Eur. Phys. J. Plus* 137.9 (2022), p. 1077.
- [17] [Oleksii Sokoliuk](#), Subhrat Praharaj, et al. “Accretion flows around exotic tidal wormholes - I. Ray-tracing”. In: *Astron. Astrophys.* 665 (2022), A139.
- [18] [Oleksii Sokoliuk](#) and Alexander Baransky. “On the existence and stability of traversable wormhole solutions in modified theories of gravity”. In: *Eur. Phys. J. C* 81.8 (2021), p. 781.

Observations of near-earth objects and comets were published in 19 Minor Planet Electronic Circulars (MPEC ) and observations of Gamma Ray Bursts in 2 GRB Coordinates Network circulars (GCN )

COLLABORATIVE PAPERS

Additionally, within several collaborations, I have actively contributed to various publications, engaging in tasks such as observations, data analysis, figure/table creation, and text revision:

- [1] Eleonora Di Valentino (including [Oleksii Sokoliuk](#)) et al. “The CosmoVerse White Paper: Addressing observational tensions in cosmology with systematics and fundamental physics”. In: *Phys. Dark. Univ.* (Apr. 2025).
- [2] T Hussenot-Desenonges (including [Oleksii Sokoliuk](#)) et al. “Multi-band analyses of the bright GRB 230812B and the associated SN2023pel”. In: *Mon. Not. Roy. Astron. Soc.* (2024), [stae503](#).
- [3] Jialian Liu (including [Oleksii Sokoliuk](#)) et al. “Early-time Observations of SN 2023wrk: A Luminous Type Ia Supernova with Significant Unburned Carbon in the Outer Ejecta”. In: *Astrophys. J.* 973.2 (2024), p. 117.
- [4] I. Tosta e Melo (including [Oleksii Sokoliuk](#)) et al. “Ready for O4 II: GRANDMA observations of Swift GRBs over eight weeks in spring 2022”. In: *Astron. Astrophys.* 682 (2024), [A141](#).
- [5] D. A. Kann (including [Oleksii Sokoliuk](#)) et al. “GRANDMA and HXMT Observations of GRB 221009A: The Standard Luminosity Afterglow of a Hyperluminous Gamma-Ray Burst—In Gedenken an David Alexander Kann”. In: *Astrophys. J. Lett.* 948.2 (2023), p. L12.
- [6] V. Aivazyan (including [Oleksii Sokoliuk](#)) et al. “GRANDMA observations of ZTF/Fink transients during summer 2021”. In: *Mon. Not. Roy. Astron. Soc.* 515.4 (2022), pp. 6007–6022.

CONFERENCE PROCEEDINGS & OTHER

- [1] Cristina Andrade (including [Oleksii Sokoliuk](#)) et al. “GRANDMA Observations of SN 2023wrk, a Luminous Type Ia Supernova with Significant Unburned Carbon in the Outer Ejecta”. In: *Research Notes of the AAS* 8.10 (Oct. 2024), p. 273.
- [2] S. Agayeva (including [Oleksii Sokoliuk](#)) et al. “The GRANDMA network in preparation for the fourth gravitational-wave observing run”. In: *Observatory Operations: Strategies, Processes, and Systems IX* 12186 (Aug. 2022), 121861H.

IN PREPARATION & UNDER REVIEW

- [1] [Oleksii Sokoliuk](#) et al. “The cosmic web’s Lyman- α glow at $z \approx 2.5$; varying hydrodynamic models, dust, and wide-field, narrow-band imaging detection”. In: *arXiv: 2510.07259* (Oct. 2025).
- [2] Kenneth M. Lanzetta (including [Oleksii Sokoliuk](#)) et al. “Direct Images of the Cosmic Web of Intergalactic and Circumgalactic Gas in the Distant Universe”. In: *arXiv: 2412.10081* (Dec. 2024).

PEER REVIEW

I have been invited as a peer reviewer for the following journals (most of the reviews are linked to my [ORCID](#) and [Web of Science](#) profiles):

- | | |
|---------------------------------------|---|
| ➤ European Physical Journal C (2022) | ➤ Physics of the Dark Universe (2023 (2)) |
| ➤ New Astronomy (2022) | ➤ Pramana (2024) |
| ➤ Foundations of Physics (2022, 2024) | ➤ Annals of Physics (2024 (3)) |
| ➤ Scientific Reports (2023) | ➤ Physics Letters B (2024) |
| ➤ Annalen der Physik (2023) | ➤ Int. J. Mod. Phys. A (2024) |
| ➤ Indian Journal of Physics (2023) | ➤ General Relativity and Gravitation (2025) |

MEMBERSHIPS

- International Society for Relativistic Quantum Information (ISRQI)
- International Society for Quantum Gravity (ISQG)
- Global Rapid Advanced Network Devoted to the Multi-messenger Addicts (GRANDMA)
- Wide-field Spectroscopic Telescope (WST) Science Team
- Condor Array Telescope
- Assembling Galaxies Of Resolved Anatomy (AGORA)
- Nucleosynthesis Grid (NuGrid)
- Insitute of Physics (IoP) Associate Member
- American Astronomical Society (AAS) Undergraduate Student Member

AWARDS & GRANTS

Recognitions:

- ◆ Nominated for the "Cambridge Independent Science and Technology Awards" by Prof. John Webb

Monetary awards - 11000\$ total:

- ◆ CA21106 STSM Grant - 2100\$
- ◆ CA21136 ITC Conference Grant for CCP2023 - 2200\$
- ◆ CA21136 STSM Grant - 2200\$
- ◆ CA21136 Conference Grant for CosmoVerse@Lisbon - 1000\$
- ◆ CA21136 Conference Grant for CosmoVerse@Krakow - 1000\$ (declined due to personal reasons)
- ◆ Scholarship of the President of Ukraine - 1000\$
- ◆ MAO NAS travel grant - $3 \times 500\$$

Computing time allocations - 0.85M CPUh total:

- ◆ Co-PI: 300k CPUh on IUCAA Pegasus, with Prof. Jiajun Zhang as Co-PI and Prof. P. K. Sahoo as PI
- ◆ Co-PI: ~200k CPUh on Australian NCI Gadi with Subhrat Praharaj as PI
- ◆ Co-PI: ~300k CPUh on IUCAA Pegasus with Prof. P. K. Sahoo as PI
- ◆ Co-PI: ~50k CPUh on OzSTAR with Prof. John Webb as PI

Observational proposals - 21ks total:

- ◆ PI: Target of Opportunity (TOO) observation of Gaia18awg by SWIFT space telescope (ID: 13502, ~3k seconds)
- ◆ PI: Target of Opportunity (TOO) observation of Gaia18awg by XMM-Newton space telescope (ID: 08711910011, ~18k seconds)

PUBLIC OUTREACH

- ☐ Short article "*Is Modified Gravity an Illusion?*" for CosmoVerse COST action in a series of articles for general public "Learn about Cosmology"
- ☐ Interview for CosmoVerse COST action in a "*Meet our scientists*" dissemination activity

- ❑ Volunteer for Astronomy night under "*Curiosity in Action*" program (funded by STFC)
- ❑ STEM Ambassador Scotland, volunteering to promote science to the general public
- ❑ Demonstrator for the STEM Summer Showcase 2024 at UoA
- ❑ Keynote speaker for ~250 people of general public at the event "*Stargazing in the Botanic Gardens*"

SKILLS

LANGUAGES	Ukrainian (native tongue), Russian (native tongue), English (~ C2)
PROGRAMMING	Python (advanced), \LaTeX (advanced), Mathematica (advanced), MATLAB (intermediate), Haskell (intermediate), Futhark/ML (beginner), C/C++ (beginner)
PARALLEL COMPUTING	MPI, OpenMP, Slurm, worked with Cray/ARM

PROJECTS

CA21106 - COSMIC WISPerS in the Dark Universe - Working Group 2: WISPerS Dark Matter and Cosmology	Oct 2022 – Oct 2026
CA21136 - CosmoVerse - Working Group 3: Fundamental Physics	Oct 2022 – Oct 2026
CA22113 - Fundamental challenges in theoretical physics - Working Group 2: Gravity and Holography	Oct 2023 – Oct 2027
Mathematical Modeling in Interdisciplinary Research of Processes and Systems - Grant for the Lab of LSS, MAO NAS of Ukraine	Jan 2021 – Jan 2025

DEVELOPED SOFTWARE & SIMULATIONS

RAMA	Code can be used with <code>reps</code> output to find z_* , l at which N-body simulations coincide with the desired cosmology in the presence of massive neutrinos. Available at RAMA .
MG-SWIFT	Modification of the standard N-body/SPH SWIFT code to include such cosmologies as $f(Q)/f(T)$ gravitation, Palatini- $f(R)$ gravitation, with the help of linearly interpolated Hubble parameter and effective gravitational constant, which are updated every step using provided data from tables. Available at MG-SWIFT .
ZWINDSTROOM	With the help of Willem Elbers, modified the initial conditions generator <code>monofonIC</code> to include massive neutrinos and non-standard cosmologies simultaneously. Available at MG-monofonic .
LANCELOT	A suite of 12 high-resolution N-body simulations with more than 13.5 billion particles in total as well as 24 TB of output. From the simulation snapshots, many quantities such as void/halo catalogues, power spectrum, and HMF are being derived. Currently in development.
CORINTH	Emulator of non-linear $P(k)$ for Jordan–Brans–Dicke cosmology, based on 200 Comoving Lagrangian Approximation simulations of structure formation with Latin hypercube parameter sampling. Currently in development.
ANTHOLOGY OF INFLATION	A project aimed at studying 27 single-parameter models of inflation using $N = 256$ lattice simulations of reheating, primordial power spectra of curvature perturbations, and gravitational waves. Currently in development; some of the code is available via ASPIC .

REFERENCES

NAME: **Dr. P. K. Sahoo**
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NAME: **Dr. Irina Vavilova**
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NAME: **Dr. Charles Wang**
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NAME: **Dr. Alexander Baransky**
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RESEARCH INTERESTS

I am a cosmologist, mainly interested in the complicated, high resolution simulations of the Large Scale Structure of the Universe within the non-standard theories of modified gravitation or dark matter. As well, I am trying to alleviate H_0 , σ_8 and other cosmological tensions beyond Λ CDM, find new physics in higher order weak lensing statistics.