Oleksii Sokoliuk

Personal Data

Date of Birth: 3rd October 2005
Phone: +44 7721 453391
email: oleksii.sokoliuk@mao.kiev.ua

Work Experience

Jul–Sept 2025 — *Visiting Student – Institute of Astronomy, University of Cambridge*
Supervisor: Prof. John Webb, Projects:
- 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 — *Visiting Student – KICC, University of Cambridge*
Supervisor: Prof. John Webb, Project:
- 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 — *Research Scholar – Main Astronomical Observatory, NAS of Ukraine*
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** — 16 Jul 2025
Wednesday Colloquia — (invited talk)

[2] **Astronomy Group, University of St. Andrews** — 1 Jul 2025
Lunchtime Talks — (invited talk)

[3] **Mullard Space Science Laboratory, University College London** — 23 Jan 2025
UCL Astrophysics seminar — (invited talk)

[4] **GRANDMA collaboration (a part of LIGO/VIRGO)** — 05 Dec 2024
Seminar/Telecon — (invited talk)

[5] **Institute for Computational Cosmology, Durham University** — 14 Jun 2024
Friday Lunchtime Astrophysics Talks (FLAT) — (invited talk)

[6] **Kobe International Conference Center, Kobe Port Island** — 4 Aug - 8 Aug 2023
CCP2023 - 34th IUPAP Conference on Computational Physics — (contributed talk)

[7] **Faculdade de Ciências da Universidade de Lisboa** — 30 May - 1 Jun 2023
CosmoVerse@Lisbon, First Annual Conference — (poster)

[8] **Faculty of Physics, Odesa I.I. Mechnikov National University** — 16 Aug - 20 Aug 2021
XXI Gamow International Astronomical Conference-School — (contributed talk)

[9] **Faculty of Physics, Taras Shevchenko National University of Kyiv** 26 Apr - 30 Apr 2021
27-th Young Scientists' Conference on Astronomy and Space Physics (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 >590 citations and h-index of 12 according to NASA ads and >380 citations, h-index of 12 according to Web of Science. Here are some selected publications:

[1] Oleksii Sokoliuk. "Explaining JWST star formation history at z $\sim$ 17 by modifying ΛCDM". 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 Praduymn 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)
- New Astronomy (2022)
- Foundations of Physics (2022, 2024)
- Scientific Reports (2023)
- Annalen der Physik (2023)
- Indian Journal of Physics (2023)
- Physics of the Dark Universe (2023 (2))
- Pramana (2024)
- Annals of Physics (2024 (3))
- Physics Letters B (2024)
- Int. J. Mod. Phys. A (2024)
- General Relativity and Gravitation (2025)
- Nuclear Physics B (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 - 3×500$

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 Oct 2022 – Oct 2026
- Working Group 2: WISPs Dark Matter and Cosmology

CA21136 - CosmoVerse Oct 2022 – Oct 2026
- Working Group 3: Fundamental Physics

CA22113 - Fundamental challenges in theoretical physics Oct 2023 – Oct 2027
- Working Group 2: Gravity and Holography

Mathematical Modeling in Interdisciplinary Research of Processes and Systems Jan 2021 – Jan 2025
- Grant for the Lab of LSS, MAO NAS of Ukraine

Developed Software & Simulations

RAMA	Code can be used with `reps` 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 `monofonIC` 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**	Name:	**Dr. Irina Vavilova**
Position:	Professor	Position:	Professor
Affiliation:	Dept. of Mathematics, BITS Pilani	Affiliation:	MAO, NAS of Ukraine
E-mail:	pksahoo@hyderabad.bits-pilani.ac.in	E-mail:	irivav@mao.kiev.ua
Name:	**Dr. Charles Wang**	Name:	**Dr. Alexander Baransky**
Position:	Professor	Position:	Senior Scholar
Affiliation:	Dept. of Physics, University of Aberdeen	Affiliation:	Lisnyky Obs. Station, Kyiv Astron. Obs.
E-mail:	c.wang@abdn.ac.uk	E-mail:	abaransky@ukr.net

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 ΛCDM, find new physics in higher order weak lensing statistics.