Sasha (Alexander A.) Kaurov, Ph.D.

sasha@kaurov.org — kaurov.org — https://www.linkedin.com/in/akaurov/

10+ years of experience in astronomy, astrophysics and cosmology utilizing , and 2+ years of data-driven sociological research. Interested in meaningful incorporation of novel technology into science outreach. Enthusiastic about improving the pathways in academia and founded a mentoring network.

WORK EXPERIENCE

Harvard University — *Visitor, History of Science*
Boston, MA, Starting 01/2022
- **Dean's Competitive Fund for Promising Scholarship, Co-PI Naomi Oreskes** 01 — 07/2022

Blue Marble Space Institute of Science — *Affiliate Research Scientist*
Seattle, WA, 11/2021 — PRESENT

The Institute for Advanced Study — *Visitor, Program in Interdisciplinary Studies*
Princeton, NJ, 08/2021 — PRESENT

The Institute for Advanced Study — *Postdoctoral researcher*
Princeton, NJ, 2016 — 07/2021
- **William D. Loughlin fellowship**   2020 — 2021
- **IBM Einstein fellowship**   2019 — 2020
- **William D. Loughlin fellowship**   2018 — 2019
- **Eric and Wendy Schmidt fellowship**   2017 — 2018
- *Paternity leave*   01 — 06/2017
- **AMIAS fellowship**   2016 — 2017

The University of Chicago — *Research Assistant*
Chicago IL, 2012 — 2016

Fermilab — *Research Assistant*
Batavia IL, 2012 — 2013
- **Fermilab Fellowship in Theoretical Physics**   2012 — 2013

The University of Chicago — *Teaching Assistant*
Chicago IL, 2011 — 2012
- PHSC 12000 **The Origin of Universe & How We Know**
- PHSC 11900 **Introductory astronomy course**
- PHSC 13500 **Chemistry — The Atmosphere**

EDUCATION

The University of Chicago — *Ph.D. in Astronomy & Astrophysics*
Chicago IL, 2011 — 2016

Thesis: "Analytical and numerical modeling of the epoch of cosmic reionization."
- **McCormick Fellowship**   2011 — 2012

St. Petersburg State Polytechnic University — *B.Sc. in Astrophysics*
St. Petersburg, Russia, 2007 — 2011

Thesis: "Multidimensional numerical simulations of heat transfer in the crusts of neutron stars."
- **Russian Academy of Science fellowship (Pulkovo, Russia)**   2009 — 2011
- **Ioffe Institute Fellowship**   2009 — 2010

PUBLIC SERVICE

- The National Aeronautics and Space Administration (NASA) grant review panelist.
- Referee for Monthly Notices of the Royal Astronomical Society.

REFERENCES

Academic:

Nickolay Gnedin, professor at the University of Chicago and senior scientist at Fermilab
gnedin@fnal.gov

Matias Zaldarriaga, professor at the Institute for Advanced Study
matiasz@ias.edu

Education and outreach:

Piet Hut, professor of Interdisciplinary Studies at the Institute for Advanced Study
piet@ias.edu

Mark Subbarao, president of the International Planetarium Society,
lead of NASA's Scientific Visualization Studio
mark.u.subbarao@nasa.gov

SELECTED ASTRONOMY PROJECTS

- **Cosmology and Astrophysics with 21 cm signal.** We leverage numerical cosmological simulations to forward model the observed optical and radio signals and then design machine learning techniques capable of meaningfully interpreting the mock data.

- **Time-domain Astronomy and Highly Magnified Stars in Lensing Clusters.** We mine the existing data and develop methods for the upcoming space telescopes to detect the brightness variability of lensed galaxies and then build theoretical models to constrain the physics of dark matter.

- **Geological Evidence of Near-Earth Supernova Explosion.** We adopt numerical models of the Inter-Stellar Medium to estimate the flux of the supernova ejecta that can reach the Solar system.

SELECTED DATA-DRIVEN SCIENCE COMMUNICATION PROJECTS

- **Leveraging Public and Marketing Data for Probing Public's Perception of Science.** Together with Prof. Naomi Oreskes (Harvard) we explore new methods of deducing public's trust in science by creating indicators from large datasets, potentially replacing traditional methods of field surveys.

- **AI for democratizing access to Higher Ed.** We adapt NLP and other ML techniques to analyze the freely available online learning resources and aggregate them in a way to make them accessible to students with any background or experience.

- **Quantitative Methods for Accessibility Estimations.** Together with Mark SubbaRao (President, International Planetarium Society) we studied the accessibility of the planetariums in the United States based on census data and Google Maps API.

SELECTED OUTREACH AND SCIENCE COMMUNICATION PROJECTS

❖ **STEM XR initiative** https://stemxr.org . I founded a network of 50+ science communicators, theater professionals and technologists from 18 countries who joined on the quest of combining novel immersive tech and theatrical storytelling techniques for creating science-focused shows and experiences.

❖ **Science communication in the shared virtual worlds.** I designed and supervised the development of virtual world experiences in collaboration with the Earth Life Science Institute (ELSI, Tokyo Institute of Technology) and the Japan Aerospace Exploration Agency (JAXA) about the Hayabusa2 mission and another one for the Nautilus science magazine.

MENTORING

❖ I co-founded a mentoring program that connects undergraduate and graduate students from post-Soviet countries (Russia, Belarus, Ukraine and Kazakhstan) with mid-career scientists from all over the world. We generate around 100 mentor-mentee pairs each quarter from ~20 countries. https://www.thesciencementors.com/en

❖ I supervised the B.Sc. thesis projects of several undergraduate students from St. Petersburg State Polytechnic University (my alma mater):
  ❖ Evgenii Chaikin (B.Sc., 2017), M.Sc. fellowship at the University of Bonn (Germany), currently Ph.D. student at Leiden Observatory (Netherlands).
  ❖ Nadezhda Tuberozova (B.Sc., 2018), a graduate student at the University of Bonn (Germany).
  ❖ Ekaterina Leonova (B.Sc., 2019), M.Sc. fellow at the University of Geneva (Switzerland), Ph.D. student at the University of Amsterdam.

PUBLICATIONS

20+ refereed research papers with h-index (ADS): 12.

List of my publications and various metrics are available on ADS portal: http://bit.ly/ads_kaurov

The students I mentored are in *Italic.*

	Title	Authors	Year	Citations (ADS)
	Submitted:			
26	Exploring the cosmic 21-cm signal from the Epoch of Reionisation using the Wavelet Scattering Transform	Greig, Ting, **Kaurov**	**2021**	
25	Optical properties of the Resonant Drag Instabilities: Consequences for the variability of AGB-stars and R Cor Bor stars arxiv:2111.09335	Steinwandel, **Kaurov**, Hopkins	**2021**	
24	Simulations of Fe60 entrained in ejecta from a near-earth supernova: Effects of observer motion arxiv:2109.11242	*Chaikin*, **Kaurov**, Fields	**2021**	
	Published:			
23	Planetarium commute accessibility in the United States of America (accepted to CAPJournal) 10.22541/au.159724581.14747461	**Kaurov**, *Bazhenov*, SubbaRao	**2020**	**0**
22	Asymmetric surface brightness structure of caustic crossing arc in SDSS J1226+2152: a case for dark matter substructure 2020MNRAS.495.3192D	Dai, **Kaurov**, Sharon and 6 more	**2020**	**9**
21	Research and Development for HI Intensity Mapping 2019BAAS...51g..71T	Timbie and 53 more	**2019**	**3**
20	Packed Ultra-wideband Mapping Array (PUMA): A Radio Telescope for Cosmology and Transients 2019BAAS...51g..53S	Slosar and 61 more	**2019**	**37**
19	Highly Magnified Stars in Lensing Clusters: New Evidence in a Galaxy Lensed by MACS J0416.1-2403 2019ApJ...880...58K	**Kaurov**, Dai, Venumadhav, Miralda-Escudé, Frye	**2019**	**21**
18	Probing the Time Domain with High Spatial Resolution 2019BAAS...51c.529B	Blakeslee, John and 19 more	**2019**	**1**
17	Non-perturbative probability distribution function for cosmological counts in cells 2019JCAP...03..009I	Ivanov, **Kaurov**, Sibiryakov	**2019**	**15**
16	Heating of the intergalactic medium by the cosmic microwave background during cosmic dawn 2018PhRvD..98j3513V	Venumadhav, Dai, **Kaurov**, Zaldarriaga	**2018**	**35**

15	Probing Dark Matter Subhalos in Galaxy Clusters Using Highly Magnified Stars 2018ApJ...867...24D	Dai, Venumadhav, **Kaurov**, Miralda-Escudé	2018	15
14	Implication of the Shape of the EDGES Signal for the 21 cm Power Spectrum 2018ApJ...864L..15K	**Kaurov**, Venumadhav, Dai, Zaldarriaga	2018	21
13	Observing Galaxy Mergers at the Epoch of Reionization 2018ApJ...853...81C	*Chaikin*, *Tyulneva*, **Kaurov**	2018	2
12	Stochasticity in the 21cm power spectrum at the epoch of reionization and cosmic dawn 2017arXiv170904353K	**Kaurov**	2017	2
11	Neutron stars with variable internal heaters 2017EL....11729001C	*Chaikin*, **Kaurov**, Kaminker, Yakovlev	2017	1
10	The Effects of Dark Matter Annihilation on Cosmic Reionization 2016ApJ...833..162K	**Kaurov**, Hooper, Gnedin	2016	6
9	On Improving Analytical Models of Cosmic Reionization for Matching Numerical Simulation 2016ApJ...831..198K	**Kaurov**	2016	6
8	Cosmic Reionization On Computers. Mean and Fluctuating Redshifted 21 cm Signal 2016ApJ...824..114K	**Kaurov**, Gnedin	2016	12
7	Energy Dissipation of Energetic Electrons in the Inhomogeneous Intergalactic Medium during the Epoch of Reionization 2016ApJ...824...97K	**Kaurov**	2016	1
6	Cosmic Reionization on Computers. III. The Clumping Factor 2015ApJ...810..154K	**Kaurov**, Gnedin	2015	23
5	Central Compact Objects in Kes 79 and RCW 103 as `Hidden' Magnetars with Crustal Activity 2015PASA...32...18P	Popov, **Kaurov**, Kaminker	2015	13
4	Cosmic Reionization on Computers. II. Reionization History and Its Back-reaction on Early Galaxies 2014ApJ...793...30G	Gnedin, **Kaurov**	2014	78
3	Thermal emission of neutron stars with internal heaters 2014MNRAS.442.3484K	Kaminker, **Kaurov**, Potekhin, Yakovlev	2014	38
2	Recombination Clumping Factor during Cosmic Reionization 2014ApJ...787..146K	**Kaurov**, Gnedin	2014	26
1	Effect of Halo Bias and Lyman Limit Systems on the History of Cosmic Reionization 2013ApJ...771...35K	**Kaurov**, Gnedin	2013	21