Princeton, NJ — (773) 787-9856 — kaurov@ias.edu — kaurov.org

Sasha (Alexander) Kaurov, Ph.D.

Astronomer & astrophysicist with 10+ years of experience in research, science outreach and curriculum development. Passionate about advancing the scientific frontier as well as making it accessible to the public using the latest technologies.

WORK EXPERIENCE

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

- **AMIAS fellowship** 2016 — 2017
- *Paternity leave* 01 — 06/2017
- **Eric and Wendy Schmidt fellowship** 2017 — 2018
- **William D. Loughlin fellowship** 2018 — 2019
- **IBM Einstein fellowship** 2019 — 2020
- **William D. Loughlin fellowship** 2020 — 2021

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.*
Chicago IL, 2011 — 2016

Astronomy & Astrophysics.
Thesis: "Analytical and numerical modeling of the epoch of cosmic reionization."

- **McCormick Fellowship** 2011 — 2012

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

Nuclear astrophysics.
Thesis: "Multidimensional numerical simulations of heat transfer in the crusts of neutron stars."

- **Russian Academy of Science fellowship** 2009 — 2011
  Central Astronomical Observatory of the Russian Academy of Sciences at Pulkovo, Russia
- **Ioffe Institute Fellowship** 2009 — 2010
  St. Petersburg State Polytechnic University, Russia

PUBLIC SERVICE

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

REFERENCES

Academic:

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

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

Education and outreach:

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

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

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 Evidences 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 various virtual world experiences. In collaboration with the Earth Life Science Institute (ELSI, Tokyo Institute of Technology) and the Japan Aerospace Exploration Agency (JAXA) we designed a virtual outreach lecture about the Hayabusa2 mission and another 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

- Several undergraduate students from St. Petersburg State Polytechnic University (my alma mater) have defended their B.Sc. theses under my supervision:
  - 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), currently a graduate student at the University of Bonn (Germany).
  - Ekaterina Leonova (B.Sc., 2019), currently M.Sc. fellow at the University of Geneva (Switzerland).

PUBLICATIONS

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

List of my publications and various metrics are available on ADS portal:
https://ui.adsabs.harvard.edu/search/p_=0&q=orcid%3A0000-0003-0255-1204

Selected publications

Highly Magnified Stars in Lensing Clusters: New Evidence in a Galaxy Lensed by MACS J0416.1-2403
2019ApJ...880...58K
Kaurov, Alexander A.; Dai, Liang; Venumadhav, Tejaswi; Miralda-Escudé, Jordi; Frye, Brenda

Implication of the Shape of the EDGES Signal for the 21 cm Power Spectrum
2018ApJ...864L..15K
Kaurov, Alexander A.; Venumadhav, Tejaswi; Dai, Liang; Zaldarriaga, Matias

Cosmic Reionization on Computers. II. Reionization History and Its Back-reaction on Early Galaxies
2014ApJ...793...30G
Gnedin, Nickolay Y.; **Kaurov, Alexander A.**

Planetarium commute accessibility in the United States of America
DOI: 10.22541/au.159724581.14747461
Kaurov, Alexander A.; *Bazhenov, Vyacheslav*; SubbaRao, Mark

The students I mentored are in *Italic.*

	Title	Authors	Year	Citations (ADS)
	Current projects:			
28	Optical properties of the Resonant Drag Instabilities: Consequences for the variability of AGB-stars and R Cor Bor stars	Steinwandel, **Kaurov**, Hopkins	**2021**	
27	The Back Reaction of Lyman Alpha Radiation onto the Gas	Murinov, **Kaurov**, Dai, Venumadhav	**2021**	
26	Cosmological Counts in Cells: Theory and Numerical Simulations	Ivanov, **Kaurov**	**2021**	
25	Python Package for Data Reduction Pipeline for Near-Infrared and Optical Spectroscopy	**Kaurov**, Brenda Frye	**2021**	
	Submitted:			
24	Simulations of Fe60 entrained in ejecta from a near-earth supernova: Effects of observer motion	*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**	**35**
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**	**14**
16	Heating of the intergalactic medium by the cosmic microwave background during cosmic dawn 2018PhRvD..98j3513V	Venumadhav, Dai, **Kaurov**, Zaldarriaga	**2018**	**33**

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**	**20**
13	Observing Galaxy Mergers at the Epoch of Reionization 2018ApJ...853...81C	*Chaikin*, *Tyulneva*, **Kaurov**	**2018**	**1**
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**	**0**
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**	**5**
8	Cosmic Reionization On Computers. Mean and Fluctuating Redshifted 21 cm Signal 2016ApJ...824..114K	**Kaurov**, Gnedin	**2016**	**10**
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**	**22**
5	Central Compact Objects in Kes 79 and RCW 103 as `Hidden' Magnetars with Crustal Activity 2015PASA...32....18P	Popov, **Kaurov**, Kaminker	**2015**	**12**
4	Cosmic Reionization on Computers. II. Reionization History and Its Back-reaction on Early Galaxies 2014ApJ...793...30G	Gnedin, **Kaurov**	**2014**	**72**
3	Thermal emission of neutron stars with internal heaters 2014MNRAS.442.3484K	Kaminker, **Kaurov**, Potekhin, Yakovlev	**2014**	**37**
2	Recombination Clumping Factor during Cosmic Reionization 2014ApJ...787..146K	**Kaurov**, Gnedin	**2014**	**25**
1	Effect of Halo Bias and Lyman Limit Systems on the History of Cosmic Reionization 2013ApJ...771...35K	**Kaurov**, Gnedin	**2013**	**21**