Ilya S. Khrykin, Ph.D

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Education

2012 – 2016 **Ph.D., Heidelberg University / MPIA (Heidelberg, DE)**
Thesis title: *Understanding the Sources of HeII Reionization*
Advisor: *Prof. Dr. Joseph F. Hennawi*

2010 – 2012 **M.Sc. Physics, Southern Federal University (Rostov-on-Don, RU)**
Thesis title: *Simulation of global spiral structure of galaxies NGC 3982, NGC 4030 and NGC 5247 in the hydrodynamical approximation.*

2006 – 2010 **B.Sc. Physics, Southern Federal University (Rostov-on-Don, RU)**

Academic Experience

2024 – · · · · **Postdoctoral researcher** at PUCV (Curauma, Valparaiso, CL)

2019 – 2023 **Postdoctoral researcher** at Kavli IPMU (Kashiwanoha, Chiba, JP)

2017 – 2018 **Researcher** at Southern Federal University (Rostov-on-Don, RU)

Research Interests

- fast radio bursts, missing baryons, cosmology
- the intergalactic medium, circumgalactic medium, galaxy feedback, magnetic fields
- quasars, active galactic nuclei, cosmic reionization
- statistical methods in astronomy, machine learning

Grants

2025 – · · · · **Co-PI**, *Investigating the magnetic fields in galactic halos using Fast Radio Bursts*
ALMA-ANID 2024 31240053, PI: Nicolas Tejos, PUCV

2018 – 2019 **PI**, *Co-evolution of quasars and the intergalactic medium at high redshifts*
1 million rubles grant for young scientists, Russian Foundation for Basic Research (RFBR)

2017 – 2018 **Co-PI**, *Probing the reionization epoch and the high redshift IGM*
Joint Russian/Indian grant, RFBR, PIs: Vasiliev E./ Sethi S.

Selected Meetings

2025 Talk at “FRB 2025”, Montreal, CA

2024 Invited Talk at “Mind the Gap: Galaxies and the LSS", Córdoba, AR

Invited Talk at “CGM-Chile 2024", Santa Cruz, CL

Invited Talk at “Baryons in the Universe 2024", Tokyo, JP

2023 Talk at “FRB symposium", Taichung, TW

2022 Talk at “General Assembly of International Astronomical Union", Busan, KR

Talk at “Cosmic Cartography 2022: Exploring Cosmic Web and LSS", Tokyo, JP

Selected Meetings (continued)

2019 Talk at “Cosmic Evolution of Quasars: from the First Light to Local Relics", Beijing, CH
2018 Talk at “IGM2018: Revealing Cosmology & Reionization History with the IGM", Tokyo, JP
2017 Talk at “National Russian Astrophysical Conference", Yalta, RU
Talk at “Modern Problems of ExtraGalactic Astronomy", Moscow, RU
2016 Talk at “From Wall to Web" conference (member of LOC), Berlin, DE
2015 Talk at “The Olympian Symposium: Cosmology and the EoR", Paralia Katerinis, GR
2014 Talk at “Intergalactic Matters" Workshop, Heidelberg, DE

Skills & Miscellaneous

OS — GNU Linux/macOS, Windows

Programming languages — Python, C, Fortran 77/90, LaTeX, bash, HTML

Computing Experience — Machine Learning and Bayesian statistical analysis (MCMC), radiative transfer algorithms, cosmological hydrodynamical codes, various observational data reduction codes (e.g. PypeIt, ESOREX, etc.)

Spoken languages — Russian (native), English (fluent), German, Japanese, Spanish (communicational)

Teaching experience — ”Introduction to Astronomy" for B.Ss/M.Ss students [Fall 2013]
”Introduction to Astronomy" for high-school students [Fall 2016]
”How to teach astronomy in school" for high school teachers [Fall 2017]
Co-supervision of undergrad students at PUCV, Chile [2025]

Observing experience — 2.5m DuPont Telescope, Las Campanas Observatory, Chile
Anglo-Australian Telescope (2dF-AAOmega spectrograph), Australia
VLT (MUSE, UVES spectrographs), Paranal Observatory, Chile
Keck (HIRES spectrograph), Keck Observatory, USA

Service — **Referee** The Astrophysical Journal (ApJ), Astronomy & Astrophysics (A&A)
LOC member: “Intergalactic Matters", Heidelberg, DE [June 2014]
LOC member: “From Wall to Web" conference, Berlin, DE [July 2016]
LOC member: “Cosmic Cartography" conference, Tokyo, JP [March 2022]
Co-organizer: Kavli IPMU Astro Lunch Seminar [2021 – 2023]

Public outreach — Public lectures at Festival of Science, multiple cities, RU [2017–2018]
“Astronomy on Tap" organizer, Rostov-on-Don, RU [2017–2019]
Public talk at “Cultogram" Event, Rostov-on-Don, RU [2023]

References

Dr. Nicolas Tejos
Associate professor
Instituto de Fisica, PUCV,
Avenida Universidad 330,
Curauma, 2373223, Chile.
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Dr. Khee-Gan Lee
Associate professor
Kavli IPMU (University of Tokyo),
5-1-5 Kashiwanoha, Kashiwa,
277-8583, Japan.
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Dr. Jason X. Prochaska
Professor
UC Santa Cruz,
1156 High St. Santa Cruz,
CA 95064, USA.
jxp@ucsc.edu

Selected Research Publications and Preprints

As of August 2025: a total of 15 published (and/or submitted) papers in refereed journals (6 as corresponding author; 9 as co-author); 365 citations in total (h-index: 11; link to NASA ADS).

Corresponding Author Publications and Preprints

1. **Khrykin, I. S.**, Ata, M., Lee, K.-G., Simha, S., Huang, Y., Prochaska, J. X., … Bernales-Cortes, L. (2024b). FLIMFLAM DR1: The First Constraints on the Cosmic Baryon Distribution from Eight Fast Radio Burst Sight Lines. *ApJ*, *973*(2), 151. doi:10.3847/1538-4357/ad6567. arXiv: 2402.00505 [astro-ph.GA]
2. **Khrykin, I.S.**, Sorini, D., Lee, K.-G., & Davé, R. (2024a). The cosmic baryon partition between the IGM and CGM in the SIMBA simulations. *MNRAS*, *529*(1), 537–549. doi:10.1093/mnras/stae525. arXiv: 2310.01496 [astro-ph.GA]
3. **Khrykin, I. S.**, Hennawi, J. F., Worseck, G., & Davies, F. B. (2021). The first measurement of the quasar lifetime distribution. *MNRAS*, *505*(1), 649–662. doi:10.1093/mnras/stab1288. arXiv: 2102.04477 [astro-ph.GA]
4. **Khrykin, I. S.**, Hennawi, J. F., & Worseck, G. (2019). Evidence for short $\sim$ 1 Myr lifetimes from the He II proximity zones of z $\sim$ 4 quasars. *MNRAS*, *484*(3), 3897–3910. doi:10.1093/mnras/stz135. arXiv: 1810.03391 [astro-ph.GA]
5. **Khrykin, I. S.**, Hennawi, J. F., & McQuinn, M. (2017). The Thermal Proximity Effect: A New Probe of the He II Reionization History and Quasar Lifetime. *ApJ*, *838*(2), 96. doi:10.3847/1538-4357/aa6621. arXiv: 1611.05583 [astro-ph.CO]
6. **Khrykin, I. S.**, Hennawi, J. F., McQuinn, M., & Worseck, G. (2016). The He II Proximity Effect and The Lifetime of Quasars. *ApJ*, *824*(2), 133. doi:10.3847/0004-637X/824/2/133. arXiv: 1511.03659 [astro-ph.GA]

Co-Author Publications and Preprints

1. Caleb, M., Nanayakkara, T., Stappers, B., Pastor-Marazuela, I., **Khrykin**, I. S., Glazebrook, K., … Tian, J. (2025). A fast radio burst from the first 3 billion years of the Universe. *arXiv e-prints*, arXiv:2508.01648. doi:10.48550/arXiv.2508.01648. arXiv: 2508.01648 [astro-ph.HE]
2. Pastor-Marazuela, I., Gordon, A. C., Stappers, B., **Khrykin**, I. S., Tejos, N., Rajwade, K., … Mas-Ribas, L. (2025). Localisation and host galaxy identification of new Fast Radio Bursts with MeerKAT. *arXiv e-prints*, arXiv:2507.05982. doi:10.48550/arXiv.2507.05982. arXiv: 2507.05982 [astro-ph.HE]
3. Bernales-Cortes, L., Tejos, N., Prochaska, J. X., **Khrykin, I. S.**, Marnoch, L., Ryder, S. D., & Shannon, R. M. (2025). Empirical estimation of host galaxy dispersion measure toward well-localized fast radio bursts. *A&A*, *696*, A81. doi:10.1051/0004-6361/202452026. arXiv: 2501.14063 [astro-ph.GA]
4. Huang, Y., Simha, S., **Khrykin, I.S.**, Lee, K.-G., Prochaska, J. X., Tejos, N., … Zhang, J. (2024). FRB Line-of-sight Ionization Measurement From Lightcone AAOmega Mapping Survey: the First Data Release. *ApJ*, *277*, 64. doi:10.3847/1538-4365/adbc7f. arXiv: 2408.12864 [astro-ph.GA]
5. Lee, K.-G., **Khrykin, I. S.**, Simha, S., Ata, M., Huang, Y., Prochaska, J. X., … Zhang, J. (2023). The FRB 20190520B Sight Line Intersects Foreground Galaxy Clusters. *ApJ*, *954*(1), L7. doi:10.3847/2041-8213/acefb5. arXiv: 2306.05403 [astro-ph.GA]
6. Simha, S., Lee, K.-G., Prochaska, J. X., **Khrykin, I. S.**, Huang, Y., Tejos, N., … Zhang, J. (2023). Searching for the Sources of Excess Extragalactic Dispersion of FRBs. *ApJ*, *954*(1), 71. doi:10.3847/1538-4357/ace324. arXiv: 2303.07387 [astro-ph.GA]
7. Lee, K.-G., Ata, M., **Khrykin, I. S.**, Huang, Y., Prochaska, J. X., Cooke, J., … Batten, A. (2022). Constraining the Cosmic Baryon Distribution with Fast Radio Burst Foreground Mapping. *ApJ*, *928*(1), 9. doi:10.3847/1538-4357/ac4f62. arXiv: 2109.00386 [astro-ph.CO]

8 Worseck, G., **Khrykin, I. S.**, Hennawi, J. F., Prochaska, J. X., & Farina, E. P. (2021). Dating individual quasars with the He II proximity effect. *MNRAS*, *505*(4), 5084–5103. doi:10.1093/mnras/stab1685. arXiv: 2101.01196 [astro-ph.GA]

9 Khoperskov, S. A., Khoperskov, A. V., **Khrykin, I. S.**, Korchagin, V. I., Casetti-Dinescu, D. I., Girard, T., … Maitra, D. (2012). Global gravitationally organized spiral waves and the structure of NGC 5247. *MNRAS*, *427*(3), 1983–1993. doi:10.1111/j.1365-2966.2012.22031.x. arXiv: 1209.2879 [astro-ph.CO]