



Nhat-Minh Nguyen, PhD

Cosmologist, Leinweber Postdoctoral Fellow

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Research Interest

Growth of Large-scale Structure in the Universe.

Scientific Expertise

Field-level, forward-modeling of large-scale galaxy redshift surveys (galaxy clustering, galaxy intrinsic shape alignment); Cosmic microwave background radiation (gravitational lensing, Sunyaev-Zel'dovich effects)

Domain Knowledge

Skills

Bayesian inference with explicit likelihood (hierachical models, advanced sampling methods); Simulation-based inference with implicit likelihood (AI/ML methods for density estimation); Large-scale, high-performance computing; Big-data analysis

Experience

Python [Numpy, Scipy, TensorFlow, JAX, PyTorch, Dask, sbi, optuna, wandb], C++, ROOT [pyROOT], OpenMP Parallel, MPI Distributed & Differentiable Programming (in Python, C++)

Affiliation

Postdoctoral Research Fellow, Leinweber Prize Fellowship

Leinweber Center for Theoretical Physics, Physics Department, University of Michigan

Jan 2022 - now

Postdoctoral Research Associate

Physical Cosmology Group, Max Planck Institute for Astrophysics

Jul 2020 - Dec 2021

PhD Candidate

Physical Cosmology Group, Max Planck Institute for Astrophysics

Oct 2016 - Jun 2020

Education	International Max Planck Research School on Astrophysics (Magna Cum Laude)	2016 - 2020, PhD
	Max Planck Institute for Astrophysics, Garching near Munich Ludwig Maximilians University of Munich	
	Erasmus Joint Master Degree in Astronomy & Astrophysics (with full-ride Scholarships)	2014 - 2016, MSc
	University of Göttingen University of Rome, Tor Vergata University of Innsbruck	
	Physics and Theoretical Physics (with Honors and Scholarships)	2008 - 2013, BSc
	Ho Chi Minh University of Science	

Collaboration Dark Energy Spectroscopic Instrument (DESI), Rubin Observatory Legacy Survey of Space and Time - Dark Energy Science Collaboration (LSST-DESC), SimBIG, Aquila Consortium

Publications I have authored 11 publications, excluding big-collaboration papers (citations: 232; h-index: 9) [NASA/ADS]; 14 publications, including big-collaboration papers (citations: 586; h-index: 11) [NASA/ADS] [INSPIRE HEP].

First, co-first¹, or significant
contributions

A parameter-masked mock data challenge for beyond-2pt galaxy clustering statistics. Beyond-2point Collaboration. arXiv preprint. Under review at The Astrophysical Journal Supplement Series. [NASA/ADS]	2024
How much information can be extracted from galaxy clustering at the field level?. Nguyen, Schmidt, Tucci, Reinecke, Kostić. arXiv preprint. Under review at Phys. Rev. Lett. [NASA/ADS]	2024
Sweeping through Horndeski Canvas: a New Growth-Rate Parameterization for Modified-Gravity Theories. Wen ¹ , Nguyen ¹ , Huterer. JCAP09(2023)028. [NASA/ADS]	2023
Evidence for suppression of structure growth in the concordance cosmological model. Nguyen, Huterer, Wen. Phys. Rev. Lett. 131, 111001. Editor's Suggestion. [NASA/ADS] [SciAm] [NewScientist] [VICE] [UM press]	2023
Consistency tests of field level inference with the EFT likelihood. Kostić, Nguyen, Schmidt, Reinecke. JCAP07(2023)063. [NASA/ADS] [MPA Research Highlights]	2022
Field-level inference of galaxy intrinsic alignment from the SDSS-III BOSS survey. Tsaprazi ¹ , Nguyen ¹ , et al. JCAP08(2022)003. [NASA/ADS] [MPA Research Highlights]	2021
Impacts of the physical data model on the forward inference of initial conditions from biased tracers. Nguyen et al. JCAP03(2021)058. [NASA/ADS] [MPA Research Highlights]	2021
Taking measurements of the kinematic Sunyaev-Zel'dovich effect forward: including uncertainties from velocity reconstruction with forward modeling. Nguyen et al. JCAP12(2020)011. [NASA/ADS] [MPA Research Highlights]	2020

Co-author

DESI 2024 VI: Cosmological Constraints from the Measurements of Baryon Acoustic Oscillations. DESI Collaboration. arXiv preprint. Submitted to JCAP. [NASA/ADS]	2024
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DESI 2024 IV: Baryon Acoustic Oscillations from the Lyman Alpha Forest. DESI Collaboration. arXiv preprint. Submitted to JCAP. [NASA/ADS]	2024
DESI 2024 III: Baryon Acoustic Oscillations from Galaxies and Quasars. DESI Collaboration. arXiv preprint. Submitted to JCAP. [NASA/ADS]	2024
Exploring the Growth Index γ_L: Insights from Different CMB Dataset Combinations and Approaches. Specogna et al. Phys. Rev. D 109, 043528. [NASA/ADS]	2023
Cosmology Inference from Biased Tracers using the EFT-based Likelihood. Elsner et al. JCAP01(2020)029. [NASA/ADS]	2019
A rigorous EFT-based forward model for large-scale structure. Schmidt et al. JCAP01(2019)042. [NASA/ADS]	2018

Languages

English (Fluent), Vietnamese (Native)

Upcoming and Recent Talks

****COSMO'24**, Kyoto, Japan, October 2024.

PASCOS 2024, Plenary Session, ICISE Quy Nhon, Vietnam (slides), July 2024.

PASCOS 2024, Parallel Session (slides), originally invited for a Plenary, rescheduled to dedicate the Plenary for DESI-Y1 results.

Cosmology from Home, online conference, Youtube, June 2024.

DESI Research Forum (remote, recording, slides), June 2024.

Aspen workshop, "Fundamental Physics in the Era of Big Data and Machine Learning", May-June 2024. (Blackboard talk).

KIPAC Cosmology Seminar, Stanford (remote, slides), May 2024.

Cosmology Talks (with Beyond-2point Collaboration), Youtube, May 2024.

Fundamental Physics from Future Spectroscopic Surveys, LBNL, Berkeley (recording, slides), May 2024.

Columbia Cosmology Group Meeting, Columbia University (slides), New York, April 2024.

CCA Cosmology Meeting, Flatiron Institute, New York (slides), April 2024.

Cosmology Talks (ft. Beatriz Tucci), Youtube, April 2024.

Newcastle Cosmology Journal club, Newcastle University, Newcastle (remote, slides), April 2024.

Perimeter Cosmology Seminar, Perimeter Institute, Waterloo (remote, recording), April 2024.

Midwest Cosmology Network Meeting, US Midwest (remote), April 2024.

Cosmolunch, CCAPP, University of Ohio (slides), March 2024.

HEP-Astro Seminar, University of Michigan, Michigan, January 2024.

Cosmology from Home, online conference, YouTube (recording), July 2023.

Future Science with CMB x LSS workshop, YITP (session recording, slides), Kyoto, April 2023.

Cosmology Talks, Youtube, Mar 2023.

TACOS Seminar, Arizona Cosmology Lab, University of Arizona, February 2023. (During the "Beyond 2-point data challenge" workshop.)

Aspen workshop, "Large-Scale Structure Cosmology beyond 2-Point Statistics", May-June 2022. (Blackboard talk, picture)

Mentoring, Advising and Teaching

Mentoring

Carter Matties, Undergraduate student, University of Michigan.

Andrja Kostić, Research Scientist, DeepL, co-mentored with Fabian Schmidt.

Advising on a research project

Eleni Tsaprazi Postdoc, Imperial College London.

Andrew Hope, UROP project, University of Michigan). Otho Lyle Tiffany & Mary Lois Tiffany Fellow 2024.

Kyle Lee, UROP project, University of Michigan.

Disha Saxena, UROP and MRADS project, University of Michigan.

Kasey Thai, UROP project, University of Michigan.

Teaching

Michigan Math and Science Scholars, course instructor, “Climbing the Distance Ladder to the Big Bang: How astronomers survey the Universe.”

Summer 2024

Michigan Math and Science Scholars, guest lecturer.

Summer 2023

Popular Science Writings

Tín hiệu mới từ vũ trụ? DESI và manh mối mới về năng lượng tối, Tia Sang Magazine.

2024

Growing in molasses: Cosmic large-scale structure caught growing slower than expected, Science X Dialog, Phys.org.

2023

Đi tìm những tín hiệu mới từ vũ trụ, Tia Sang Magazine.

2023

Organizing and Reviewing

Community-wide Service

COSMO'24, Large-scale Structure Session Convener, Kyoto, Japan, October 2024.

2024

Michigan Cosmology Summer School 2023, Local Organizing Committee member.

2023

Active referee for Astronomy & Astrophysics (A&A, EDP Sciences), Journal of Cosmology and Astroparticle Physics (JCAP, IOP) & Physical Review D (PRD, APS).

2021-now

Institute and Group Service

VLLT Joint Astronomy & Physics Seminar Series (for junior graduate and senior undergraduate students in Physics & Astronomy in Vietnam), founder and co-organizer.

2021-2022

Cosmology Journal Club and **Cosmology & Astrophysics Seminar** (University of Michigan), founder & main organizer.

2022-now

Cosmology Book Club (Max Planck Institute for Astrophysics), founder & main organizer.

2020-2021

Large-scale Structure Journal Club (joint between Max Planck Institute for Astrophysics and Max Planck Institute for Extraterrestrial Physics), co-organizer.

2018-2020

Social and Outreach

Ask-Me-Anything (Reddit), r/askscience and Youtube, Cosmology from Home 2023, panelist.

Summer 2023

Institute Social Coffee (Leinweber Center for Theoretical Physics), founder & co-organizer.

2022-now

Skype a Scientist (science outreach and interview with students of all ages and backgrounds in the US), scientist participant.

2022-now

Physicists To-Go (similar to Skype-a-Scientist and organized by APS), scientist participant.

Fall 2023

Science Communication Fellows (science outreach demonstrations and presentations at Michigan local museums and libraries), scientist participant.

Fall 2023

References

Dr. Fabian Schmidt, Max Planck Institute for Astrophysics (PhD advisor) Email

Prof. Dragan Huterer, University of Michigan (postdoc advisor) Email

Prof. Elisabeth Krause, University of Arizona (external collaborator) Email

Prof. Elisa G. M. Ferreira, Kavli IPMU, University of Tokyo (previous colleague) Email

Prof. Eiichiro Komatsu, Max Planck Institute for Astrophysics (MPA director, formal PhD advisor) Email