

Yarone Meir Tokayer

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EDUCATION

Yale University Ph.D., Physics, Advisors: Priyamvada Natarajan, Michael Koss Thesis: “Title here” M.S. and M.Phil (en route)	New Haven, CT exp. 2026 May 2023
Columbia University M.A., Philosophical Foundations of Physics, Advisor: David Z. Albert Thesis: “Probability in Everettian Quantum Mechanics”	New York, NY Feb. 2020
The Cooper Union B.S., Engineering, Minor in Mathematics, GPA: 3.9, <i>summa cum laude</i> Senior Project: “Muscle Denervation and Neurotensin as a Therapeutic Target for ALS”	New York, NY May 2014

SKILLS AND LANGUAGES

- **Programming languages:** Python, MATLAB, C++, HTML
- **Software & Tools:** NASA HEASoft, Mathematica, Latex, LabVIEW, Excel
- **Python Libraries:**
Astronomy: Astropy, Stingray, PyXSPEC
Data and Visualization: Pandas, NumPy, Matplotlib
- **Telescope data:** Chandra, Swift, NuSTAR, NICER
- **Observing experience:**
Palomar: Double Spectrograph, TripleSpec
Keck: NIRC2+AO, OSIRIS+AO
- **Design Tools:** Arduino, Microchip PIC, AutoCAD, SolidWorks, laser cutting
- **Spoken languages:** English (native), Hebrew (fluent), Yiddish (intermediate)

RESEARCH EXPERIENCE

Constraining Dark Matter Profiles with GGSL Measurements Graduate Research Assistant, PI: Priyamvada Natarajan <i>Using galaxy-galaxy strong lensing measurements to constrain cluster subhalo dark matter density profiles.</i> <ul style="list-style-type: none">– Developed <u>fitting algorithms</u> in Python to find best fit DM profiles for matter distributions.– Derived empirical c-M relation, which furthers tension between ΛCDM cosmological simulations and lensing observations on galaxy-scales, and is consistent with overefficient lensing observations.– Paper in preparation.	Jan. 2022—Present Yale University
Quantifying Selection Effects in Deep-Field AGN Surveys Using BASS Graduate Research Assistant, PIs: Michael Koss, C. Megan Urry <i>Extra-galactic high energy astrophysics. Simulated low-redshift BASS AGN X-ray spectra at higher redshifts to detect bias in Chandra deep field AGN surveys</i> <ul style="list-style-type: none">– Developed <u>simulation data pipeline</u> to generate Chandra AGN spectra at high redshifts redshifts using Python and XSPEC.– <u>Spectral analysis</u> of 2800 simulated spectra to quantify bias in Chandra-COSMOS Legacy Survey.	Jul. 2021—Present Yale University

– Paper in preparation; poster presented at the Jan. 2023 meeting of the American Astronomical Society

NuSTAR Group, Columbia Astrophysics Laboratory

Mar. 2020—Dec. 2020

Research Assistant, PIs: Charles Hailey, Kaya Mori

Columbia University

Investigations in galactic high energy astrophysics.

- *Timing analysis of NICER observations of AR Scorpii, the only known “white dwarf pulsar” system. Measured spin period to sub- μ s precision; found pulsed non-thermal emission in X-ray band.*
- *Imaging analysis of NuSTAR observations of the “Eel Nebula” (PWN G18.5-0.4). Revealed synchrotron burnoff effect in the PWN and found evidence of a shock feature. Work published in ApJ.*
- *Spectral and timing analysis of NuSTAR observations of the TeV binary HESS J0632+057. Work published in ApJ.*

GAPS Group, Columbia Astrophysics Laboratory

Aug. 2019—Feb. 2020

Research Assistant, PI: Charles Hailey

Columbia University

Fabrication, testing, passivation, and assembly of Si(Li) detector array modules to be used in GAPS flight (2022), which aims to detect antimatter evidence of dark matter annihilation in the galactic halo.

Motor Neuron Center, Columbia University Medical Center

Sep. 2013—May 2014

Research Assistant, PI: Christopher Henderson; Supervisor: Dima Yudin

Columbia University

Senior capstone project: ALS pathology in mouse and cell culture models.

- *Immunohistochemistry of neuro-muscular junction sites to measure denervation in ALS mouse models over time across the body.*
- *Optimization of embryonic stem cell-derived motor neuron cultures to determine the effect of various trophic factors.*

Lung Perfusion Bioreactor

Jan. 2011—May 2011

Undergraduate Researcher, Faculty: Eric Lima (Cooper Union),
Gordana Vunjak-Novakovic (CUMC)

Cooper Union/Columbia University

Designed and built prototype used for testing on swine lung.

PUBLICATIONS AND POSTERS

Refereed Journal Publications

1. Burgess, D., Mori, K., Gelfand, J. D., et al. (incl. **Tokayer, Y. M.**), The Eel Pulsar Wind Nebula: a PeVatron-Candidate Origin for HAWC J1826–128 and HESS J1826–130. *The Astrophysical Journal*, 930, 148, May 2022.
doi:10.3847/1538-4357/ac650a
2. **Tokayer, Y. M.**, An, H., Halpern, J. P., et al., Contemporaneous Multi-Wavelength Campaign to Study HESS J0632+057s Distinctive Light Curve. *The Astrophysical Journal*, 923, 17, Dec. 2021.
doi:10.3847/1538-4357/ac2c6a

Conference Posters

3. **Tokayer, Y. M.**, Koss, M., Urry, C. M., et al., Quantifying Selection Effects in Deep-Field AGN Surveys with BASS. In: *241st Meeting of the AAS*, January 8–12, 2023. Seattle, WA.
Link to poster.
4. Woo, J., An, H., Burgess, D., et al. (incl. **Tokayer, Y. M.**), Multi-wavelength Study of PeVatron Candidate Pulsar Wind Nebulae. In: *AAS/High Energy Astrophysics Division 19th Annual Meeting*, March 13–17, 2022. Pittsburgh, PA.

5. Saffold, N., **Tokayer, Y. M.**, Mori, K., A NICER X-ray View of White Dwarf Pulsar AR Scorpii. In: *237th Meeting of the AAS*, January 10–15, 2021. Virtual.
Link to poster.

Papers in Preparation

6. **Tokayer, Y. M.**, Koss, M., Urry, C. M., et al., Quantifying AGN Selection Effects in the Chandra COSMOS-Legacy Survey with BASS. In prep for *The Astrophysical Journal*
7. **Tokayer, Y. M.**, Natarajan, P., Meneghetti, M., et al., An Overconcentration of Cluster Subhalos Found Using Galaxy-Galaxy Strong Lensing Measurements. In prep for *The Astrophysical Journal*

ACADEMIC PRESENTATIONS

Invited Talks

8. “The Unified AGN Model in X-ray observations,” Columbia University High-Energy Astrophysics Meeting; Jan. 28, 2022. Virtual.

Conference Talks

9. “Quantifying Selection Effects in Deep-Field AGN Surveys,” New England Regional Quasar and AGN Meeting (NERQUAM); May 6, 2022; Storrs, CT.
10. Saffold, N., **Tokayer, Y. M.**, “A NICER X-ray View of White Dwarf Pulsar AR Scorpii,” Spring 2021 NICER Data Analysis and Science Workshop; May 13, 2021. Virtual.
Video of presentation.

ACCEPTED PROPOSALS

11. Co-Investigator. Proposal 8087 for NuSTAR Observations. *A Survey of the Most Luminous Hard X-ray Selected Obscured Quasars at $z=0.2-0.4$.*
PI: Michael Koss
12. Co-Investigator. Proposal 90296 for XMM-Newton Observations. *A Survey of the Most Luminous Hard X-ray Selected Obscured Quasars at $z=0.2-0.4$.*
PI: Michael Koss

TEACHING

Yale University

Graduate Teaching Fellow

- University Physics for the Life Sciences (PHYS 171)* *Spring 2023*
- Introduction to Mathematical Methods of Physics (PHYS 301)* *Fall 2022*
- General Physics Laboratory II (PHYS S166)* *Summer 2022*
- General Physics Laboratory II (PHYS 166L)* *Spring 2022*
- General Physics Laboratory I (PHYS 165L)* *Fall 2021*

SAR High School

Chemistry Teacher

Spring 2021

- Taught four 10th grade chemistry sections spanning three levels from remedial to honors*

Physics Teacher and Advisor

Fall 2014—Spring 2019

- Designed curriculum and taught 4 physics courses on two tracks for 11th and 12th grade*
- Taught 11 grade Jewish Philosophy course, 9 and 11 grade Jewish text study*

- 10th grade advisor
- Designed and oversaw engineering-related elective and co-curricular programming
- Coached robotics team that won second place in robotics competition at the Technion in Haifa, Israel

Naaleh High School for Girls

STEM Teacher

Fall 2019—Spring 2020

- Wrote curriculum and taught a course in computer programming and engineering design
- Designed and instructed Python coding co-curricular; club was a member of Girls Who Code

The Cooper Union

Teaching Assistant

Fall 2021

- Introductory Physics Lab (PH291)

COMMUNITY ENGAGEMENT AND OUTREACH

Service

Slifka Center for Jewish Life at Yale, Board of Trustees

2023—Present

Physics Department Faculty Hiring Committee, Graduate Student Representative

Spring 2023

Outreach

Astronomy on Tap

Fall 2022—Present

- Astronomy nights at a New Haven bar, featuring trivia and talks by members of the Yale Astronomy Department.

Super Science Showdown, Yale Open Labs

Spring 2022

- Interactive science events for students in grades 6-8 in New Haven County.

Engineers as Teachers, Iridescent and Cooper Union

Spring 2011

- Wrote and built interactive lesson plans on the topic of sound and music
- Lessons were taught at family science nights in local NYC middle school

Public Talks

1. “The hype is real: what we are already learning from the most powerful telescope in human history,” SAR High School; Jan. 4, 2023; Riverdale, NY.

AWARDS AND SCHOLARSHIPS

- **Teacher Award**
2017 Robotraffic Competition at the Technion in Haifa, Israel, as coach to the SAR High School team
- **Entrance Scholarship**
Philosophical Foundations of Physics Program, Columbia University, Fall 2016
- **Tau Beta Pi**
Engineering Honors Society
- **Goodman Prize**
Cooper Union, Spring 2013
- **Dean’s List**
Cooper Union, all semesters