

Dr. Viviana Acquaviva

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Education

Ph.D. Degree in Astrophysics at SISSA/ISAS, Trieste, Italy (2006)

Thesis: “Weak lensing and cosmic acceleration”

B. Sc. and M. Sc. Degree in Physics at University of Pisa, Italy (2002)

Thesis: “Non-Gaussianity from inflation”

Current Appointments

Full Professor, Physics Department, CUNY NYC College of Technology (2021 - present).

Adjunct Senior Research Scientist, Lamont-Doherty Earth Observatory and LEAP (Learning the Universe with Artificial Intelligence and Physics) Center, Columbia University (2023 - present).

Associate Member/Visiting Scholar, Flatiron Institute (2016 - present).

Visiting Scientist, Theoretical and Scientific Data Science Group, SISSA/ISAS, Trieste (2024 - present).

Research Interests

Developing, validating and testing improved metrics to assess similarity in climate maps, using data science tools.

Using ML/AI to reconstruct global fields from sparse spatio-temporal data; application to the ocean pCO₂ field.

Learning from simulations in galaxy formation and climate science with ML and Bayesian inference tools: model discovery, causal structure learning, uncertainty quantification, data valuation.

Ethical AI for scientists and study of AI systems as a tool for responsible AI.

Pedagogy, inclusion, and equity in STEM.

Scholarship Summary

56 published papers in peer-reviewed journals or peer-reviewed conference proceedings. Two invited review articles for science outreach journals. ~ 10,300 citations; h-index: 34 (source: Google Scholar).

Author, “Machine Learning for Physics and Astronomy”, Princeton University Press (2023).

> 70 invited seminars and lectures, > 50 contributed talks/posters in conferences and workshops.

Select Recent Invited Presentations

“Teaching Machine Learning for the Physical Sciences”, Partnership for Integration of Computation in Undergraduate Physics, online (2024).

“Uncertainty Quantification: Conformal Predictions”, European Astronomical Society Meeting, Padova (2024).

“Machine Learning for Science: A Journey from Astrophysics to Climate”:

Plenary Talk, M²LInES meeting (2024).

Colloquium, Yale Institute for Foundations of Data Science (2023).

“Machine Learning and Multiscale Phenomena”, Invited Review, Simons Meeting for Multi-scale Physics (2023).

“Machine Learning with Pen and Paper”, Astrophysics Colloquium, Center for Computational Astrophysics, Flatiron Institute (2023).

Teaching Experience Summary

Undergraduate course instructor: PHYS 3600, Machine Learning for Physics and Astronomy (2018-2024); PHYS 1117, Astronomy I (2012-2023); PHYS 1000, The Physical Universe (2016); PHYS 1112, General Physics II (2015); CUNY NYC College of Technology. Total Enrollment: 760; Average teaching evaluation: 4.8/5.0.

Graduate course instructor: PHYS 85200, Machine Learning for Scientists, CUNY Graduate Center (2020, 2023, 2025). Total enrollment: 45.

Massive Open Online Courses: Developer and Lecturer, Machine Learning for Physics and Astronomy; Total enrollment: ~ 610 (launched 2023); Aprendizaje Automático para Física y Astronomía; Total enrollment: ~ 140 (launched 10/2024).

Summer school/conference lecturer: LSST Data Science Fellowship, Drexel University (2023); 18th Vatican Observatory Summer School “Learning the Universe: Data Science Tools for Astronomical Surveys”, Vatican Observatory, Castelgandolfo, Italy (2023); “Essential Cosmology for the Next Generation”, Playa del Carmen, Mexico (2022); Machine Learning x Astronomy course, Center for Computational Astrophysics, Flatiron Institute (2021 and 2019); online Summer School “Adventure in the Theoretical Sciences”, CUNY Graduate Center (2020).

Select Awards and Honors

2024 Chambliss Astronomical Writing Award from the American Astronomical Society for astronomy writing for an academic audience, specifically textbooks at either the upper-division undergraduate or graduate level, for *Machine Learning for Physics and Astronomy*.

Women Who Code’s **Mentorship award** and **“100 Technologist to Watch” award** (2023).

“Tecnovisionarie” award for Italian Women in AI, AI x Astrophysics prize, by Women&Tech (2021).

Forbes “100 Italian Successful Women” (2021).

“50 women who did or are doing the history of Information Technology” by Wired Italy (2020).

Inspiring 50 Award, recognizing the 50 most influential Italian Women in Tech (2018).

Feliks Gross award for outstanding scholarship, CUNY Academy of Arts and Sciences (2017).

Select Media Engagements

“The promises and perils of a mid-career pivot”, *Physics Today*, career issue (2024).

“How one astrophysicist is tackling climate change”, piece and interview by the CUNY Graduate Center (2024).

“Viviana Acquaviva and Charles Liu win American Astronomical Society awards for sharing the wonders of the Universe, piece and interview by the CUNY Graduate Center (2024).

“Viviana Acquaviva, from Astrophysics to Climate”, Interview with the Italian Institute of Nuclear Physics media team (in Italian) (2022).

“Machine Learning in Astronomy and Physics”, “The Data Exchange” podcast (2021).

“This is my View of the modern Physicist, Interview with the Italian Institute of Nuclear Physics media team (in Italian), also available in English here (2020).

“Dark Energy and the Accelerated Expansion of the Universe”, Interview for Uptown Radio (2019).

“Exploring Dark Energy and Star Formation with ML”, “This Week in Machine Learning and Artificial Intelligence” podcast (2018).

Grant Awards (last 5 years)

NOAA award, co-PI, “Valuation of Surface Ocean pCO₂ Observations For Machine Learning Applications”, \$573,955 (2024).

LEAP Research funding award, PI, “The Metrics Reloaded: Improved similarity assessment for climate maps”, NSF, \$111,380 (2024).

PIVOT Fellowship award, Simons Foundation, PI, “From galaxy evolution to climate models: a data-driven journey”, \$280,000 (2023).

PSC-CUNY research award, PI, “Improved evaluation methods for global climate models”, \$6,000 (2024); “Yes, we can: Inferring galaxy properties from cosmological simulations using machine learning”, \$12,000 (2021); “Learning from simulations: a framework for domain adaptation techniques in Astrophysics”, \$6000 (2020).

NSF S-STEM award, co-PI, “Engaging, Empowering, and Retaining New Scholars in Science, Technology, Engineering and Mathematics,” \$999,625 (2019-2024).

Research In the Classroom grant by the CUNY Research Foundation, PI, “Estimating the physical properties of galaxies using Machine Learning”. \$7,380 (2019).

Select Professional Experience

Member, Editorial Board, Machine Learning: Earth, IOP (2024-present).

Member, AI Advisory Council to the Italian government (2023-present). We developed a strategic plan for Artificial Intelligence activities and regulation in Italy, available here (in Italian).

Data Science Advisory Group (DSAG) member for NSF's National Optical-Infrared Astronomy Research Lab (NOIRLab) (2021-2023).

Grant Proposal Reviewer: Simons Foundation: Simons Collaborations; PIVOT fellowship program; Scientific Software Research Faculty Award; **Sloan Foundation:** Junior Faculty Research Awards in Science and Engineering; **National Science Foundation:** Institutes for Data-Intensive Research in Science and Engineering; Astrostatistics, Cosmology, and Extragalactic Astronomy panels. **Department of Energy:** Office of Science (SC) Funding For Accelerated, Inclusive Research (FAIR) program. **UK Science and Technology Facilities Council:** Astronomy Grant Panel. **NASA:** Hubble Fellowship Postdoctoral Program, Hubble Space Telescope annual Time Allocation Committee and science review panel, Postdoctoral Program. **CUNY Sponsored Programs:** Dissertation Award, CUNY Graduate Center; Faculty Development Grant, Borough of Manhattan Community College.

Referee for the journals: “Nature Climate and Atmospheric Sciences”, “Nature Review Physics”, *Nature Astronomy*, “Astronomy and Computing”, “The Astrophysical Journal”, “The Dark Universe”, “Monthly Notices of the Royal Astronomical Society”, “Journal of Cosmological Physics”, and “Astronomy and Astrophysics”; **Reviewer** for the NeurIPS workshop “Machine Learning for the Physical Sciences” and the ICML workshop “Machine Learning for Astrophysics”.

Ph.D Committee member for **Carlos Ordaz**, CUNY (exp. 2026); **Dr. Regina Sarmiento**, Instituto de Astrofísica de Canarias (2023); **Dr. Shihua Zhao**, CUNY (2022); **Dr. Zoe Ansari**, University of Copenhagen (2022); **Dr. David Valcin**, University of Barcelona (2021); **Dr. Wouter Dobbels**, University of Ghent (2021); **Dr. Nicola Bellomo**, University of Barcelona (2020); **Dr. Karthik Iyer**, Rutgers University (2019).

Scientific Organizing Committee Member: 18th Vatican Observatory Summer School (co-Chair), Vatican Observatory, Castelgandolfo, Italy (June 2023); Meeting in a Meeting “Machine Learning in Astronomy: Methods, Applications, and Challenges”, American Astronomical Society Meeting 238, online (June 2021); International Workshop “The Art of Measuring Physical Parameters in Galaxies”, University of California Riverside, (2018); International School in Astronomy and Data Analysis “ADAIX” (Valencia, Spain, 2018); “SabinoFest International Workshop, to celebrate the 60th birthday of Sabino Matarrese (Castiglioncello, Italy, 2015).

Select University Service Experience

Member, Technology Industry Committee, CUNY (2023-present). We collaborate with industry members to improve AI-related career opportunities for CUNY students.

Member, Executive Research Council, NYCCT (2021-present). We design and execute plans to increase research output at our college by exploring funding opportunities, developing partnerships, designing and running student research programs, and supporting faculty.

Member and Chair of 2022 Faculty Search, Department Appointment Committee (2018-present). We plan and execute faculty searches and evaluate re-appointment, tenure, and fellowship leave requests.

Member, CUNY Office of Research Faculty Advisory Council (2020-2023).

Program Director/Internship Director, Applied Computational Physics program, 2018-2019 and 2021-2022.

Faculty Liaison and Grants Outreach Coordinator, Office of Sponsored Program, NYCCT (2021-2023).

Member, Institute for the Theoretical Sciences of the CUNY Graduate Center Steering Committee member (2021-2023).

Member, Undergraduate Research Committee, NYCCT (2012-2022).

Member, General Education assessment committee, NYCCT (2014-2018).

Recent Student Mentoring (last 5 years)

Research mentor for: **Dr Festa Bućinca**, CUNY, now a research scientist at Regeneron; **Jake Postiglione**, Applied Computational Physics (ACP) graduate, now CUNY Ph.D. student (2021-present); **Olga Privman**, ACP graduate, school Valedictorian, CUNY Masters student; **Dr. Andy Lawler**, Ph. D. advisee and postdoctoral collaborator, Baylor University, 2017-2022; **Carlos Aguayza**, ACP intern, 2019; **Herschel Gordon**, ACP intern, 2019; **Andrea Zambrano**, ACP intern, 2019; **Justin Peterkin**, AstroCom scholar, now a Ph.D. student at the University of Maryland, 2019; **Dr. Christopher Lovell**, visiting Astronomy Ph.D. candidate, now a Dennis Sciama Fellow, 2017-2019; **George Nwanwko**, Emerging Scholar, CUNY, now a senior software engineer

at Intuit, 2018-2019; **Faraz Chahili**, CUNY Masters student, now a Ph. D. student at University of Syracuse, 2017-2019; **Harpreet Gaur**, Microsoft Research Data Science Internship recipient, now Senior Program Manager at Meta, 2017-2019; **Hashir Qureshi**, Emerging Scholar and NASA Space Opportunity Grant recipient, CUNY, now a senior software engineer at Bluevine, 2017-2019.

Career mentor for: **Snigdaa Sethuram**, Ph.D. student at Georgia Tech; **Rosario Cecilio-Flores**, CUNY Master's student, now a Ph.D. student at Cornell U; **Hannah Stauss**, NYCCT Data Science major (2022-2023); **Nathanael Gutierrez**, CUNY Lehman College (2020-2022), now a Ph. D. student at Georgia Tech; **Sarah Medina**, AstroCom scholar and NASA grant recipient (2021-2022); **Dr. Ana Delgado**, CUNY/AstroCom scholar, recent Ph.D. from Harvard University, now a postdoc at Johns Hopkins University. (2018-2020).

Select DEI and Outreach Work

Project Creator and Leader, "Astromaquinarios", development of Spanish-language Machine Learning materials together with students and postdocs from Latin America.

Panelist, "Rising Stars in Physics Workshop", Columbia University and Flatiron Institute (2024).

Invited Speaker, "A space for your whole self: carving your academic path", European Astronomical Society meeting, Padova (2024); "Community building/ Finding your network", workshop for early career Astronomers, Center for Astrophysics, Harvard University (2022); European Astronomical Society meeting, Valencia (2022); "Navigating Science and Motherhood", Astronomoms network online group meeting (2022).

Co-I and Mentor, "AstroComNYC: A Partnership between New York City Astronomers", mentoring program for undergraduate students funded by the NSF (2012-present).

Organizer, "Career in the Sciences: An Interactive Panel" for undergraduate CUNY students, Flatiron Institute (2021); "How to support early career researchers" round table, Center for Computational Astrophysics of the Flatiron Institute (2021).

Panelist, NYU Women in STEM Peer Undergraduate Mentoring Program Career Panel (2019); Tri-State Post-doc career panel, Center for Computational Astrophysics of the Flatiron Institute (2018)

Public lecture speaker, including the Intrepid Museum Astronomy night, the "Paradox" lecture series at Rockefeller University, the NJ MENSA club, the Rutgers Society of Physics Students, the Rutgers society for Teaching Development, the Rutgers Astronomical Society, and several amateur Astronomy clubs in New York, New Jersey and Connecticut (2012-).

Curator, Italian translation for the Hayden Planetarium show "Dark Energy and Dark Matter" (2015).

Creator, activities for 6-8 grade students "Dark Matter", for the musical album "Biophilia" by Bjork (2012).

Participant and Organizer, Prison Teaching Project: I was a participant at Princeton University (2008-2012), and I established and coordinated the ongoing program at Rutgers University (2009-2012).