

# RYAN GOLANT

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## EDUCATION

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**Columbia University**, New York, NY

Sept. 2020 - present

- Ph.D. in Astronomy (in progress; expected graduation Summer 2026)
  - Thesis advisors: Greg Bryan & Lorenzo Sironi
- M.Phil. in Astronomy (March 2023)
- M.A. in Astronomy (Oct. 2022)
  - GPA: 4.1/4.0

**Princeton University**, Princeton, NJ

Sept. 2016 - June 2020

- B.A. in Astrophysical Sciences (May 2020)
  - GPA: 3.7/4.0 (*magna cum laude*)
  - Senior thesis: *The answer, my friend, is blowing in the stellar wind: Investigating the Effects of Early Stellar Feedback on the Interstellar Medium and Star Formation* (Advisors: Eve Ostriker & Chang-Goo Kim)
- Minor in Computer Science (May 2020)

## OTHER EDUCATION: WORKSHOPS & SUMMER SCHOOLS

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**Les Houches School on Plasmas in Extreme Environments** (May 2023; Les Houches, France). Two-week intensive course on extreme plasma physics, including topics in high-energy astrophysics, geophysics, and laboratory plasma physics.

**Flatiron Fluid Dynamics Summer School** (Aug. 2023; New York, NY). Two-week workshop consisting of lectures and hands-on activities related to cutting-edge techniques in computational hydrodynamics and MHD.

**ComSciCon 2022 Flagship Workshop** (Aug. 2022; Cambridge, MA). Three-day intensive workshop at MIT focused on building science communication skills.

**Code/Astro 2022** (June 2022; Pasadena, CA). Week-long workshop at Caltech focused on software development for astronomy and astrophysics research.

**American Physical Society – Division of Plasma Physics: Topical Group in Plasma Astrophysics (GPAP) Summer School** (June 2019; Swarthmore, PA). Three-day intensive summer school at Swarthmore College covering the basics of plasma physics and its applications to astrophysics.

**Princeton Plasma Physics Lab (PPPL) Undergraduate Summer Course in Plasma Physics** (June 2019; Princeton, NJ). Week-long summer school at PPPL covering the basics of plasma physics, with emphasis on laboratory plasma physics and nuclear fusion energy.

## AWARDS & HONORS

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**NASA FINESST Future Investigator** (Sept. 2024 - Sept. 2026)

**Columbia Center for Teaching and Learning's Senior Lead Teaching Fellowship** (Sept. 2023 - May 2024) & **Lead Teaching Fellowship** (Sept. 2022 - May 2023)

**NSF Graduate Research Fellowship Honorable Mention** (Apr. 2022)

**AAS National Osterbrock Leadership Fellowship** (Oct. 2021 - Oct. 2023)

**Columbia University Dean's Fellowship** (Sept. 2020)

**Princeton-UTokyo Educational Partnership in Plasma Physics research scholarship** (March 2019)

## ACADEMIC PUBLICATIONS

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**Golant, R.**, Vanthieghem, A., Sironi, L. 2024, "Generation of large-scale magnetic fields upstream of GRB afterglow shocks via continuous pair loading from prompt photons," *submitted to ApJ*

Sironi, L., Comisso, L., **Golant, R.** 2023, "Generation of near-equipartition magnetic fields in turbulent collisionless plasmas," *Phys. Rev. Lett.* 131, 055201

Lewis, B., et al. (including **Golant, R.**) 2024, "Improving undergraduate astronomy students' skills with research literature via accessible summaries: A case study with Astrobites-based lesson plans," *submitted to Physical Review Physics Education Research*

**Golant, R.**, Bryan, G., Abruzzo, M., Bordner, J. 2024, "Defining Gravity: Implementing a Scalable Gravity Solver in Enzo-E," *in prep.*

**Golant, R.**, Sironi, L. 2024, "The Fully-Kinetic Mean-Field Dynamo," *in prep.*

## ACADEMIC TALKS

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**5th Purdue Workshop on Relativistic Plasma Astrophysics** (May 2024; West Lafayette, Indiana): *Sustaining Large-Scale Magnetic Fields in Gamma-Ray Burst Afterglows*

**Columbia Theoretical High-Energy Astrophysics Meeting** (April 2024; New York, NY): *The Turbulent Origins of Cosmic Magnetism*

**Les Houches School on Plasmas in Extreme Environments** (May 2023; Les Houches, France): *Sustaining Large-Scale Magnetic Fields in Gamma-Ray Burst Afterglows* (poster presentation)

**241st AAS Meeting** (Jan. 2023; Seattle, WA): *Defining Gravity: Implementing a Scalable Gravity Solver in Enzo-E*

**240th AAS Meeting** (June 2022; Pasadena, CA): *Sustaining Large-Scale Magnetic Fields in Gamma-Ray Burst Afterglows*

**2021 Gothamfest** (Dec. 2021; New York, NY): *Sustaining Large-Scale Magnetic Fields in Gamma-Ray Burst Afterglows*

## TEACHING & MENTORING

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### Classes taught:

- *Astronomy Lab II* (Spring 2023; 11 students). Similar to my Spring 2022 iteration of *Astronomy Lab II*, but with a modified syllabus and improved course materials based on feedback from students. Co-taught with another astronomy graduate student.
- *Astronomy Lab II* (Spring 2022; 11 students). An introduction to quantitative reasoning and data analysis in modern astronomy, intended for non-STEM undergrads; topics focused primarily on phenomena outside the Solar System, from stars to cosmology. Class met once per week for 3 hours. Instructional responsibilities included designing a course syllabus, designing class activities, creating handouts and worksheets, giving short lectures, and grading student work. Received an average student evaluation score of 4.8/5.0.

**Classes TA'd** (i.e., held weekly office hours, led review sessions prior to exams, graded exams, helped professors run small-group activities during lectures):

- *Stars, Galaxies, and Cosmology* (Fall 2021; 53 students). 5.0/5.0 student evaluation.
- *Life in the Universe* (Summer 2021; 61 students). 4.0/5.0 student evaluation.
  - Gave guest lecture on numerical methods and simulations in astronomy for the Spring 2023 iteration of *Life in the Universe* (March 2023).
- *Earth, Moon, and Planets* (Spring 2021; 69 students). 4.5/5.0 student evaluation.
- *Stars and Atoms* (Fall 2020; 84 students). 4.7/5.0 student evaluation.
  - Gave guest lecture on numerical algorithms in December 2020.

### Pedagogical development:

- Involvement with the **Columbia Center for Teaching and Learning (CTL)** (Jan. 2022 - present):
  - Participant in **Teaching Development Program (TDP)** (Jan. 2022 - present). On the “Advanced Track” for the TDP, having participated in and written reflections on numerous pedagogical development activities organized by the CTL. These activities include workshops, learning communities, and teaching observations.
  - Completed intensive **“Innovative Course Design Seminar”** (Spring 2023). Five-week seminar on syllabus and course design. For capstone project, fully designed a syllabus,

schedule, and policy sheet for a new course titled “Telling Stories of the Stars: Science Communication for Astronomers.”

- Completed intensive “**Teaching-As-Research Seminar**” (Spring 2023). Five-week seminar on the “Teaching-As-Research” method for pedagogical development. For capstone project, produced a full proposal for a Teaching-As-Research intervention probing the efficacy of inquiry-based astronomy labs.
- **Senior Lead Teaching Fellow** (Sept. 2023 - May 2024) and **Lead Teaching Fellow** (Sept. 2022 - May 2023) with the Columbia Center for Teaching and Learning (CTL). Served as liaison between the CTL and the Columbia astronomy department. Developed pedagogy workshops and events to promote teaching development within the department and across the university.
  - **Co-founded and co-organized “Teaching Tea” (now “CommuniVerse”)**, a bi-weekly departmental event dedicated to open, round-table discussions of relevant topics in astronomy pedagogy and science communication (Dec. 2022 - present).
  - Developed, organized, and ran **four pedagogy workshops** within and beyond the Columbia astronomy department:
    - \* “Teaching Scientifically: Improving your teaching via the scientific method” (Oct. 2022, Columbia Department of Astronomy). Two-part (total 160 minutes) workshop introducing the concept of “Teaching-as-Research” and leading participants through the basic steps of planning a Teaching-as-Research project. Workshop had 19 participants, including Columbia astronomy grad students, postdocs, and faculty, plus a few grad students from physics, biology, and engineering.
    - \* “Inquiry-based learning: Teaching students to think like scientists” (March 2023, Columbia Department of Astronomy). 1-hour open discussion on best practices for implementing inquiry-based learning in astronomy, with particular focus on inquiry-based labs. Workshop had 7 participants, including grad students, postdocs, and lecturers from both Columbia Astronomy and Columbia Physics.
    - \* “Moving Forward Together: The Interdependence of Instructor and Student Motivation” (Nov. 2023, Columbia Center for Teaching and Learning). Two-part (total 150 minutes) workshop discussing theoretical frameworks for motivation, brainstorming strategies for teachers to motivate both themselves and their students, and connecting a teacher’s intrinsic motivations to their teaching philosophy. Workshop had 19 participants, all grad students from a wide array of Columbia’s schools and departments. Co-facilitated with a graduate student in the Columbia School of Social Work.
    - \* “Moving Forward Together: The Interdependence of Instructor and Student Motivation” (June 2024, Center for the Integration of Research, Teaching, and Learning). An expanded, 4-hour version of the CTL “Moving Forward Together” workshop, held online through the Center for the Integration of Research, Teaching, and Learning (CIRTL). Workshop had 96 participants, including grad students, postdocs, faculty, administration, and staff from 30 different universities.
- Involvement with the **Center for the Integration of Research, Teaching and Learning** (CIRTL) (Aug. 2022 - present):

- Member of CIRTLL’s “Teaching-as-Research (TAR) Leaders Learning Community,” which meets once per month to discuss the best practices for facilitating Teaching-as-Research among STEM instructors (Oct. 2022 - present).
- Completed CIRTLL’s online course “An Introduction to Evidence-Based Undergraduate STEM Teaching” with an A grade (Fall 2022).

### Tutoring:

- **Democracy Prep Coding Club** (Spring 2021, Fall 2021, Fall 2022). Taught computer science and programming fundamentals to a group of underrepresented high school students in Harlem. Met once per week as part of an after-school program.
- **Computer Science Lab Teaching Assistant** (Fall 2019 - Spring 2020). Assisted Princeton undergrads in the introductory computer science classes COS 126 (“Computer Science: An Interdisciplinary Approach”), COS 217 (“Introduction to Programming Systems”), and COS 226 (“Algorithms and Data Structures”). Held office hours for four hours per week (two hours each on Thursday and Friday evenings) to answer student questions and assist in the debugging of code.
- **Tutor in Princeton’s McGraw Center for Teaching and Learning** (Spring 2018 - Spring 2020). Tutored Princeton undergrads in MAT 103 (“Calculus I”), MAT 104 (“Calculus II”), MAT 175 (“Mathematics for Economics/Life Sciences”), MAT 201 (“Calculus III”), MAT 202 (“Linear Algebra”), and MAT 204 (“Accelerated Linear Algebra”). Met with students at least once per week throughout the academic year.
  - Promoted to position of **Senior Tutor** for 2019-2020 academic year. Assisted in the process of hiring and training new tutors, as well as outreach on behalf the McGraw Center’s tutoring program.
- **Residential College Peer Tutor** in Princeton’s Mathey College (Spring 2018 - Spring 2020). Tutored Princeton undergrads in AST 203 (“The Universe”) and AST 204 (“Topics in Modern Astronomy”).

### Mentoring:

- Columbia Astronomy **Head Teaching Assistant** (Sept. 2023 - May 2024). Mentored and advised the Department of Astronomy’s first- and second-year graduate TAs. Held monthly meetings to check in on the TAs, offer advice, and provide resources for pedagogical development. Served as liaison between TAs and faculty and organized grading of midterm and final exams for introductory astronomy classes.
- Mentor in Columbia Astronomy’s **Grad-Grad Mentoring program** (Oct. 2023 - May 2024). Advised and supported first-year graduate students as they transitioned into grad school and became active members of the Columbia Department of Astronomy.
- **Co-organizer of Columbia Astronomy’s Grad-Undergrad Mentoring program** (Oct. 2021 - Oct. 2023). Facilitated interactions between Columbia astronomy graduate and undergraduate students by pairing grad mentors with undergrad mentees and holding events bringing grads and undergrads together.

- Have mentored 6 astronomy and physics undergrads through the grad-undergrad mentoring program (Oct. 2020 - present).
- **Peer Academic Advisor** in Princeton’s Mathey College (Fall 2019 - Spring 2020). Advised and mentored a group of 24 Princeton sophomores on academic matters, such as selecting courses and preparing for exams.

## OUTREACH & COMMUNITY SERVICE

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### Columbia Astronomy Public Outreach Oct. 2022 - present

- **Coordinate and organize Columbia Astronomy’s departmental outreach initiatives** among a team of  $\sim 30$  undergrads, grads, postdocs, and faculty (Oct. 2022 - present). Also serve as liaison between the Columbia Department of Astronomy and the public.
- Lead organizer of the Columbia Astronomy public lecture and stargazing series (Oct. 2022 - present). This outreach series includes two events per month, free and open to anyone.
- Overhauled the leadership structure of Columbia Astronomy’s departmental outreach program, organizing the program into small committees to allow more distributed and democratic leadership (Fall 2023). Each committee leads a different outreach initiative; initiatives include organizing public lectures and public observing/stargazing, managing social media, connecting with local elementary/middle/high schools, and collaborating with local branches of the New York Public Library.
- Led the effort to revive Columbia Astronomy’s outreach program after a long period of dormancy due to the pandemic (Nov. 2022).

### Astrobites collaboration Jan. 2021 - present

- *Author* (Jan. 2021 - present). Have written [15 articles for Astrobites](#), including undergrad-level summaries of recent astronomy papers, in-depth guides to important topics in modern astronomy, and interviews and talk summaries for plenary speakers at the 241st meeting of the AAS. [Four of my articles](#) have also been carried by AAS Nova.
- *Admin committee member* (July 2022 - present). Assist in administrative tasks pertaining to the entire Astrobites collaboration.
- *Education committee co-chair* (July 2022 - August 2023). Led initiatives to develop Astrobites as a pedagogical tool. Led efforts to make Astrobites more accessible to blind/visually-impaired and deaf individuals, as well as to develop new ways for Astrobites to be used in outreach to high-schoolers and the general public.
  - Co-led an education research study evaluating the efficacy of Astrobites-based lesson plans in courses for undergraduate astronomy majors; the resulting paper has been submitted to Physical Review Physics Education Research.
- *Undergraduate chair* (July 2022 - August 2023). Led initiatives to reach out to undergrads and help with the transition from undergraduate to grad school. Co-led an effort to expand Astrobites’ resources for non-native English speakers and for non-US undergrads looking to apply to US grad schools.

- *Hiring committee member* (Dec. 2021, Dec. 2022). Helped choose the new cohort of Astrobites members by reading applications and participating in committee-wide hiring discussions.
- *SciBites chair* (July 2021 - July 2022). Served as liaison between Astrobites and other “Bites” websites to support a collaborative network of blogs dedicated to popular science communication and the enrichment of young scientists.

### **National Osterbrock Leadership Program (NOLP)**

Oct. 2021 - Oct. 2024

- Co-organized and co-led a splinter session on grad student leadership at the 241st meeting of the AAS (Jan. 2023).
- Co-organized a series of public astronomy talks for the “Academic Achievers” program, a group of 750 South African high-school students visiting New York and Columbia University (Oct. 2022).
  - Gave a talk on astrophysical and cosmic magnetic fields to the 2023 Academic Achievers cohort (Oct. 2023).
- Co-organized an orientation for Columbia undergrads starting astronomy research for the summer (June 2022). Later held a workshop on scientific computing with Python for the same group of students (Aug. 2022).

**Science Storytellers** (Feb. 2023 - present). Give planetarium-style talks on different sky cultures to children at the Variety Boys & Girls Club of Queens.

**Astronomy at MSK** (Spring 2023 - present). Developing an astronomy outreach and education program for pediatric cancer patients at the New York cancer hospital Memorial Sloan Kettering.

Expert reviewer for **Annals of the Deep Sky** (Aug. 2022 - present). Edited the article on Eridanus in August 2022.

Speaker at **The Equity Project** (May 2023). Guest-taught a lesson on computer simulations to two fifth-grade science classes in Inwood, Manhattan.

Speaker at **Astronomy on Tap** (Nov. 2022, Jan. 2023). Gave public talks (titled “The Universe’s Magnetic Mystery”) at Astro on Tap NYC in November 2022 and at Astro on Tap Seattle in January 2023.

Treasurer for **Princeton Finding the Match** (Fall 2018 - Spring 2020). Ran campus-wide events focused on enrolling eligible Princeton students and faculty in the national bone marrow donor registry and spreading awareness of blood cancers and blood cancer treatment.

## **SOFTWARE**

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Co-developer of **Enzo-E** (Oct. 2021 - present). Lead developer of a new, scalable gravity solver (using the Fast Multipole Method) for the cosmological (magneto)hydrodynamics code Enzo-E.

Co-developer of **N-Body Builder** (June 2021 - present), an interactive module for visualizing different numerical methods for N-body simulation. Development began at Code/Astro 2022.

Co-developer of **Pegasus++** (Spring 2019). Led the implementation of an expanding box module in the hybrid-PIC code Pegasus++ to study the behavior of expanding or contracting plasmas.

## DEPARTMENTAL ACTIVITIES

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**Speaker host** for Columbia Theoretical High-Energy Astrophysics (THEA) group (Sept. 2022 - present). Coordinate guest speaker visits (including one-on-one meetings) for the Columbia THEA group's weekly meetings.

**Social media manager** for the Columbia Astronomy department (Oct. 2022 - present). Operate Columbia Astronomy's Twitter, Instagram, and Facebook accounts, in addition to Columbia Astronomy's outreach webpage.

**Lead organizer** of Astrofest 2022 (Sept. 2022). Led the organizing team for the 2022 iteration of Columbia Astronomy's "Astrofest" mini-conference, which featured 69 talks, 30 undergraduate poster presentations, and over 100 attendees.

**Speaker** at STEM Interdepartmental Seminar Series (Nov. 2022). Gave a talk on my thesis research for the Columbia Graduate School of Arts and Science's monthly STEM Interdepartmental Seminar Series; the audience included Columbia graduate students from a wide range of STEM departments.