Floor Broekgaarden

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https://github.com/FloorBroekgaarden

ACADEMIC INTERESTS

I develop methods and conduct large simulations to understand what **gravitational waves** emitted by compact object (**black hole** and **neutron star**) mergers can teach us about the formation, lives, and explosive deaths of **massive stars** throughout **cosmic history** My interdisciplinary work combines the fields of **statistics**, **data science**, and **astrophysics** to quantify uncertain physics in these large computational simulations, and tackles the key bottleneck in gravitational-wave astrophysics: **the "Uncertainty Challenge"** with the ultimate goal to learn about fundamental physical processes in our Universe in the new **Big Data** gravitational wave era.

CURRENT POSITIONS

UC San Diego, CA, USA 2024—now
Tenure-track Assistant Professor, Department of Astronomy & Astrophysics

PREVIOUS POSITIONS

Columbia University, NYC, USA 2023—24
Junior Fellow in the Simons Society of Fellows: an interdisciplinary Postdoc Fellowship funded by the Simons Foundation

Co-PI AstroAI, MA, USA 2023—24
A new center for AI, at the Center for Astrophysics | Harvard & Smithsonian

Johns Hopkins University, MD, USA 2023—24
Tenure-track Assistant Professor (0 FTE). I held this position while deferring a tenure-track faculty offer from JHU during my postdoc appointment.

EDUCATION

Harvard University, Cambridge, MA, USA 2019—23
Ph.D. Astrophysics (May 2023), Advisor: Edo Berger
M.S. Astrophysics (May 2022)

University of Amsterdam & **VU University** (joint degree) 2013—18
Amsterdam, The Netherlands
M.S. Astronomy (Aug 2018), Cum Laude
B.S. Physics and Astronomy (Aug 2017)
B.S. Mathematics (Aug 2017)

Lund University, Lund, Sweden (6 months) 2017
Erasmus exchange in Applied Mathematics and Astrophysics

SELECTED FUNDING (PI)

- UCSD VCRI "Influence and Convene" award for SMASH collaboration ($25k) 2025
- Funding for UCSD STEM-wide ML Hackathon for 200 students ($4k) 2025
- NASA GWTC Grant for leading Astronomy Software Workshop ($80k) 2025
- NASA HPOSS Open Software Solicitation Grant ($110k) 2024
- Funding for SMASH AI and Data Science x Astro initiative ($15k) 2024
- Funding for UCSD International Astronomy Affinity group 2024
- Simons Society of Fellows Award, Simons Foundation (∼$450k) 2023
- Fund for Early Career Astronomers & Their Supporters Workshop (∼$15k) 2022
- NASA FINESST Future Investigator Fellowship ($100k) 2022

SELECTED AWARDS

- Cecilia Payne-Gaposchkin Doctoral Dissertation Award in Astrophysics 2024
- Selected as one of the 2024 Rising Stars in Physics, Columbia University 2024
- GWIC-BRACCINI Thesis prize; finalist 2024
- Harvard Keto Prize for best Theoretical Astronomy Ph.D. Thesis 2023
- Harvard Horizons Fellow 2023, Harvard University 2023
- Martin and Beate Block Award for 'a promising young physicist' 2022
- First prize for best Astronomy M.S. thesis, University of Amsterdam 2018
- Second prize best Astronomy thesis presentation, University of Amsterdam 2018
- McKinsey Excellence Talent Award for a promising scholar 2018
- Third place in National Astrophysics Olympiad The Netherlands 2013

SELECTED FELLOWSHIPS

- RCSA Scialog Fellow for early Science with the LSST 2024—26
- Faculty Affiliate, Halıcıoğlu Data Science Institute (HDSI), CA, USA 2024
- Faculty Fellow, San Diego Supercomputer Center (SDSC), CA, USA 2024
- Several Postdoc fellowships including MIT Pappalardo, NASA Hubble, CITA, Dunlap, JHU Miller, (declined) 2024
- HPC Europa 3 Fellow (including 1000k CPU hours) 2022
- Dutch talent Fellowship "Prins Bernhard Cultuurfonds" ($25k) 2021
- HPC Europa 3 Fellow (incl. 500k CPU hours) 2018
- Kavli International Summer School Fellowship 2017
- Erasmus Program Scholarship for exchange to Lund, Sweden 2016
- ASTRON/JIVE International Summer Program Fellowship 2016

Top five papers h-index: 19, 1821 total citations, i10 index: 24

• **Broekgaarden, F.S.**, et al., 2022, *Impact of Massive Binary Star and Cosmic Evolution on Gravitational Wave Observations II: Double Compact Object Mergers*, *MNRAS, 516, 4, 5737–5761* **150 citations**

• Mandel, I. & **Broekgaarden, F.S.**, 2022, *Rates of Compact Object Coalescences*, invited review for *Living Rev Relativ, 25, 1* **223 citations**

• COMPAS collaboration et al. (**incl Broekgaarden, F.S.** as one of four lead authors), 2022, *Rapid stellar and binary population synthesis with COMPAS*, *ApJS, 258, 2, 34–64*. **153 citations**
→ Initiated methods paper for COMPAS collaboration. Decided on overall scope and content. In charge of the binary stellar evolution and cosmology chapters.

• **Broekgaarden, F.S.**, Berger, E., 2021, Formation of the First Two Black Hole – Neutron Star Mergers (GW200115 and GW200105) from Isolated Binary Evolution, *ApJ Letters, 920, L13 (9pp)* **55 citations**

• **Broekgaarden, F.S.**, et al., 2021, Impact of Massive Binary Star and Cosmic Evolution on Gravitational Wave Observations I: Black Hole – Neutron Star Mergers, *MNRAS, 508, 4, 5028–5063* **141 citations**

PUBLICATIONS '†' indicates a review article, '⋆' indicates a student paper, see ADS for a full list.

– First, co-lead author or advised student (15) –

43. ⋆ Lavina, S., **Broekgaarden, F.S.**, et al. 2026 *From cosmological simulations to binary black hole mergers: The impact of using analytical star formation history models on gravitational-wave source populations*, subm.
42. Romagnolo, A., **Broekgaarden, F.S.**, et al. 2026 *The Stellar Winds Atlas I: Current uncertainties in mass-loss rates*, subm.
41. Schuetz, A., Migala, A, Boesky, A., Poon, A., **Broekgaarden, F.S.**, Li, A., *RESOLVE: Rare Event Surrogate Likelihood for Gravitational Wave Paleontology Parameter Estimation*, subm.
40. ⋆ Wagg, T & **Broekgaarden, F.S.**, 2024 *Streamlining and standardizing software citations with The Software Citation Station*, subm.
39. **Broekgaarden, F.S.**, et al. 2024 *Visualizing The Number of Existing and Future Gravitational-Wave Detections*, *ApJS, 969, 2*
38. ⋆ Boesky, A., **Broekgaarden, F. S.**, Berger, E., 2024, *Investigating the Cosmological Rate of Compact Object Mergers from Isolated Massive Binary Stars*, *ApJ, 976, 1*
37. ⋆ Boesky, A., **Broekgaarden, F. S.**, Berger, E., 2024, *The Binary Black Hole Merger Rate Deviates From the Cosmic Star Formation Rate: A Tug of War Between Metallicity and Delay Times*, *ApJ, 976, 1*
36. **Broekgaarden, F.S.**, Stevenson, S, Thrane, E., 2022 *Signatures of Mass Ratio Reversals in gravitational waves from binary black hole mergers*, *ApJ, 938, 45*
35. ⋆ Wagg, Tom, **Broekgaarden, F.S.**, de Mink, S.E., Frankel, N., van Son, L.A.C., Justham, S., 2022, *Gravitational wave sources in our Galactic backyard: Predictions for BHBH, BHNS and NSNS binaries in LISA*, *ApJ, 937, 118*
34. **Broekgaarden, F.S.**, Berger, E., Stevenson, S., Justham, S. , Mandel, I, Chruslinska, M., van Son, L. A. C., Wagg, T., Vigna-Gómez, A., de Mink, S.E., Chattopadhyay, D., Neijssel, C.J., 2022, *Impact of Massive Binary Star and Cosmic Evolution on Gravitational Wave Observations II: Double Compact Object Mergers*, *MNRAS, 516, 4, 5737–5761*

33. † Mandel, I., **Broekgaarden, F.S.**, 2022, *Rates of Compact Object Coalescences*, invited review for *Living Rev Relativ, 25, 1*
→ In charge of data collection. I created the main results: an overview of merger rates from theory and observations.

32. COMPAS collaboration et al. (**incl Broekgaarden, F.S.** as one of four lead authors), 2022, *Rapid stellar and binary population synthesis with COMPAS*, *ApJS, 258, 2, 34–64*.
→ Initiated methods paper for COMPAS collaboration. Decided on overall scope and content. In charge of the binary stellar evolution and cosmology chapters.

31. **Broekgaarden, F.S.**, Berger, E., 2021, Formation of the First Two Black Hole – Neutron Star Mergers (GW200115 and GW200105) from Isolated Binary Evolution, *ApJ Letters, 920, L13 (9pp)*

30. **Broekgaarden, F.S.**, Berger, E., Neijssel, C.J., Vigna-Gómez, A., Chattopadhyay, D., Stevenson, S., Chruslinska, M., Justham, S. , de Mink, S.E., Mandel, I., 2021, Impact of Massive Binary Star and Cosmic Evolution on Gravitational Wave Observations I: Black Hole – Neutron Star Mergers, *MNRAS, 508, 4, 5028–5063*

29. **Broekgaarden, F.S.**, Justham, S., de Mink, S.E., Gair, J., Mandel, I., Stevenson, S., Barrett, J.W., Vigna-Gómez, A., Neijssel, C.J., 2019, STROOPWAFEL: simulating rare outcomes from astrophysical populations, with application to gravitational-wave sources, *MNRAS, 490, 4, 5228–5248*

– Other first author publications (2) –

28. † **Broekgaarden, F.S.**, 2024, Contributed Book Chapter on *The formation of Stellar black holes and compact stellar remnants* for *Listening to the dark Universe: black holes in the era of gravitational-wave astronomy*, *Elsevier, in press.*

27. **Broekgaarden, F.S.**, 2023 *Ten Ways to Improve Support Resources for Workplace Incivility in Astronomy*, *BAAS, 020, 55*

– Other co-authored publications (21) –

26. Xiao1, Q., Lin, C., Mandal, A., Bingham, D., **Broekgaarden, F**), Mandel, I., and Deng, X., (2025), *A Hopfield Process Modeling for Computer Experiments with Binary Outputs*, in press, Journal of the American Statistical Association

25. † Abac, A., Abramo, R. (incl. **Broekgaarden, F**), (2025), *The Science of the Einstein Telescope*, ArXiv

24. Colombo, A., Sharan, S.O, et al. (incl. **Broekgaarden, F**), (2025), *Multi-messenger observations in the Einstein Telescope era: binary neutron star and black hole - neutron star mergers*, in press., ArXiv

23. Burns, Eric, Fryer, Christopher L., Agullo, Ivan (incl. **Broekgaarden, F**), (2025), *Multidisciplinary Science in the Multimessenger Era*, ArXiv

22. Franciolini, G., Kritos, K., Reali, L., **Broekgaarden, F**, Berti, E., (2024), *Beyond the far side: Observing black hole mergers beyond the pair-instability mass gap with next-generation gravitational wave detectors*, Physical Review, 110, 2

21. Colombo, A., Duqué, R., Sharan Salafia, O., **Broekgaarden, F.S.,** et al., 2023, *Multi-messenger prospects for black hole - neutron star mergers in the O4 and O5 runs*, *ArXiv, (in press A&A)*

20. van Son, L. A. C., Roy, S. K., Mandel, I., Farr, W. M., Lam, A., Merritt, J., **Broekgaarden**, F. S., Sander, A., Andrews, J. J., 2024, *Not just winds: why models find*

binary black hole formation is metallicity dependent, while binary neutron star formation is not, in press AAS

19. Gupta, I et al. **(incl Broekgaarden, F.S.,)** 2024, *Characterizing Gravitational Wave Detector Networks: From A$^\sharp$ to Cosmic Explorer*, Classical and Quantum Gravity, 41, 24
18. Evans, M et al. **(incl Broekgaarden, F.S.,)**, 2024, *Cosmic Explorer: A Submission to the NSF MPSAC ngGW Subcommittee*, ArXiv
17. Mould, M., Gerosa, D., **Broekgaarden, F. S.**, Steinle, N., 2022, *Which black hole formed first? Mass-ratio reversal in massive binary stars from gravitational-wave data*, *MNRAS, 517, 2, 2738–2745*
16. Chattopadhyay, D., Stevenson, S., **Broekgaarden, F.S.**, Antonini, F., Belczynski, K., 2022 *Modelling the formation of the first two neutron star-black hole mergers, GW200105 and GW200115: metallicity, chirp masses and merger remnant spins*, *MNRAS, 513, 4, 5780–5789*
15. Stevenson, S., Willcox, R., Vigna-Gómez, A., **Broekgaarden, F.S.**, 2022, *Wide binary pulsars from electron-capture supernovae*, *MNRAS, 513, 4, 6105–6110*
14. van Son, L.A.C., de Mink, S.E., Callister, T., Justham, S. et al., **(incl. Broekgaarden, F.S.)**, *The Redshift Evolution of the Binary Black Hole Merger Rate: A Weighty Matter*, *ApJ, 931, 1, 17–34*
13. Naidu, R.P., Ji, A.P, Conroy, C.C, Bonaca, A. et al. (incl. **Broekgaarden, F.S.**), *Evidence from Disrupted Halo Dwarfs that r–process Enrichment via Neutron Star Mergers is Delayed by* $\gtrsim 500$ *Myrs*, *ApJL, 926, 2, L17*
12. van Son, L. A. C., de Mink, S.E., Callister, T., Justham, S., et al. (incl. **Broekgaarden, F.S.**), 2022, *The redshift evolution of the binary black hole merger rate: a weighty matter*, *ApJ, 931, 1*
11. Hajela, A., Margutti, R., Bright, J. S., Alexander, K. D. et al. (incl. **Broekgaarden, F.S.**), 2022, *The emergence of a new source of X-rays from the binary neutron star merger GW170817*, *ApJ, 927, 1*
10. Chattopadhyay, D., Stevenson, S., Hurley, J.R., Bailes, M., **Broekgaarden, F.S.**, 2021, Modelling Neutron Star-Black Hole Binaries: Future Pulsar Surveys and Gravitational Wave Detectors, *MNRAS, 504, 3, 3682–3710*
9. Lin, L., Bingham, D., **Broekgaarden, F.S.**, Mandel, I., 2021, *Uncertainty Quantification of Computer Model for Binary Black Hole Formation*, *Annals of Applied Statistics, 15(4): 1604-1627*
8. van Son, L. A. C., de Mink, S.E., **Broekgaarden, F.S.**, Renzo, M., Justham, S., Laplace, E., Morán-Fraile, J., Hendriks, D. D. and Farmer, R., 2020, *Polluting the Pair-instability Mass Gap for Binary Black Holes through Super-Eddington Accretion in Isolated Binaries*, *ApJ, 897, 1, 100–120*
7. Kemp, A.J., Karakas, A.I., Casey, A.R., Izzard, R.G.I., et al. (incl. **Broekgaarden, F.S.**), 2021, *Population synthesis of accreting white dwarfs: Rates and evolutionary pathways of H and He novae*, *MNRAS, 504, 4, 6117–6143*
6. Vigna-Gómez, A., MacLeod, M, Neijssel, C.J., **Broekgaarden, F.S.**, et al., 2020, *Common envelope episodes that lead to double neutron star formation*, *PASA, 37, e038*
5. Neijssel, C.J., Vigna-Gómez, A., Stevenson, S., Barrett, J.W., et al., **(incl. Broekgaarden, F.S.)** 2019, *The effect of the metallicity-specific star formation history on double compact object mergers*, *MNRAS, 490, 3, 3740–3759*

– White papers (4) –

4. Burns, E. et al. **(incl Broekgaarden, F.S.,)** 2023, *Gamma-ray Transient Network Science Analysis Group Report*, *ArXiv*
3. Gomez, S. et al. **(incl Broekgaarden, F.S.,)** 2023, *Roman CCS White Paper: Characterizing Superluminous Supernovae with Roman*, ArXiv, Roman white paper
2. Lam, C. et al. **(incl Broekgaarden, F.S.,)** 2023, *Roman CCS White Paper: Characterizing the Galactic population of isolated black holes*, ArXiv, Roman white paper
1. Han, J. J. et al. **(incl Broekgaarden, F.S.,)** 2023, *NANCY: Next-generation All-sky Near-infrared Community surveY*, ArXiv, Roman white paper

SOFTWARE & DATA PUBLICATIONS

I advocate for open and reproducible science. I make all code and data to reproduce results and figures in my scientific work publicly available. Below are four out of many highlighted code and data publications. See for a full list my Github, and Zenodo.

7. Tom Wagg & **F.S. Broekgaarden**, The Software Citation Station (2025), GitHub, 80 paper citations
6. **F.S. Broekgaarden**, (2024), Data set from: Gravitational Wave Visualizations, Zenodo https://doi.org/10.5281/zenodo.7793213, >100 downloads
5. **F.S. Broekgaarden**, (2022), Data set from: Mass Ratio Reversal Project, Zenodo https://doi.org/10.5281/zenodo.6978990, >100 downloads
4. **F.S. Broekgaarden**, I. Mandel, (2022), Data set from: Rates of Compact Object Coalescences, Zenodo https://doi.org/10.5281/zenodo.7017532, >4000 downloads
3. **COMPAS stellar evolution code**, COMPAS Collaboration; Riley, Jeff et al. (2022) **incl. Broekgaarden, F.S.**, *JOSS*, Github
2. **F.S. Broekgaarden** (2021), several data sets of population synthesis simulations of BHBH, BHNS, and NSNS mergers, with over >1000 total downloads:
   - BHNS simulations Zenodo, https://doi.org/10.5281/zenodo.5178777
   - NSNS simulations Zenodo, https://doi.org/10.5281/zenodo.5189849
   - BHBH simulations Zenodo, https://doi.org/10.5281/zenodo.5651073
1. **STROOPWAFEL** code and data to efficiently sample rare astrophysical events using adaptive importance sampling. **F.S. Broekgaarden**, (2019) https://github.com/FloorBroekgaarden/STROOPWAFEL, Zenodo: zenodo.org/record/3627403 and **L. Khandelwal & F.S. Broekgaarden**, (2020) STROOPWAFEL PyPi version: extended sampling from 3 dimensions to 10 dimensions, implemented generation adaptive importance sampling

RESEARCH ADVISING

Supervised (∼30) students from many different institutions/programs. My philosophy is to support students by sharing my mentor/mentee expectations and adapting to the student's strengths and personal goals (which may change over time), providing them opportunities to network, present their work, attend conferences, and contribute to large international collaborations. See Gravitational Wave Paleontology Lab website for more details. My research group actively supports many underreprsented minority students in astrophysics, including a high-school drop out, black in astrophysics students, hispanic students, international students, and many women+ students.

— Current Group 22 members —

– Current Postdocs –

Marko Ristic, UCSD ML/AI Schmidt Fellowship — July 2026
Steffani Grondin, NSERC Fellowship, (co-adviser with Prof. Kremer) — Oct 2025
Kyle Rocha, (co-adviser with Prof. Kremer) — Oct 2025

– Current Ph.D students –

Melanie Santiago, Astronomy & Astrophysics 1st year — 2025—now
Sasha Levina, Astronomy & Astrophysics 3rd year — 2023—now
Tyler Smith, co-mentor, 7th year, UC Irvine — 2024—now
Alex Migala, Physics, 2nd year (co-adviser with Prof. Fuller) — 2024—now

– Current MSc/predoc students –

Prajakta Saraf, UCSD Data Science — 2025—now
Julia Haynes, UCSD Data Science — 2026—now
Rhea Kumar, UCSD Data Science — 2025—now
Phil van Lane, UCSD - software scientist — 2025—now

– Former MSc/predoc students –

Ana Lam, *CUNY/CCA MSc.* — 2023—2025
Amedeo Romagnolo, (now Postdoc at Heidelberg U.) — 2024—2025
Ayanah Carson, Astrophysics MSc student co-mentor — 2025—now
Loki Khandelwal, *UvA, The Netherlands*, (M.S. student) — 2019–2020
Floris Kummer, *UvA, The Netherlands*, (M.S. student) — 2019–2020
→ Now PhD student at University of Amsterdam

– Current Undergraduate students –

Haoyu Miao, Data Science major — 2026—now
Alexandre Franco, Data Science major — 2026—now
Eugene Shang, *UCSD, Mathematics, USA*, — 2025—now
Angel Hernandez, *U. Colorado Astronomy, USA*, — 2025—now
Manasvini Komandur, *UCSD Astronomy, USA*, — 2025—now
Matthew McConnel, *UCSD Astronomy, USA*, — 2025—now
Saina Kadni, *UCSD SPURS Fellowship, USA*, — 2025—now
Laya Binu, *UCSD, USA*, — 2024—now
Khushi Karthikeyan, *NYC, USA*, high school — 2024—now
→ **Awarded top 40 of the 85th Regeneron Science Talent Search**
Meera Desawale, *NYC, USA*, high school — 2024—now
Cauã Rodrigues de Oliveira, *Brazil*, (undergraduate) — 2024—now

– Past Students –

Suoi-Nguon Pham, *UCSD STARTastro, USA*, — 2025
Alexis Vazquez, *Calbridge, USA*, — 2025
Feranmi Falodun, *Calbridge, USA*, — 2025
Esther Park, *UCSD, USA*, — 2025
Jayanth Bharadwaj, *UCSD, USA*, — 2024
Danielle Smart, CENCE bridge program, (main advisor: Ana Lam) — 2024–2025
Adam Boesky, *Harvard University, USA*, (undergraduate) — 2022–2024
→ Ph.D. at Harvard University
Simone Abeti, *Milan University, Italy*, (undergraduate) — 2022–2023
Kaylie Hausknecht, *Harvard University, USA*, (undergraduate) — 2021–2022

Tom Wagg, *Harvard University, USA*, (undergraduate) 2019–2021
→ Ph.D. at UW → Computational Center for Astrophysics Prize Postdoc

MENTORING EXPERIENCE

I immensely value (peer-) mentoring programs and early-career support networks. I have contributed as a mentor to several mentoring programs and (helped) established several mentoring networks over the past years.

Served as a mentor in several mentor programs including:

- UCSD SPURS mentor (2025)
- UCSD URS mentor (2025)
- CalBridge mentor (2025)
- STARTAstro mentor (2025)
- STARS mentors (2025)
- CUNY Mentoring Program (2023, 2024, 2025)
- Columbia Mentoring Program (2023, 2024)
- The SAO–UMass Latino Initiative Program (2021 & 2022)
- The Harvard AEMES Mentorship Program (2021)
- The Harvard Astronomy peer-mentoring program (2021)
- W+OCP: The Woman of Color Program (2021)

Established mentoring networks

I have initiated several mentoring programs including at the annual European Astronomical Meeting (as part of the early-career workshop series I initiated) which served 140 participants. I have also initiated in 2019 an online early-career astronomers network to facilitate discussions between early-career astronomers that has grown to 4.5k members. In 2025 I initiated an international astronomers in the USA mentorship community with currently over 200 members.

Mentoring with Ph.D. applications

I have written numerous resources for applying for Ph.D. positions in Astronomy, and every year I support ∼10 (mostly underrepresented minority) students with their applications by discussing the application timeline, providing feedback on written essays, and giving advice regarding offers and rejections.

Mentored ∼ 20 **Physics** & **Astronomy students**, University of Amsterdam 2017
I mentored class of ∼ 20 second-year Physics & Astronomy B.S. students at the University of Amsterdam

SELECTED INVITED REVIEW TALKS / PANELS

∼10 out of 40+ total, see website for a full list. Due to travel limitations (applying to VISA) I had to reject most invitations in the past years

International Astronomical Union: Massive Star Meeting, *Mexico*	Sep 2025
PAX workshop: Physics at the Extreme *Illinois, USA (virtual)*	July 2025
Nevada CfA Gravitational Waves Conference	Mar 2025
TEONGRAV 2024, *Italy*	Sep 2024
IAU Gravitational Waves 2024, *South Africa*	Aug 2024
COSPAR 2024, *Busan, South Korea*	July 2024
10th International Conference on Gravitation and Cosmology, *India*	Dec 2023
SNEX: SuperNova EXplosions Conference, *Israel*	Aug 2023
Amaldi15: International Conference on Gravitational Waves, *virtual*	July 2023

Science with the Habitable Worlds Observatory and Beyond, *MD, USA*	July 2023
The Wolf-Rayet Conference, *Morelia, MEX*	June 2023
The APS/DGRAV Meeting, *Minnepolis, MN, USA*	Apr 2023
MIAPbP workshop on Impact of Binaries on Stellar Evolution, Germany	Nov 2022
TUTT Multi Messenger Workshop, *Otranto, Italy*	Sep 2022

SELECTED INVITED COLLOQUIA & SEMINARS

–See website for a full list–

- U. of Toronto Colloquium, *Toronto, Canada* — Sep 2025
- University of Oregon, *OR, USA* — May 2025
- UC Santa Cruz Colloquium, *CA, USA* — Mar 2025
- UC Los Angeles Colloquium, *CA, USA* — Feb 2025
- UC Irvine Colloquium, *CA, USA* — Oct 2024
- U. of Maryland Colloquium, *Maryland, USA* — Oct 2024
- Louisiana State U. Colloquium, *LA, USA* — Sept 2024
- Heidelberg-wide (HITS/MPIA/U. of Heidelberg) Colloquium *Germany* — Jul 2024
- UC San Diego Colloquium, *CA, USA* — May 2024
- RIT Colloquium, *NY, USA* — Mar 2024
- University of Arizona Colloquium, *AZ, USA* — Feb 2024
- U. of Michigan Colloquium, *MI, USA* — Oct 2023
- CIERA/Nortwestern Colloquium, *Chicago, USA* — Oct 2023
- Johns Hopkins University Colloquium, *Baltimore, USA* — Mar 2023
- University of Washington Colloquium, *Seattle, USA* — Feb 2023
- Cornell University Colloquium, *Ithaca, USA* — Feb 2023
- Monash Colloquium, *Melbourne, Australia* — Jan 2023
- UC Berkeley Seminar, *CA, USA* — Nov 2022
- Caltech Seminar, *CA, USA* — Nov 2022
- Albert Einstein Institute Seminar, *Potsdam, Germany* — May 2022
- GSSI Colloquium, *L'Acquila, Italy* — Apr 2022
- Bicocca University Astronomy Colloquium, *Milan, Italy* — Apr 2022
- ASTRON/JIVE Colloquium, *Dwingeloo, The Netherlands* — Oct 2021
- CITA Colloquium, *Toronto, Canada* — Apr 2021
- Max Planck Institute for Radio Astronomy Seminar, *Bonn, Germany* — Oct 2021
- Anton Pannekoek Institute Seminar, *Amsterdam, NL* — Sep 2021
- University de Conception Colloquium, *Conception, Chile* — Nov 2020
- ADRF Seminar on Black Hole–Neutron Star Mergers, CfA *MA, USA* — Oct 2020
- University of Wisconsin-Madison, Seminar, *WI, USA* — Oct 2020

INVITED AI/ML TALKS / PANELS

Scientific Machine Learning for Gravitational Wave Astronomy, ICERM Workshop, *Brown University, USA*	June 2025
EnCORE: UCSD Data Science Institute plenary talk	Mar 2025
American Astronomical Society (AAS) 245, AI town hall panelist,	Jan 2025
American Astronomical Society (AAS) 245 AI Simulation Based Inference	Jan 2025
Spring Workshop on Physics of Data, *Venice, Italy*	Apr 2022
Astro-statistics talk, Harvard University	Nov 2020

INVITED OUTREACH TALKS

- OSHER learning institute talk — Jan 2026
- Plenary Speaker Undergraduate Research Conference, UCSD — Aug 2025
- Salon Event UCSD, plenary speaker — May 2025
- Columbia University Outreach Colloquium, NYC, NY , — April 2024
- Harvard Horizons TEDx-like talk, MA — April 2023
- North Shore Amateur Astronomy Club, Boxford MA — Oct 2022
- Podcast Astrophiz 150: *Floor Broekgaarden, Gravitational Waves* — June 2022
- Astronomical Society of the Palm Beaches — Sep 2021
- Gloucester Area Astronomy Club (GAAC) meeting — Apr 2021
- Beacon Hill STEM Science Seminar, Harvard, USA — Apr 2021
- Science In The News Seminar — Feb 2021
- Astro Chats with YouthAstroNet — May 2020
- Lunch Talks Ortec (Dutch optimization company) — May 2020
- Mount Burnett Observatory Seminar, Melbourne, Australia — Apr 2019

SELECTED INVITED DEI TALKS

–5 out of 10+ total, see website for a full list–

Conference for Women and Gender Minorities in Physics, plenary speaker	Jan 2025
Science Magazine: Invited Review on Disability Exhibition,	Nov 2024
INAF Italian National Ph.D. School in Astrophysics, plenary speaker	Sep 2023
University of Michigan, DEI Colloquium	Nov 2023
Women in Physics JHU Meeting	Sep 2023
REU CfA Session and Panel	July 2022
ESO Conference: The Present and Future of Astronomy, *(virtual)*	Feb 2022

SELECTED DEPARTMENT AND UNIVERSITY LEADERSHIP

SMASH Hackathon, SOC — 2026
UCSD ML hackathon with over 200 undergraduate participants

SMASH Hackathon, SOC — 2025
UCSD ML hackathon with over 200 undergraduate participants

SMASH Data Science x Astrophysics Meetings–Founder/Chair 2024– now
Chair of new institute for accelerating AI in astrophysics and physics at UCSD. Organizing bi-weekly cross-campus meetings between UCSD's Astrophysics, physics, and mathematics departments, the San Diego Supercomputer Center and UCSD's HDSI data institute.

Theory and Simulations Meetings – Founder/Chair 2024—now
New 'STRAND' Meetings for Theory Collaboration at UCSD

AstroAI – co-PI 2023—2024
New institute for accelerating AI in astrophysics at the Center for Astrophysics | Harvard & Smithsonian. I helped set this up and write proposals for seed funding.

CfA–MIT Gravitational Wave Group – Founder/Chair 2022—2023
Initiated a new group meeting series to discuss the big open questions in gravitational-wave astronomy with researchers across different groups and divisions from Harvard and MIT. Received ∼$2k funding to support journal club. Currently initiating a white paper for the department Decadal Survey to establish a gravitational-wave center.

CfA Gravitational Wave Workshop "Post-PAX" – Founder/Chair 2022
Initiated and organized an international two-day discussion-based workshop on gravitational-wave astrophysics at Harvard, hosting 50 attendees.

"Where are the Black Hole–Neutron Star Binaries?" –Founder/Chair 2021
European Astronomical Society (EAS) Meeting, Leiden, The Netherlands (virtual)
Initiated and led a full day conference session on black hole–neutron star binaries aimed to bring observers and theorists together to discuss open questions including: *Why have we not confidently detected a black hole-neutron star system yet?*. I was in charge of writing the conference proposal, creating the SOC, inviting speakers, ranking submitted abstracts, and chairing and leading several (discussion) sessions. Coincidentally, the first two confirmed black hole-neutron star mergers, GW200105 and GW200115, were announced a day before our conference took place.

Machine Learning Journal Club – Organizer 2020–2022
The Machine Learning Journal Club (MLJC) Meetings are bi-weekly gatherings with astronomers across different divisions at the Center for Astrophysics | Harvard & Smithsonian to discuss new research on topics of astrostatistics, Machine Learning and related fields. I organized these between 2020–2022.

Weekly student-colloquium speaker lunch – Founder/Organizer 2019–2020
Initiated and led weekly lunch series between the astronomy graduate students of Harvard/CfA and the colloquium speaker to encourage networking

LEADERSHIP IN SUPPORTING EARLY CAREER SCIENTISTS

International Astronomers Group, Founder 2025—now
USA wide affinity group for international astronomers in the USA.

UCSD International Astronomers Affinity Group – Founder 2024– now
New affinity group to support and help international members of UCSD Astronomy and Astrophysics

CfA "Early Career Astronomers & Their Supporters" – Founder/Chair
Center for Astrophysics | Harvard & Smithsonian Workshop series 2022–2023
Founded a new workshop series on topics including mental health, job applications, fellowship writing, and mentoring. Workshop recordings and resources are posted online and have been accessed by thousands of astronomers world-wide. Led proposal that received ∼$15k funding to support workshop series.

EAS "Early Career Astronomers & Their Supporters" – Founder/Chair
European Astronomical Society (EAS) Meeting Chair: 2021, SOC: 2022, 2023
Initiated and led a full day conference on "early-career astronomers & their supporters" as part of European's largest annual Astronomy meeting 'EAS' in 2021. The day included discussion sessions, a mentor-mentee lunch, and panels on careers in and

outside academia and was attended by over 500 participants. Program was repeated in 2022 and is as of 2023 integrated as a permanent component of the conference.

Initiated several "Early Career Scientists" workshops 2022–now

Initiated several workshops to support early-career scientists at a variety of venues including:

- ECA workshop 'negotiating', UCSD 2025
- ECA workshop Columbia University, 2024
- ECA panel U. of Arizona, Physics department 2024
- ECA talk U. of Arizona Astronomy department 2024
- ECA discussion CIERA, Nortwestern U., 2023
- ECA session INAF PhD School, 2023
- ECA workshop Michigan University, 2023
- ECA workshop JHU University, 2023
- ECA talk CuWIP meeting, Baltimore, 2023
- ECA session TUTT workshop, *Otranto, Italy* Sep 2022
- Early Career Scientists Lunch GWPAW, *Melbourne, Australia* Dec 2022
- Early Career Scientists Workshop, *Johns Hopkins University, Baltimore* Oct 2022
- Early Career Scientists Workshop, *L'Aquila, Italy* May 2022
- Early Career Scientists Workshop, *AEI, Potsdam, Germany* May 2022
- Early Career Astronomers Dinner, *Saas-Fee School, Switzerland* Apr 2022
- Early Career Astronomers Dinner, GW Workshop, *Bonn, Germany* Apr 2022

Other Panels 2025–now

- UCSD DEI panel during Open House Feb 2025

SELECTED DIVERSITY EQUITY & INCLUSION LEADERSHIP

Advocacy to Improve Workplace Civility 2019–

Led many initiatives to improve workplace civility. I have supported and helped resolve over 20 different harassment and bullying concerns at various astronomy departments and institutions. I also have advocated at several departments, conferences, and workshops for better support and resources regarding workplace civility, leading successfully to creating code-of-conducts, ombudspersons, and resource websites. Most of my advocacy regard private situations, but public things I have done include:

- BAAS paper on improving harassment resources in Astronomy 2023
- Member of the CfA Workplace Civility Committee 2022–2023
- Invited to speech at Harvard Grad Student Union rally against harassment 2021
- Invited panelist during department DEI meeting 2021
- Organized several training workshops on Workplace Civility at CfA 2020–2023
- Helped improve Harvard Union Support for harassment victims 2020–2022
- Co-wrote and maintain the Harvard Grad Student Code-Of-Conduct 2019–2023

APS Inclusion, Diversity, and Equity Alliance, Harvard 2020–2021

Founding member. Led the subcommittee that created better on-boarding documents for CfA members, and created the CfA department-wide resource page

The roads to more inclusive (virtual) meetings in Astronomy Sep 2020
Organized a workshop together with Karin Öberg as part of the Equity Inclusion Journal Club (EIJC) on how to make (virtual) meetings in Astronomy more inclusive. Based on AIP "The time is now" 2019 AIP TEAM-UP report and in collaboration with the Harvard BOK center.

SELECTED ADDITIONAL LEADERSHIP

SMASH hackathon committee, SOC	UCSD	2026
Gravitational Waves + r-process enrichment Conference	SOC	2025
UCSD ArXiv Theory Coffee, Member	UCSD	2025
UCSD Graduate Student Committee, Member	UCSD	2025
SMASH hackathon committee, SOC	UCSD	2025
Amaldi Early Career Travel Support committee, Member	NSF	2025
SOC Binary Stars Conference, SOC Member	Liege, Belgium	2025
UCSD Sponsor and Donor Committee, Member	UCSD	2025
SOC Astro AI Conference EAS, SOC Member	Padova, Italy	2024
SOC Astro AI Conference CfA, SOC	Harvard University, USA	2024
ComSciCon Flagship Workshop, LOC Member		2021
Graduate student representative for CfA director hire, Harvard		2021
First year Astronomy Ph.D. Introduction Organizer, Harvard		2020

TEACHING EXPERIENCE & TRAINING

Astronomy 121 The Explosive Universe, *UCSD* winter 2026
Brand new undergraduate level course on transient astronomy and the explosive universe.

Astronomy 201 Radiative Processes, *UCSD* fall 2025
Graduate level course on radiative processes

Astronomy 211 Stellar Evolution, *UCSD* winter 2025
Graduate level course on stellar evolution and stellar structure

Astronomy 214 Observational Astronomy, *Harvard* Fall 2022
Graduate level course on instrumentational and observational astronomy with Daniel Eisenstein and Josh Grindlay

Guest Lecturer Gravitational Wave School, *Saas-Fee, Switzerland* Spring 2022
Taught week-long lectures on formation channels of compact object binaries to 50 PhD students

Guest Lecturer Python Latino Initiative Program, *Harvard* 2020, 2021
Taught (2x) a guest lecture on data investigation with Python for the students from the LIP program.

Astronomy 1 Introduction to Astronomy, *Harvard* Fall 2021
General Education Course introducing Astronomy to undergraduate students with David Charbonneau.

Organizer of the "Mathematics lecturer of the year prize", 2016
Initiated and led the organization of a Mathematics teacher of the year prize

Board Member Educational Committee Mathematics, 2014–2016
Student representative, contributed to designing the mathematics curriculum and improving the program

Teaching & Mentoring Training

Completed several training workshops on teaching in STEM including:

- Completed course *The Science of Teaching Science*, Harvard 2021
- Received Certificate of distinction in teaching, Derek BOK Center, Harvard 2021
- Various Harvard BOK center training workshops 2020, 2021, 2022
- Mentoring workshop for faculty, Harvard 2019

Memberships & Affiliations

- Member of the American Astronomical Society (AAS)
- Member of the American Physics Society (APS)
- Member of Cosmic Explorer Collaboration
- Member of Einstein Telescope Collaboration
- Member of the COMPAS collaboration
- Co-PI AstroAI at Harvard University
- Junior Investigator NSF AI Institute IAIFI

REFEREE & REVIEWER

NSF Proposal Review Panel
Hubble Space Telescope Director Time Reviewer
Nature Astronomy
Astrophysical Journal (ApJ)
Astrophysical Journal Letters (ApJL)
Astronomy and Astrophsyics (A&A)
MNRAS
UNIVERSE
Gemini Telescope Proposal Reviewer
ERC Grant Reviewer
Hubble Telescope Proposal Reviewer (Panel, DDT)
PhD/Postdoc Fellowship Reviewer JHU
UCSC Thesis committee
PhD thesis committee member UCSD (6x)

REFERENCES

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