

# Yale Department of Physics

CHIARA M. F. MINGARELLI, PhD  
*Assistant Professor*

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## Positions

**Assistant Professor of Physics**, Yale University, 2023 —  
**Guest Researcher**, Flatiron Institute, Center for Computational Astrophysics (CCA), 2023 —  
**Assistant Professor of Physics**, University of Connecticut, 2020 — 2023  
**Associate Research Scientist**, Flatiron Institute, CCA, 2019—2023  
**Flatiron Research Fellow** 2017 - 2019  
**Marie Curie International Outgoing Fellow** — 2014 - 2017: At Caltech, with visiting status at NASA's Jet Propulsion Laboratory, with the European reintegration phase at the Max Planck Institute for Radio Astronomy in Bonn, Germany.

## Education

University of Birmingham, Birmingham, UK — PhD, 2014  
University of Bologna, Bologna, Italy — M.Sc., 2009  
Carleton University, Ottawa, Canada — B.Sc Double Honours Mathematics and Physics, 2006

## Grants (total \$1.45M)

- **Co-I, Finding massive BH binaries with gravitational waves and electromagnetic surveys**, LISA preparatory study #22-LPS22-0036, PI Jonathan Zrake, NASA, (2023-2026) \$200,000.
- **PI, NASA Connecticut Space Grants** (Graduate and Undergraduate Students): total \$38,000
  - Yu-Ting Chang (2024) \$6,000, Abigail Moran (2023) \$6,000, Andrea Mejia (2023) \$10,000, Bjorn Larsen (2022) \$8,000, Andrew Casey-Clyde (2021) \$8,000.
- **PI, The Era of Binary Supermassive Black Holes**, Moore Foundation grant for participation in the eponymous workshop at the Aspen Center for Physics, October 2024, \$20,000.
- **PI, An Empirical Blueprint for the Gravitational-Wave Background**, NSF AAG Collaborative grant with Jenny E. Greene (2021-2025), \$313,047.
- **Co-I, The NANOGrav Physics Frontier Center**, NSF Physics Frontier Center (2021-2026) \$282,503.
- **PI, Simons Foundation Awards**, total \$146,101
  - 2023-2025, Award 1167523, Continuing Collaboration with the Flatiron Institute Institution: \$76,738
  - 2022-2023, Award 1036401, Searching for anisotropy in the gravitational wave background: \$49,363
  - 2020-2021, Award 840641, Research Support Grant: \$20,000
- **Co-I, UConn Postdoc Seed Award**: Dr. Deborah Good (2022-2023) \$2,000
- **PI, Amazon Web Services ML Award** — October 2018, Value of \$120,000
- **PI, Marie Curie International Outgoing Fellowship** — 2014 - 2017, Project name "GW ASAP", Proposal number 623380, value €262,975 (\$330,000)

## Leadership, Mentorship, and Collaboration Work

- **Executive Committee** of NASA's Physics of the Cosmos Program Analysis Group (2023–2025)
- **Co-Chair, Gravitational Wave Science Interest Group**, NASA Physics of the Cosmos (2023-2025).
- **Chair of the 2020 & 2021 Gravitational Wave International Committee (GWIC) — Braccini Thesis Prize Committee**. As chair I assembled a team of 15 experts to evaluate the best PhD thesis across all fields of gravitational-wave science.

## C. M. F. Mingarelli, PhD

- **Founder and Chair** of the International Pulsar Timing Array gravitational wave analysis working group (March 2018-March 2020; end of term).
- **Member** of the GWIC-Braccini Thesis Prize committee (2019).
- **Ada Lovelace Director of Diversity**, Flatiron Institute, CCA, 2019-2023: Increase diversity in computation astrophysics by advising on gender balance, and all issues pertaining to equity and inclusion at CCA. Focused on actively increasing the diversity of Flatiron Fellow applicant pool to hire a more diverse Fellows, and helping to create and develop the Inclusion, Diversity, Equity & Advocacy (IDEA) Scholar Program at the Flatiron Institute.
- **Chair:** European Pulsar Timing Array detection working group (2017-2018).
- **NANOGrav Contributions:** I am currently leading the targeted search for supermassive black hole binaries with the NANOGrav 15-yr data, am part of the leadership team for a new harmonic analysis of the GW background for the 15-yr data, for making principal component maps of the GW background with the 15-yr data, and for creating custom noise models for the 15-yr pulsars. Furthermore, I wrote the astrophysical interpretation of the 12.5-yr GW background results, the astrophysical interpretation of the 11-yr continuous GW searches, led the first astrophysical interpretation of the 9-year data; conceived of and ran analyses for primordial GWs for 9-yr data, carried out first search for anisotropy in the 9-yr data — results never published due to “anomaly” present in data which is an outstanding issue, and led the change in reporting GW limits from strain-only to  $\Omega_{\text{gw}}(f)$  which is more general.
- **Solar, Art Installation, CCA:** Together with David Spergel, I led the commissioning of a custom piece of scientific art for CCA from artist Lia Halloran. Halloran has also worked with Harvard and Caltech.
- **OzGrav Governance Committee (2017-2023):** OzGrav is a multimillion Australian GW collaboration. The governance committee meets at least once a year to advice on how OzGrav is run.
- **Supernova Foundation:** scientific mentor to women in astronomy and astrophysics in developing countries (July 2017 - January 2020).
- **Caltech Women Mentoring Women:** scientific mentor to women at Caltech (Oct 2014 — Jul 2016).

### Teaching, Mentoring, and Thesis Committees

#### Graduate Advising:

- **Current:** Qinyuan Zheng (PhD advisor 2024 —, co-advising with Walter Goldberger), William Chang (PhD, 2024 —), Bjorn Larsen (PhD advisor 2021—), London Willson (PhD advisor 2022—2024, UConn).
- **Graduated:** Andrew Casey-Clyde (PhD 2019—2024, UConn & Yale)

#### Undergraduate Advising:

- **Current:** Yu-Ting Chang (Yale, 2023 —), Rohan Shivakumar (Yale, 2023 —), Ellis Eisenberg (Yale, 2024 —), Forrest Hutchison (Yale 2024 —),
- **Former:** John Kielely (Yale, 2023), Nicole Khusid (Senior Thesis Advisor and SURF, 2021-2023), Abigail Moran (Senior Thesis Advisor, and SURF, UConn 2021–2023), Chengcheng Xin (2019-2020, Columbia University and CCA), Brianna Isola (2018-2019 CCA and Stony Brook), Morgan Nañez (2018-2019 CCA and UC Berkeley).

#### Teaching at Yale:

- AY 2024/25: PHYS 506 Mathematical Methods for Physicists
- AY 2023/24: PHYS 166 (lab class), PHYS/ASTR 343 (Intro astrophysics, relativity, and cosmology)

**Teaching at UConn:** AY 2020-2021 PHYS 1501 (Intro Physics), PHYS 2701 (Intro to astrophysics).

#### PhD Thesis Committees:

- **External Examiner:** Andrea Derdzinski (Supervisor Zoltan Haiman, Columbia University, 2020), Aurelien Chalumeau (Supervisor Stas Babak, University Paris Cité, 2021)
- **Internal Committees (Yale):** William Tyndall (Supervisor Laura Newburgh, 2024), Jakob Kastelic (Supervisor Steve Lamoreaux, 2024), Chuan Tian (Supervisor Meg Urry, 2023).

## C. M. F. Mingarelli, PhD

### Telescope Use

- **Co-I Green Bank Telescope (1,723.50 hours)**, The North American Nanohertz Observatory for Gravitational Waves, GBT24B-427 (May 2024)
- **Co-I Green Bank Telescope (21 hours)**, High-Impact MSPs for the International Pulsar Timing Array, GBT17A-353 (Nov 2016)
- **Co-I Arecibo Telescope (32.5 hours)**, High-Impact MSPs for the International Pulsar Timing Array, P3133 (Sep 2016)

### Referee Service Work

Nature Astronomy, Nature Communications, Physical Review Letters, Physics Letters B, Physical Review D, Astrophysical Journal, Astrophysical Journal Letters, Monthly Notices of the Royal Astronomical Society, Classical and Quantum Gravity, Astronomy and Astrophysics (A&A), and the Journal of Cosmology and Astroparticle Physics (JCAP). NSF Astronomy and Physics Grants, and NASA grant panels.

### Yale Service Work

Service to the Department of Physics includes serving on the Mossman Fellowship Committee (2023) and the YCAA Fellowship selection committee (2023-2024). I have also organized new and exciting events for the Departments of Physics, Astronomy, and the broader Yale community, including my Beinecke Rare Books Library Pop-Up Event (October 2023 and September 2024). I've made an effort to engage my students with the broader physics community by having guest speakers in the classroom. This has had the form of a screening of *Interstellar* with Kip Thorne for PHYS 343 students (May 2024), and a guest lecture by Stephen Wolfram for PHYS 506 (100 attendees). I also presented at the Yale Information Security Office Staff Meeting (April 2024), and have interacted with alumni groups by giving talks to the Class of '66 and Class of 1962, at their request. As a Fellow at Jonathan Edwards College, I judge the Jonathan Edwards College Science and Mathematics Prize.

### Code Sharing for the Scientific Community

Codes and lecture notes are available on github account, <https://github.com/ChiaraMingarelli>. Primarily in Python and publish my codes with Jupyter notebooks. Public codes from Mingarelli et al. (2017) have been widely used by the community, including researchers at Imperial College London, CCA and Yale.

### Selection of Prizes, Honors and Awards

- Bruno Rossi Prize from the American Astronomical Society's High Energy Astrophysics Division (HEAD), 2025. Shared with NANOGrav.
- ICBS Frontiers of Science Award in Astrophysics and Cosmology, 07/2024. Shared with NANOGrav.
- Marie Curie Alumni Association, 2023 Career Award, €1500, awarded 03/2024.
- IOP Top Cited Paper Award (North America) for "The NANOGrav 15 yr Data Set: Evidence for a Gravitational-wave Background", Agazie with Mingarelli et al., *ApJ Letters*, (2023).
- Public Voices Fellow at Yale University, The OpEd Project, 2023-2024.
- HEAD Early Career Award, American Astronomical Society, 2023.
- Nature "Inspiring Women in Science Award", Scientific Achievement Category, 2022 runner-up.
- Marie Curie International Outgoing Fellowship — 2014 - 2017.
- Marie Curie Actions "Communicating Science" Prize for 2017.
- Woman Physicist of the Month, American Physical Society, November 2016.
- Springer Thesis Award — 2015, Thesis published by Springer Theses with \$650 cash prize.

### Recent Conference and Meeting Organization

- SOC, Aspen 2025 Winter Conference Organizer: "The Era of Binary Supermassive Black Holes: Coordination of Nanohertz-Frequency Gravitational-Wave Follow-up", Feb 2nd - 7th 2025
- SOC Chair, KITP Rapid Response, "Gravitational Wave Background Found in Pulsar Timing Arrays: Implications for Merging Supermassive Black Holes", Santa Barbara, November 12th-22nd, 2024.

## C. M. F. Mingarelli, PhD

- SOC Chair, Yale Gravitational Wave Symposium, Yale University, November 20th-21st 2023
- SOC Chair, NANOGrav Spring Meeting, CCA, NY, March 2022
- SOC, Gravitational Wave Physics and Astronomy Workshop (GWPAW), AEI Hannover, December 2021
- SOC, Fast Radio Bursts: theory meets observations, CCA Feb 2020
- SOC, NANOGrav Collaboration Meeting, Cornell, October 2019
- SOC Chair, Eternal Multimessenger Workshop, CCA, NY, August 2018
- SOC Chair, 1st International Pulsar Timing Array Hack Week, CCA, NY, December 2017

### Public Engagement in Science

#### Selection of Television Appearances and Podcasts:

- NASA's Universe of Learning Science Briefing, Gravity and Gravitational Waves, October 3rd 2024
- The Supermassive Podcast, Royal Astronomical Society, September 2024
- World Science Festival with Brian Greene, "Gravitational Waves and the Dark Universe", August 2023
- Robinson Erhardt Podcast, "Chiara Mingarelli: Supermassive Black Holes & the Gravitational Wave Background", Episode 108
- Sean Carroll's "Mindscape" podcast, "Searching for Black Holes with Pulsars", episode 212
- Cool Worlds Podcast, "Chiara Mingarelli - NANOGrav, Background Gravitational Waves, Black Holes", Episode 3
- Science In Action — BBC World Service "Melting of Greenland ice sheet"
- Daniel and Jorge Explain the Universe "How to use the whole galaxy to hear huge gravitational waves"
- Origins with Dr. Natasha Wilson "Dr. Chiara Mingarelli: Starry Night Skies, Supermassive Black Holes, and Wavy Spacetime"
- How the Universe Works — Science Channel, Seasons 5, 7, 8, 9 and 10
- Nova's "Universe", Orbital Path podcast with Michelle Thaller
- Story Collider podcast, "How I Ended Up At the Center of the Universe"

### Popular Science Articles

Picture This: Making Waves, for Pioneer Works, 2024; Nautilus Magazine, "A Supermassive Test for Einstein's Famous Theory", by Melize Ferrus and CMF Mingarelli; Scientific American, 2023; "Searching for the Gravitational Waves LIGO Can't Hear", by CMF Mingarelli, 2016; Amy Poehler Smart Girls, "Conversations with a Theoretical Astrophysicist", invited blog series for Women's Month 2016

### High Profile Public Lectures

Amazon MARS 2017 — 2024. Two talks given to Jeff Bezos (2017 and 2024); Dreamworks Animation Studios, Los Angeles, CA, USA; Ad Astra Academy (owned by Elon Musk), Bel Air, CA; Adler Planetarium, "Adler After Dark", Chicago, IL, USA.

### Recent Invited Talks

I've given 83 invited talks at world-class research institutes such as Caltech, Princeton, Harvard, Cambridge, and NASA Headquarters, as well as high-profile meetings such as the American Astronomical Society, the American Physical Society, LISA symposium, and Amaldi. A complete list of talks is at the end of this document.

1. *[upcoming] European Consortium for Astroparticle Theory Symposium, Invited Speaker, May 2025*
2. *[upcoming] NASA Goddard Spaceflight Center, Center for Research and Exploration in Space Science & Technology Colloquium, May 2025*
3. Tel Aviv University, Department of Physics and Astronomy Colloquium, March 2025
4. Solvay Workshop on Gravitational Wave Cosmology, Invited Speaker, Brussels, Belgium, February 2025
5. University of British Columbia, Department of Physics & Astronomy Colloquium, December 2024
6. UCSB, Department of Physics Colloquium, Santa Barbara, November 2024

7. Center for Particle Cosmology, University of Pennsylvania, November 2024
  8. XIX Brazilian School of Cosmology and Gravitation, Rio de Janeiro, Brazil, September 2024
  9. Stony Brook University, Physics and Astronomy Colloquium, September 2024
  10. IoA50: New Frontiers of Astronomy, invited talk, Cambridge University, UK, July 2024
  11. Royal Swedish Academy of Science, Gravitational Wave Symposium, guest speaker, June 2024
  12. GRAPPA Colloquium, University of Amsterdam, June 2024
  13. Black Hole Initiative annual meeting, Harvard University, invited talk, May 2024
  14. Leung Center for Center for Cosmology & Astroparticle Physics, National Taiwan University, March 2024
  15. APS March Meeting, Plenary Talk in the Kavli Symposium, Minneapolis, March 2024
  16. Rutgers Department of Physics & Astronomy Colloquium, New Brunswick, December 2023
  17. McGill Physical Society Colloquium, McGill University, Montreal, December 2023
  18. Flatiron Institute, "Black Holes on Broadway", Plenary talk, December 2023
  19. NYU Physics Department Colloquium, November 2023
  20. CMB-S4 Summer Meeting, Plenary Talk, August 2023
  21. Dark Side of the Universe 2023, Kigali Rwanda, Plenary Talk, July 2023
  22. Giant Magellan Telescope Community Meeting, Plenary Talk, September 2022
  23. TeVPA, Plenary Talk, Queen's University, August 2022
- ... continued at end of CV

# Publications

**Summary statistics: h index: 59; citations: 17,838** as of March 17th, 2024 on Google Scholar; refereed papers 105, total 123.

## Monographs

- **C. M. F. Mingarelli**, Introduction to Gravitational Wave Astronomy, Princeton University Press. In preparation
- **C. M. F. Mingarelli**, Gravitational Wave Astrophysics with Pulsar Timing Arrays, Springer Thesis Series 2016, ISBN 978-3-319-18400-5.

**An asterisk \* denotes a paper led by one of my students.** I have also listed my PTA-related papers and not the LIGO ones, since they are most relevant.

## Top 5 publications:

1. [1,333 citations] G. Agazie with **C. M. F. Mingarelli** et al., The NANOGrav 15 yr Data Set: Evidence for a Gravitational-wave Background, ApJL, Volume 951, 2 (2023).
2. [181 citations] **C. M. F. Mingarelli**, T. J. W. Lazio, A. Sesana et al., The local nanohertz gravitational-wave landscape from supermassive black hole binaries, Nature Astronomy, Volume 1 (2017)<sup>1</sup>.
3. [182 citations] **C. M. F. Mingarelli**, T. Sidery, I. Mandel and A. Vecchio. Characterizing stochastic gravitational wave background anisotropy with Pulsar Timing Arrays. Phys. Rev. D 88, 062005 (2013).
4. [272 citations] P. Lasky, **C. M. F. Mingarelli**, T. Smith et al., Gravitational-wave cosmology across 29 decades in frequency, Phys. Rev. X, Volume 6, Issue 1, 011035 (2016)<sup>2</sup>.
5. [118 citations] **C. M. F. Mingarelli**, J. Levin, T. J. W. Lazio, Fast Radio Bursts and Radio Transients from Black Hole Batteries, ApJL, Volume 814, L20 (2015).

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<sup>1</sup> This was the first PTA paper to appear in a Nature journal. Nature Astronomy commissioned a News & Views article to be written about the importance of this work, see L. Moustakas, Nature Astronomy Volume 1, 825--826 (2017)

<sup>2</sup> Highlighted in APS "Physics". Synopsis: Homing in on Primordial Gravitational Waves

**Submitted**

1. F. Semenzato\*, J. A. Casey-Clyde\*, **C. M. F. Mingarelli**, et al., Cross-Correlating the Universe: The Gravitational Wave Background and Large-Scale Structure, submitted to PRD.
2. J. A. Casey-Clyde\*, **C. M. F. Mingarelli**, J. E. Greene, A. D. Goulding, S. Chen, J. R. Trump, Quasars Likely Host Supermassive Black Hole Binaries, under review at ApJ, arXiv:2405.19406
3. G. Agazie with **C. M. F. Mingarelli** et al., The NANOGrav 15 yr Data Set: Harmonic Analysis of the Pulsar Angular Correlations, submitted to ApJ, arXiv:2411.13472

**First author and Mingarelli Group papers**

4. **C. M. F. Mingarelli**, L. Blecha, T. Bogdanović, et al., Insights into Supermassive Black Hole Mergers from the Gravitational Wave Background, *Nature Astronomy*, Volume 9, (2025)
5. **C. M. F. Mingarelli**, Scientific Writing in the Age of AI, *Nature Astronomy* (2025), a companion article to Mingarelli et al. 2025 (above), published as Correspondence in *Nature Astronomy* in Feb 2025.
6. J. A. Casey-Clyde\*, **C. M. F. Mingarelli**, et al., The NANOGrav 15 yr Data Set: Looking for Signs of Discreteness in the Gravitational-wave Background, *ApJ* Volume 978, 1 (2024).
7. B. Larsen\*, **C. M. F. Mingarelli**, et al., The NANOGrav 15 yr Data Set: Chromatic Gaussian Process Noise Models for Six Pulsars, *ApJ* Volume 972, Issue 1 (2024).
8. A. Moran\*, **C. M. F. Mingarelli**, K. Van Tilburg, D. Good\*, A Pulsar-Based Map of Galactic Acceleration, *Phys Rev D*. 109, 123015 (2024).
9. **C. M. F. Mingarelli**, The black hole revolution needs you!, *Nature Astronomy*, Volume 8, Issue 2 (2024).
10. N. Khusid\*, **C. M. F. Mingarelli**, P. Natarajan, J. A. Casey-Clyde\*, A Barnacka, Strongly Lensed Supermassive Black Hole Binaries as Nanohertz Gravitational-wave Sources, *ApJ*, Volume 955, Number 1 (2023).
11. A. Moran\*, **C. M. F. Mingarelli**, M. Bedell, D. Good\*, D. N. Spergel, Improving Distances to Binary Millisecond Pulsars with Gaia, *ApJ*, Volume 954, Number 1 (2023).
12. **C. M. F. Mingarelli** and J. A. Casey-Clyde\*, PTAs: The Next Window on the Gravitational-Wave Universe, *Science* 378 (6620), (2023).
13. J. A. Casey-Clyde\*, **C. M. F. Mingarelli**, J. E. Greene et al., An AGN-based supermassive black hole binary population model: implications for the gravitational-wave background, *ApJ*, Volume 924, 2 (2022).
14. C. Xin\*, **C. M. F. Mingarelli**, J. S. Hazboun, Multimessenger pulsar timing array constraints on supermassive black hole binaries traced by periodic light curves, *ApJ* Volume 915, Issue 2 (2021).
15. K. Breivik\*, **C. M. F. Mingarelli**, S. L. Larson, Constraining Galactic Structure with the LISA White Dwarf Foreground, *ApJ*, Volume 901, Issue 1 (2020).
16. **C. M. F. Mingarelli**, Probing Supermassive Black Hole Binaries with Pulsar Timing, *Nature Astronomy*, Volume 3 (2019).
17. **C. M. F. Mingarelli** and A. B. Mingarelli, Proving the short-wavelength approximation in Pulsar Timing Array gravitational-wave background searches, *J. Phys. Commun.* 2 105002 (2018).
18. **C. M. F. Mingarelli**, T. J. W. Lazio, A. Sesana et al., The local nanohertz gravitational-wave landscape from supermassive black hole binaries, *Nature Astronomy*, Volume 1 (2017).
19. **C. M. F. Mingarelli** for NANOGrav, Interpreting the Recent Upper Limit on the Gravitational Wave Background from the Parkes Pulsar Timing Array; arXiv:1602.06301 (2016).
20. **C. M. F. Mingarelli**, J. Levin, T. J. W. Lazio, Fast Radio Bursts and Radio Transients from Black Hole Batteries, *ApJL*, Volume 814, L20 (2015).
21. **C. M. F. Mingarelli**, T. Sidery. Effect of small interpulsar distance variations in stochastic gravitational wave background searches with Pulsar Timing Arrays, *Phys. Rev. D* 90, 062011 (2014)<sup>3</sup>.
22. **C. M. F. Mingarelli**, T. Sidery, I. Mandel and A. Vecchio. Characterizing stochastic gravitational wave background anisotropy with Pulsar Timing Arrays. *Phys. Rev. D* 88, 062005 (2013).

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<sup>3</sup> Selected for APS Kaleidoscope

23. **C. M. F. Mingarelli**, K. Grover, T. Sidery, R. J. E. Smith, and A. Vecchio. Observing the Dynamics of Supermassive Black Hole Binaries with Pulsar Timing Arrays. *Phys. Rev. Lett.*, 109, 081104 (2012)<sup>4</sup>.

**Short author papers**

24. J. Nay, K. K. Boddy, T. L. Smith, **C. M. F. Mingarelli**, Harmonic Analysis for Pulsar Timing Arrays, *Phys. Rev D*. 110, 044062 (2024).
25. R. J. Jennings with **C. M. F. Mingarelli** et al., An unusual pulse shape change event in PSR J1713+0747 observed with the Green Bank Telescope and CHIME, *ApJ*, Volume 964, Issue 2 (2024).
26. M. Koss with **C. M. F. Mingarelli** and J. A. Casey-Clyde\* et al., “UGC 4211: A Confirmed Dual AGN at 230 pc Nuclear Separation”, Volume 942, Issue 1, L24 (2023).
27. M. Renzo\*, T. Callister\*, K. Chatziioannou, L. Van Son, **C. M. F. Mingarelli** et al. Prospects of gravitational-waves detections from common-envelope evolution with LISA, *ApJ*, Volume 919, Issue 2 (2021).
28. Y. Ali-Haïmoud, T. L. Smith, **C. M. F. Mingarelli**, Insights into searches for anisotropies in the nanohertz gravitational-wave background, *Phys. Rev. D*, Volume 103, Issue 4, article id.042009 (2021).
29. G. Ogiya, O. Hahn, **C. M. F. Mingarelli**, M. Volonteri, Accelerated orbital decay of supermassive black hole binaries in merging nuclear star clusters, *MNRAS*, Volume 493, Issue 3, p.3676-3689 (2020).
30. Y. Ali-Haïmoud, T. L. Smith, **C. M. F. Mingarelli**, Fisher formalism for anisotropic gravitational-wave background searches with pulsar timing arrays, *Phys. Rev. D*, Volume 102, Issue 12, article id.122005 (2020).
31. A. Goulding, K. Pardo, J. Greene, **C. M. F. Mingarelli** et al., Discovery of a Close-separation Binary Quasar at the Heart of a  $z \sim 0.2$  Merging Galaxy and Its Implications for Low-frequency Gravitational Waves, *ApJL*, Volume 879, Issue 2, article id. L21, 7 pp. (2019).
32. C. Conneely, A. H. Jaffe, **C. M. F. Mingarelli**, On the Amplitude and Stokes Parameters of a Stochastic Gravitational-Wave Background, *MNRAS* Volume 487, Issue 1, p.562-579 (2019).
33. J. Hazboun, **C. M. F. Mingarelli**, K. Lee, The Second International Pulsar Timing Array Mock Data Challenge, *arXiv:1810.10527* (2018).
34. P. Lasky, **C. M. F. Mingarelli**, T. Smith et al., Gravitational-wave cosmology across 29 decades in frequency, *Phys. Rev. X*, Volume 6, Issue 1, 011035 (2016).
35. S. R. Taylor, M. Vallisneri, J. A. Ellis, **C. M. F. Mingarelli**, T. J. W. Lazio, R. van Haasteren, Are we there yet? Time to detection of nanohertz gravitational waves based on pulsar-timing array limits, *ApJL*, Volume 819, L6 (2016).
36. S. R. Taylor, **C. M. F. Mingarelli**, J. R. Gair, et al. Limits on anisotropy in the nanohertz stochastic gravitational-wave background *Phys. Rev. Lett.* 115, 041101 (2015).
37. G. Janssen with **C. M. F. Mingarelli** et al., Gravitational wave astronomy with the SKA, *Proceedings of Science* (2014), *arXiv:501.00127*
38. J. R. Gair, J. D. Romano, S. R. Taylor, **C. M. F. Mingarelli**, Mapping gravitational-wave backgrounds using methods from CMB analysis: Application to pulsar timing arrays, *Phys. Rev. D* 90, 082001 (2014)<sup>5</sup>.
39. J. D. Romano, S. R. Taylor, N. J. Cornish, J. Gair, **C. M. F. Mingarelli**, R. van Haasteren, Phase-coherent mapping of gravitational-wave backgrounds using ground-based laser interferometers, *Phys. Rev. D* 92, 042003 (2015).
40. A. Y. Kamenshchik and **C. M. F. Mingarelli**, A generalized Heckmann-Schücking cosmological solution in the presence of a negative cosmological constant. *Phys. Lett. B* (693), 213 (2010).
41. A. B. Mingarelli and **C. M. F. Mingarelli**, Conjugate points in the gravitational n-body problem, *Celest. Mech. Dynam. Astron.* 91, 391 (2005).

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<sup>4</sup> Highlighted in APS “Physics”. Synopsis: Sailing Choppy Gravitational Seas

<sup>5</sup> Editor's Suggestion, *Phys. Rev. D* Highlights

42. R. van Haasteren, **C. M. F. Mingarelli**, A. Vecchio, A. Lassus, Analysis of the first IPTA Mock Data Challenge by the EPTA timing data analysis working group, arXiv:1301.6673v1 (2013).
43. A. Lassus, R. van Haasteren, **C. M. F. Mingarelli**, K. J. Lee, A. Vecchio, Data Analysis Library for Gravitational Wave Detection, Proceedings IAU Symposium No. 291, Volume 8, pp 438-440 Beijing, China, August (2012).

**Collaboration papers**

44. G. Agazie with **C. M. F. Mingarelli** et al., The NANOGrav 15-year data set: Search for Transverse Polarization Modes in the Gravitational-Wave Background, ApJ Letters, Volume 964, Issue 1, L14 (2024).
45. A. D. Johnson with **C. M. F. Mingarelli** et al., NANOGrav 15-year Gravitational-Wave Background Analysis Pipeline, eprint arXiv:2306.16223 (in press PRD).
46. G. Agazie with **C. M. F. Mingarelli** et al., G. Comparing recent PTA results on the nanohertz stochastic gravitational wave background, arXiv:2309.00693 (in press ApJ)
47. G. Agazie with **C. M. F. Mingarelli** et al., The NANOGrav 12.5 yr Data Set: A Computationally Efficient Eccentric Binary Search Pipeline and Constraints on an Eccentric Supermassive Binary Candidate in 3C 66B, ApJ, Volume 963, Issue 2 (2024).
48. G. Agazie with **C. M. F. Mingarelli** et al., The NANOGrav 12.5-year Data Set: Search for Gravitational Wave Memory, ApJ, Volume 963, Issue 1 (2024).
49. B. Bécsy with **C. M. F. Mingarelli** et al., How to Detect an Astrophysical Nanohertz Gravitational-Wave Background, ApJ, Volume 959, Volume 9 (2023).
50. M. Falxa with **C. M. F. Mingarelli** et al., Searching for continuous Gravitational Waves in the second data release of the International Pulsar Timing Array, MNRAS, Volume 521, Issue 4 (2023)
51. G. Agazie with **C. M. F. Mingarelli** et al., The NANOGrav 15-year Data Set: Search for Anisotropy in the Gravitational-Wave Background, APJL Volume 956,1, L3 (2023).
52. G. Agazie with **C. M. F. Mingarelli** et al., The NANOGrav 15 yr Data Set: Evidence for a Gravitational-wave Background, APJL Volume 951, 2 (2023).
53. G. Agazie with **C. M. F. Mingarelli** et al., The NANOGrav 15 yr Data Set: Observations and Timing of 68 Millisecond Pulsars, APJL Volume 951, 2 (2023).
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80. N. Caballero with **C. M. F. Mingarelli** et al., The noise properties of 42 millisecond pulsars from the European Pulsar Timing Array and their impact on gravitational wave searches, *MNRAS*, Volume 457 (2016).
81. R. M. Shannon with **C. M. F. Mingarelli** et al., Summary of session C1: pulsar timing arrays, *General Relativity and Gravitation*, Volume 46, Issue 8, article id. 1765, 11 pp. (2014).
82. L. Carbone with **C. M. F. Mingarelli** et al., Computer-games for Gravitational Wave science outreach: Black Hole Pong and Space Time Quest, *Journal of Physics Conference Series*, 363 012057, June (2012).

#### ***White Papers and arXiv Documents***

83. H. Zoltán with **C. M. F. Mingarelli** et al., Massive Black Hole Binaries as LISA Precursors in the Roman High Latitude Time Domain Survey, *arXiv:2306.14990* (white paper).
84. S. Yue with **C. M. F. Mingarelli** et al., Discovery and Characterization of Galactic-scale Dual Supermassive Black Holes Across Cosmic Time, *arXiv:2306.15527* (white paper).

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<sup>6</sup> I wrote the section on pulsar timing arrays, and so appear in the first tier of authors.

## C. M. F. Mingarelli, PhD

85. NANOGrav Collaboration with **C. M. F. Mingarelli**, Science with the Next-Generation VLA and Pulsar Timing Arrays, ASP Monograph Series, "Science with a Next-Generation VLA", ed. E. J. Murphy (ASP, San Francisco, CA), arXiv:1810.06594
86. X. Siemens with **C. M. F. Mingarelli** et al., Physics Beyond the Standard Model With Pulsar Timing Arrays, arXiv:1907.04960 (white paper)
87. **C. M. F. Mingarelli**, S. R. Taylor, B. S. Sathyaprakash, W. M. Farr, Understanding  $\Omega_{\text{gw}}(f)$  in Gravitational Wave Experiments, arXiv:1911.09745
88. **C. M. F. Mingarelli**, L. Anderson, M. Bedell, D. N. Spergel, A. Moran\*, Improving Binary Millisecond Pulsar Distances with Gaia, arXiv:1812.06262

### Invited Talks Continued

24. ZTH Colloquium, Zurich, May 2022
25. Yale University, Department of Astronomy Colloquium, April 2022
26. Johns Hopkins & Space Telescope Science Institute Colloquium, March 2022
27. Cambridge Cosmology Seminar, March 2022
28. BLAST Workshop seminar, Black Hole Initiative, December 2021
29. Galileo Galilei Institute, Colloquium, Florence, November 2021
30. Amaldi 14, Plenary Talk on the NANOGrav 12.5-yr results, July 2021
31. Stony Brook University, Astronomy Seminar, May 2021
32. Padova Cosmology Seminar Series, Padova, Italy, April 2021
33. Primordial Black Holes Confront GW Data, Plenary Talk, Rome, February 2021
34. GRASP Colloquium, Utrecht University, Netherlands, January 2021
35. Columbia University, Astronomy Colloquium, January 2021
36. CU Boulder, Departmental Colloquium, November 2020
37. Swarthmore University, Departmental Colloquium, November 2020
38. University College London, Astronomy Seminar Series, October 2020
39. Copernicus Webinar Series, October 2020
40. New York University, High Energy Physics Seminar, Department of Physics, February 2020
41. California Institute of Technology, TAPIR Seminar, January 2020
42. University of Florida, Theoretical Astrophysics Seminar, December 2019
43. North Carolina State University, Department of Physics Colloquium, November 2019
44. Penn State, Institute for Gravitation and the Cosmos Fundamental Theory Seminar, Oct 2019
45. Johns Hopkins University, Department of Physics and Astronomy Seminar, April 2019
46. Queen's University, Canada, Departmental Colloquium, March 2019
47. University of Southern California, Departmental Colloquium, Los Angeles CA, USA, January 2019
48. Vanderbilt University, Departmental Colloquium, January 2019
49. University of Auckland, NZ, Departmental Colloquium, December 2018
50. American Museum of Natural History, NY, Astronomy Seminar, November 2018
51. Cornell University, The Josephine Lawrence Hopkins Foundation Colloquium, October 2018
52. Interplay between Particle and Astroparticle physics, Plenary Talk, October 2018
53. SISSA, Trieste, Italy (APC Seminar) September 2018
54. Observatoire Côte d'Azur (Seminare Lagrange), September 2018
55. University of California, Berkeley, TAC seminar, February 2018
56. New York University, CCPP, Astronomy Seminar, New York, NY, February 2018
57. Harvard University (ITC Colloquium and ITC Luncheon Talk), December 2017
58. OzGrav Retreat and Advisory Board Meeting, Invited Speaker, Perth, Australia, November 2017
59. University of Illinois Urbana-Champaign, Department of Physics Colloquium, Urbana, IL, October 2017
60. Imperial College London, Astrophysics Group Seminar, London, UK, August 2017
61. Princeton University, Department of Physics, Gravity Lunch, April 2017
62. Washington University in St. Louis, Department of Physics Colloquium, St. Louis, MO, April 2017
63. Washington University in St. Louis, Department of Physics, Astronomy Seminar, St. Louis, MO, April 2017

## C. M. F. Mingarelli, PhD

64. Perimeter Institute, Colloquium, Waterloo, Ontario Canada, March 2017
65. University of Guelph, Department of Physics Colloquium, Guelph, Canada
66. 229th AAS Meeting Special Session: HEAD I (Plenary), January 2017
67. Adler Planetarium Colloquium, Chicago, IL, USA, October 2016
68. Oberlin College, Department of Physics and Astronomy Colloquium, Oberlin, Ohio, USA, October 2016
69. 11th International LISA Symposium, Plenary Talk, Zurich, Switzerland, September 2016
70. International Pulsar Timing Array meeting in Stellenbosch, South Africa, June 2016
71. Gordon Research Conference, invited talk, Salve Regina University, RI, USA, June 2016
72. McGill University, Department of Physics, Astronomy Seminar, Montreal, Canada, June 2016
73. University of Toronto, Department of Astronomy and Astrophysics, Colloquium, May 2016
74. NASA Headquarters, Colloquium, Washington DC April 2016
75. NASA Goddard Space Flight Center, Invited seminar, Maryland, USA, April 2016
76. Canadian Institute for Advanced Research Meeting, CIFAR, Whistler, Canada, April 2016
77. California Institute of Technology, High Energy Physics Seminar, Pasadena, CA, January 2016
78. California Institute of Technology, Astronomy Tea Talk, Caltech, Pasadena, CA, May 2015
79. Department of Physics, McGill Space Institute Seminar, McGill University, Montreal, Canada, April 2015
80. Columbia University, Department of Astronomy, Seminar, NY, USA April 2015
81. California Institute of Technology, TAPIR Seminar, Pasadena, CA, January 2014
82. University of British Columbia, Department of Physics & Astronomy Colloquium, British Columbia, Canada, January 2014
83. University of Victoria, Department of Physics and Astronomy Colloquium, British Columbia, Canada, January 2014
84. Cardiff University, School of Physics and Astronomy Colloquium, Cardiff, UK, April 2013
85. Carleton University, joint Department of Mathematics and Department of Physics Colloquium, Ottawa, Canada January 2013