

Josephine Baggen

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Education

Ph.D. Astronomy, Yale University, USA	2022 – May 2027 (expected)
Thesis: <i>Compact Galaxies and Black Holes in the First Billion Years</i>	
Advisor: Prof. P. van Dokkum	
Qualifying exam passed 2024. M.Sc. Astronomy received 2026	
M.Sc. Astronomy & Cosmology (<i>cum laude</i>), Leiden University, NL	2020 – 2022
Thesis II: <i>The Highest-Redshift Radio Galaxies</i>	
Advisors: Prof. H.J.A. Röttgering, Dr. A. Gloudemans	
Thesis I: <i>Transformation of Galaxy Morphology and Alignment in Galaxy Clusters</i>	
Advisors: Prof. H. Hoekstra, Dr. Y.M. Bahé	
B.Sc. Astronomy, Leiden University, NL	2017 – 2020
Thesis: <i>Hypervelocity Stars Generated by the Large Magellanic Cloud</i>	
Advisors: Prof. E.M. Rossi, Dr. F. Evans	
Saas-Fee Advanced Course Winter School (54th): <i>Galaxies and Black Holes in the First Billion Years as Seen by JWST</i>, Switzerland	2025

Research Interests

Extragalactic astronomy; galaxy formation and evolution; high-redshift galaxies and little red dots; the origin of massive black holes and quasars; galaxy dynamics; gravitational lensing; dark matter halos and large-scale structure; analytical modeling and hydrodynamical simulations.

Employment

Ph.D. Researcher, Department of Astronomy, Yale University	2022 – present
Teaching Assistant, Department of Astronomy, Yale University	
ASTR 180: Introduction to Relativity and Black Holes	2024
ASTR 130: Origins & Search for Life in the Universe	2023
ASTR 160: Frontiers and Controversies in Astrophysics	2022, 2023

Observing Programs

JWST GO 8047 (CoI; PI Wang), “Extremely massive galaxies in the early universe? Confirming the nature of the most model-breaking object by hunting for stellar absorption features”	20.0 h
JWST GO 5545 (CoI; PI Barrufet), “Dead or alive? Unveiling the nature of massive galaxies in the early Universe”	10.5 h
JWST GO 9327 (CoI; PI van Dokkum), “Confirmation of a direct-collapse supermassive black hole”	2.8 h
Keck I/LRISp (CoI; PI Burke), “Coming out of their shells: constraining the geometry of Little Red Dots with spectropolarimetry”	1 night

Prizes and Awards

Dr. Pliny A. and Margaret H. Price Prize , Center for Cosmology and AstroParticle Physics (CCAPP), Ohio State University	2026
M.Sc. awarded <i>cum laude</i> , Leiden University	2022

Publications

First-author publications

- [1] **J. F. W. Baggen**, M. T. Scoggins, P. van Dokkum, Z. Haiman, A. Torralba, et al. “Connecting the Dots: UV-bright Companions of Little Red Dots as Lyman–Werner Sources Enabling Direct-collapse Black Hole Formation”. *ApJL* 1002 (2026), L4. doi: [10.3847/2041-8213/ae58a5](https://doi.org/10.3847/2041-8213/ae58a5).
- [2] **J. F. W. Baggen**, F. C. van den Bosch, and K. Mitra. “The Impact of Baryonic Effects on the Dynamical Masses Inferred Using Satellite Kinematics”. *The Open Journal of Astrophysics* 9 (2026), 58198. doi: [10.33232/001c.158198](https://doi.org/10.33232/001c.158198).
- [3] **J. F. W. Baggen**, P. van Dokkum, I. Labbé, and G. Brammer. “(Re)solving the Complex Multiscale Morphology and V-shaped Spectral Energy Distribution of a Newly Discovered Strongly Lensed Little Red Dot in A383”. *ApJL* 1006 (2026), L14. doi: [10.3847/2041-8213/ae82fe](https://doi.org/10.3847/2041-8213/ae82fe).
- [4] **J. F. W. Baggen**, P. van Dokkum, G. Brammer, A. de Graaff, M. Franx, et al. “The Small Sizes and High Implied Densities of “Little Red Dots” with Balmer Breaks Could Explain Their Broad Emission Lines without an Active Galactic Nucleus”. *ApJL* 977 (2024), L13. doi: [10.3847/2041-8213/ad90b8](https://doi.org/10.3847/2041-8213/ad90b8).
- [5] **J. F. W. Baggen**, P. van Dokkum, I. Labbé, G. Brammer, T. B. Miller, et al. “Sizes and Mass Profiles of Candidate Massive Galaxies Discovered by JWST at $7 < z < 9$: Evidence for Very Early Formation of the Central 100 pc of Present-day Ellipticals”. *ApJL* 955 (2023), L12. doi: [10.3847/2041-8213/acf5ef](https://doi.org/10.3847/2041-8213/acf5ef).

Co-authored publications

- [1] R. P. Naidu, J. Matthee, H. Katz, A. de Graaff, P. A. Oesch, et al. (incl. **J. F. W. Baggen**). “A gas-enshrouded and gas-reddened black hole at cosmic dawn”. *Nature* 656 (2026), 329–333. doi: [10.1038/s41586-026-10846-4](https://doi.org/10.1038/s41586-026-10846-4).
- [2] A. Venditti, D. Schaerer, E. Zackrisson, Y. Asada, H. Katz, et al. (incl. **J. F. W. Baggen**). “How can we finally see the first light? Status and perspective in the search for Population III stars”. *The Open Journal of Astrophysics* 9 (2026), 67811. doi: [10.33232/001c.167811](https://doi.org/10.33232/001c.167811).
- [3] B. Wang, J. E. Greene, H. Liu, N. Kaaz, G. B. Brammer, et al. (incl. **J. F. W. Baggen**). “Balmer Absorption Series and Broad Metal Lines in Two Luminous Little Red Dots”. *arXiv e-prints* (2026). arXiv: [2609.22623](https://arxiv.org/abs/2609.22623).
- [4] L. Barrufet, P. A. Oesch, R. Marques-Chaves, K. Arellano-Cordova, **J. F. W. Baggen**, et al. “Quiescent or dusty? Unveiling the nature of extremely red galaxies at $z > 3$ ”. *MNRAS* 537 (2025), 3453–3469. doi: [10.1093/mnras/staf013](https://doi.org/10.1093/mnras/staf013).
- [5] F. D’Eugenio, E. Nelson, X. Ji, **J. F. W. Baggen**, J. Greene, et al. “Irony at $z=6.68$: a bright AGN with forbidden Fe emission and multi-component Balmer absorption”. *arXiv e-prints* (2025). arXiv: [2510.00101](https://arxiv.org/abs/2510.00101).
- [6] A. de Graaff, H.-W. Rix, R. P. Naidu, I. Labbé, B. Wang, et al. (incl. **J. F. W. Baggen**). “A remarkable ruby: Absorption in dense gas, rather than evolved stars, drives the extreme Balmer break of a little red dot at $z = 3.5$ ”. *A&A* 701 (2025), A168. doi: [10.1051/0004-6361/202554681](https://doi.org/10.1051/0004-6361/202554681).
- [7] K. Mitra, F. C. van den Bosch, **J. F. W. Baggen**, and J. U. Lange. “BASILISK IV. No S_8 Tension with Satellite Kinematics”. *arXiv e-prints* (2025). arXiv: [2512.14889](https://arxiv.org/abs/2512.14889).
- [8] P. van Dokkum, G. Brammer, **J. F. W. Baggen**, M. A. Keim, P. Natarajan, et al. “The ∞ Galaxy: A Candidate Direct-collapse Supermassive Black Hole between Two Massive, Ringed Nuclei”. *ApJL* 988 (2025), L6. doi: [10.3847/2041-8213/addcfe](https://doi.org/10.3847/2041-8213/addcfe).
- [9] P. van Dokkum, G. Brammer, C. Jennings, I. Pasha, and **J. F. W. Baggen**. “Further Evidence for a Direct-collapse Origin of the Supermassive Black Hole at the Center of the ∞ Galaxy”. *ApJL* 990 (2025), L48. doi: [10.3847/2041-8213/adfb50](https://doi.org/10.3847/2041-8213/adfb50).
- [10] A. Weibel, A. de Graaff, D. J. Setton, T. B. Miller, P. A. Oesch, et al. (incl. **J. F. W. Baggen**). “RUBIES Reveals a Massive Quiescent Galaxy at $z = 7.3$ ”. *ApJ* 983 (2025), 11. doi: [10.3847/1538-4357/adab7a](https://doi.org/10.3847/1538-4357/adab7a).

- [11] B. Wang, J. Leja, A. de Graaff, G. B. Brammer, A. Weibel, et al. (incl. **J. F. W. Baggen**). “RUBIES: Evolved Stellar Populations with Extended Formation Histories at $z \sim 7-8$ in Candidate Massive Galaxies Identified with JWST/NIRSpec”. *ApJL* 969 (2024), L13. doi: [10.3847/2041-8213/ad55f7](https://doi.org/10.3847/2041-8213/ad55f7).
- [12] F. A. Evans, T. Marchetti, E. M. Rossi, **J. F. W. Baggen**, and S. Bloot. “Comparing hypervelocity star populations from the Large Magellanic Cloud and the Milky Way”. *MNRAS* 507 (2021), 4997–5012. doi: [10.1093/mnras/stab2271](https://doi.org/10.1093/mnras/stab2271).

Talks & Presentations

Invited talk, <i>Price Prize Seminar</i> , CCAPP, Ohio State University, Columbus, USA	2026
Invited talk, <i>ITC Luncheon</i> , Center for Astrophysics Harvard & Smithsonian, Cambridge, USA	2026
Contributed talk, <i>European Astronomical Society Annual Meeting</i> , Lausanne, Switzerland	2026
Invited talk, <i>LRD 2026 Workshop: Unveiling the Little Red Dots</i> , online	2026
Contributed talk, <i>Charting Cosmic Dawn</i> , Copenhagen, Denmark	2026
Lightning talk, <i>YCIU Primordial Black Holes Workshop</i> , Yale, New Haven, USA	2026
Contributed talk, <i>The First Billion Years: 5 Questions in 5 Days</i> , Aspen, USA	2026
Invited talk, <i>CSI: Sesto – Cosmology Scene Investigation: Joining Efforts to Solve JWST Mysteries in the Distant Universe</i> , Sesto, Italy	2026
Seminar, Swinburne University of Technology, Melbourne, Australia	2025
Contributed talk, <i>Kaba Kada: Exploring the First Billion Years of the Universe</i> , Queensland, Australia	2025
Contributed talk, <i>Inaugural Cosmic Frontier Center Conference: The Formation of the Earliest Cosmic Structures</i> , Austin, USA	2025
Seminar, Leiden University, Leiden, The Netherlands	2025
Invited talk and invited discussion, <i>Santa Cruz Workshop on Galaxy Formation</i> , Santa Cruz, USA	2024
Seminar, Leiden University, Leiden, The Netherlands	2024
Contributed talk, RUBIES team meeting, The Netherlands	2024
Poster, <i>European Astronomical Society Annual Meeting</i> , Padova, Italy	2024
Poster, <i>First Light at MIT</i> , Cambridge, USA	2023

Service & Outreach

Yale Galaxy Lunch Organizer, Yale University	2026 – present
Journal Referee, <i>ApJL</i> , <i>ApJ</i> and <i>A&A</i>	2023 – present
Astronomy Student Council (ASC), Yale University	2024 – present
Astronomy on Tap, New Haven – public outreach talks for general audiences	2024
Leitner Family Planetarium, New Haven – public outreach talks for school groups and children	2023 – present
Tour Guide, The Old Observatory, Leiden	2017 – 2021

Press

<i>AAS Nova</i> , research highlight on little red dots	2026
<i>Astrobites</i> , featured in conference report, Queensland, Australia	2025
<i>AAS Nova</i> , research highlight on little red dots	2025
<i>New Scientist</i> , research feature on little red dots	2024
<i>Yale Daily News</i> , expert commentary on massive galaxy discovery	2024
<i>Event Horizon</i> , invited guest on astronomy YouTube channel	2023