

## THOMAS R. QUINN

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### EDUCATION:

Ph.D. in Astrophysics, Princeton University, October, 1986.

B.S. in Engineering Physics, Lehigh University, January, 1982.

### EXPERIENCE:

2021–2023 Chair, Astronomy Department. University of Washington

2003–2023 Full Professor. University of Washington

Supervision of Iryna Butsky's Ph. D. thesis: "Simulating Multiphase Galactic Halos: The Impact of Cosmic Rays Through an Observational Lens"

Supervision of Isaac Backus' Ph. D. thesis: "Protoplanetary disks and planet formation: A computational perspective"

Supervision of Lauren Anderson's Ph. D. thesis: "The Little Galaxies That Could Reionize the Universe"

Supervision of Ferah Munshi's Ph. D. thesis: "Star Formation in N-Body + SPH Simulations"

Supervision of Charlotte Christensen's Ph. D. thesis: "The Connection Between Star Formation and the Interstellar Media in Simulations of Evolving Galaxies with a Focus on Molecular Hydrogen"

Supervision of Rok Roskar's Ph. D. thesis: "Examining the Role of Radial Migration in the Evolution of Galactic Disks"

Supervision of Nathan Kaib's Ph. D. thesis: "Numerical models of Oort Cloud formation and comet delivery."

Supervision of Greg Stinson's Ph. D. thesis: "Supernova Feedback in Smoothed Particle Hydrodynamics Simulations of Galaxy Formation."

Supervision of Sean Raymond's Ph. D. thesis: "Late-stage accretion and habitability of terrestrial planets."

Supervision of Graeme Lufkin's Ph. D. thesis: "Simulations of giant planet migration in gaseous circumstellar disks".

Supervision of Rory Barnes' Ph. D. thesis: "The dynamics of the initial planetesimal disk".

2000–2003 Associate Professor. University of Washington

Supervision of Darren Reed's Ph. D. thesis: "Cosmological Simulations of Dark Matter Halos".

Supervision of John Armstrong's Ph. D. thesis: "Wind Erosion and Long Period Climate Change on Mars".

Supervision of Joachim Stadel's Ph. D. thesis: "Cosmological N-body Simulations and their Analysis".

- Chair, Astrobiology Graduate Curriculum Committee.  
 Chair, Astronomy Graduate Curriculum Subcommittee.  
 Participant in Center for Astrobiology and Early Evolution.  
 Adjunct in Physics
- 1998–2000 Research Associate Professor. University of Washington  
 Supervision of Jeffrey Gardner’s Ph. D. thesis: “Numerical simulations of Galaxy Formation in a Cosmological Context”.
- 1993–1998 Research Assistant Professor. University of Washington (Seattle, WA)  
 Co-I on NSF KDI grant to provide frameworks for improving usability, visualization and algorithms for particle based simulation methods. Running and analyzing large simulations of planet formation.  
 Member of Grand Challenge science team in NASA’s High Performance Computing and Communication program. Running and analyzing large simulations of galaxy formation and large scale structure.  
 Principal Investigator on a NASA Innovative Research grant to study the long term stability of the Solar System.  
 Developing scientific software for analysis of the Sloan Digital Sky Survey.  
 Searching for asteroids in the Sloan Digital Sky Survey.  
 Supervision of graduate research: formation of Ly $\alpha$  clouds, evaporation of globular clusters, visualization of N-body simulations, long term stability of the Solar System.  
 Teaching a graduate course on galactic dynamics.
- 1989–1993 Postdoctoral research. University of Oxford. (Oxford, UK)  
 Numerical simulations of the formation of polar rings. Study of the impact of cosmological infall on the formation and evolution of galaxies with J. Binney and G. Efstathiou. Galaxy and quasar formation simulations with N. Katz. Effects of photoionization on Lyman- $\alpha$  clouds.
- 1991–1992 Supervision of graduate research. University of Oxford. (Oxford, UK)  
 Supervision during George Efstathiou’s sabbatical of student working on cosmological N-body simulations.  
 Supervision during James Binney’s sabbatical of student working on galactic orbital dynamics.
- 1991–1992 Undergraduate teaching in Physics. University of Oxford. (Oxford, UK)  
 Mathematical Physics: partial differential equations, special relativity and quantum mechanics.  
 Theory Option: electricity and magnetism, special relativity, classical mechanics, quantum mechanics.
- 1991,1993 Graduate teaching in Astrophysics, University of Oxford. (Oxford, UK)  
 Graduate course in Solar System Dynamics.  
 Graduate course in Galactic and Solar System Dynamics.
- 1990–1993 Supervision of undergraduate research. University of Oxford. (Oxford, UK)
- 1986–1989 Postdoctoral research fellowship. Canadian Institute for Theoretical Astrophysics. (Toronto, Ont.)

Numerical work on dynamical problems in the Solar System with M. Duncan and S. Tremaine. Modeling VLA HI observations of interacting galaxies using N-body simulations with P. Kronberg.

1982–1986 Graduate research assistant. Princeton U. Dept. of Astro. Sci. (Princeton, N.J.)  
Studying the large scale structure of the Universe using numerical simulations with E. L. Turner. Reduction of VLA HI observations of a dwarf spiral with J. van Gorkom. Constructing models of winds from neutron stars with B. Paczyński.

1981–1982 Undergraduate research assistant. Lehigh U. Dept. of Physics. (Bethlehem, Pa.)  
Studying properties of strong shocks in curved shock tubes with Y. Kim.

1981–1982 Undergraduate teaching assistant. Lehigh U. Dept. of Physics. (Bethlehem, Pa.)  
Assisted with an introductory physics lab and an electronics lab.

#### Miscellaneous

Extensive experience in computer programming and administration.

### RESEARCH GRANTS:

NSF, 9/1/22–8/31/25, \$439,516, PI  
NSF, 9/1/20–8/31/23, \$451,334, PI  
NASA HST, 12/19–11/22, \$135,350, PI  
NSF OAC, 10/19–9/22, \$145,817, PI  
NASA XRP, 5/16/19–5/15/22, \$43,854, Co-PI  
NASA Astrobiology, 6/18–5/23, \$10.974M, Co-I  
NASA HST, 12/16/17–12/15/19, \$123,352, PI  
NSF, 9/1/16–8/31/17, \$139,977, Co-PI  
NSF, 9/1/16–6/16/17, \$74,974, PI  
NSF, 9/1/16–8/31/18, \$20,036, PI  
NSF, 9/1/15–8/31/18, \$399,669, PI  
NASA XRP, 1/26/15–1/25/18, \$376,552, PI  
NASA ATP, 10/1/14–9/30/17, \$248,648, Co-I  
NASA HST, 12/16/13–12/15/16, \$119,785, PI  
NSF, 9/01/13–8/31/15, \$169,980, PI  
NASA Astrobiology, 11/1/12–10/31/17, \$9.56M, Co-I  
NSF, 6/01/12–5/31/16, \$26,528, PI  
NSF, 9/15/10–8/31/13, \$51,747, PI  
NSF, 9/1/09–8/31/12, \$370,888, PI  
NASA AISR, 9/1/07–8/31/10, \$741,903, PI  
NSF, 9/1/07–8/31/10, \$297,577, PI  
NASA Beyond Einstein, 6/1/07–5/31/10, \$242,291 PI  
NASA TPF Foundation Science, 6/1/06–5/31/09, \$43,127 Co-PI  
NSF, 6/1/06–5/31/09, \$324,491, Co-I  
NASA ATP, 7/1/03–6/30/06, \$311,000 Co-PI  
NSF ITR, 9/1/02–8/31/07, \$1,000,000, PI  
NASA AISR, 6/1/02–5/30/05, \$458,000, PI  
NASA Astrobiology, 7/1/01–6/30/06, \$5,000,000, Co-I

NSF, 7/1/99–6/30/02, \$240,000, Co-I  
NSF KDI, 9/15/99–9/14/02, \$1,000,000, Co-I  
NASA, 2/1/99–1/31/02, \$471,000, Co-I  
NASA, 9/1/95–8/31/97, \$70,000, PI  
NASA, 9/1/96–8/31/98, \$140,000, PI  
NASA, 4/15/97–4/14/00, \$204,872, PI  
UW Royalty Research Fund, 2/1/95–1/31/96, \$35,000, PI  
NASA, 10/15/95–10/14/98, \$270,000, Co-I

**PROFESSIONAL SERVICE:**

Member, UW E-Science Steering committee.  
Panel Member, TeraGrid Allocation committee.  
Panel Member, DOE INCITE review committee.  
Chair, Solar System Working Group for the Sloan Digital Sky Survey.  
Panel member for Artic Supercomputer Technology panel.  
Panel member for NSF Career panel.  
Panel member for NSF Astronomy Major Research Instrumentation.  
Panel member for NSF Planetary Astronomy panel.  
Panel member for NSF Galactic structure panel.  
Panel member for NSF Terascale Visualization panel.  
Panel member for NASA Outer Planets Research.  
Panel member for NASA Applied Information Systems Research.  
Astronomy Graduate Program Advisor  
Panel member for UW Royalty Research Fund  
Chair, Astrobiology curriculum committee  
Chair, Astronomy curriculum sub-committee  
Astronomy Computing representative

**HONORS:**

Francis Upton Graduate Fellowship, 1982–1986  
Graduated with highest honors, Lehigh University, 1982  
Phi Beta Kappa, Lehigh University, 1982  
National Merit Scholarship, 1978–1982

## BIBLIOGRAPHY:

In the following graduate students working under my supervision are presented in **bold face**, while postdocs working under my supervision are *emphasized*.

- Applebaum, E. and 6 colleagues 2022. VizieR Online Data Catalog: Dwarfs galaxies in DC Justice League Simulations (Applebaum+, 2021). VizieR Online Data Catalog.
- Tamfal, T. and 7 colleagues 2022. The Dawn of Disk Formation in a Milky Way-sized Galaxy Halo: Thin Stellar Disks at  $z > 4$ . *The Astrophysical Journal* 928.
- Wissing, R., Shen, S., Wadsley, J., Quinn, T. 2022. Magnetorotational instability with smoothed particle hydrodynamics. *Astronomy and Astrophysics* 659.
- Van Nest, J. D. and 6 colleagues 2022. What's in a Name? Quantifying the Interplay between the Definition, Orientation, and Shape of Ultra-diffuse Galaxies Using the Romulus Simulations. *The Astrophysical Journal* 926.
- Johnson, J. W. and 8 colleagues 2021. Stellar migration and chemical enrichment in the milky way disc: a hybrid model. *Monthly Notices of the Royal Astronomical Society* 508, 44844511.
- Munshi, F., Brooks, A. M., Applebaum, E., Christensen, C. R., Quinn, T., Sligh, S. 2021. Quantifying Scatter in Galaxy Formation at the Lowest Masses. *The Astrophysical Journal* 923.
- Bellovary, J. M. and 11 colleagues 2021. The origins of off-centre massive black holes in dwarf galaxies. *Monthly Notices of the Royal Astronomical Society* 505, 51295141.
- Roca-Fàbrega, S. and 23 colleagues 2021. The AGORA High-resolution Galaxy Simulations Comparison Project. III. Cosmological Zoom-in Simulation of a Milky Way-mass Halo. *The Astrophysical Journal* 917.
- Ricarte, A., Tremmel, M., Natarajan, P., Quinn, T. 2021. Unveiling the Population of Wandering Black Holes via Electromagnetic Signatures. *The Astrophysical Journal* 916.
- Tamfal, T. and 6 colleagues 2021. Revisiting Dynamical Friction: The Role of Global Modes and Local Wakes. *The Astrophysical Journal* 916.
- Chadayammuri, U., Tremmel, M., Nagai, D., Babul, A., Quinn, T. 2021. Fountains and storms: the effects of AGN feedback and mergers on the evolution of the intracluster medium in the ROMULUSC simulation. *Monthly Notices of the Royal Astronomical Society* 504, 39223937.
- Ricarte, A., Tremmel, M., Natarajan, P., Zimmer, C., Quinn, T. 2021. Origins and demographics of wandering black holes. *Monthly Notices of the Royal Astronomical Society* 503, 60986111.
- Spencer Wallace**, Quinn, T. R., Boley, A. C. 2021. Collision rates of planetesimals near mean-motion resonances. *Monthly Notices of the Royal Astronomical Society* 503, 54095424.
- Bird, J. C., Loebman, S. R., Weinberg, D. H., Brooks, A. M., Quinn, T. R., Christensen, C. R. 2021. Inside out and upside-down: The roles of gas cooling and dynamical heating in shaping the stellar age-velocity relation. *Monthly Notices of the Royal Astronomical Society* 503, 18151827.

- Wright, A. C. and 6 colleagues 2021. The formation of isolated ultradiffuse galaxies in ROMULUS25. *Monthly Notices of the Royal Astronomical Society* 502, 53705389.
- Sanchez, N. N. and 7 colleagues 2021. One-Two Quench: A Double Minor Merger Scenario. *The Astrophysical Journal* 911.
- Cruz, A. and 8 colleagues 2021. Self-interacting dark matter and the delay of supermassive black hole growth. *Monthly Notices of the Royal Astronomical Society* 500, 21772187.
- Applebaum, E. and 6 colleagues 2021. Ultrafaint Dwarfs in a Milky Way Context: Introducing the Mint Condition DC Justice League Simulations. *The Astrophysical Journal* 906.
- Lentz, E. W., Lettermann, L., Quinn, T. R., Rosenberg, L. J. 2020. Mixed state dynamics with non-local interactions. *Nuclear Physics B* 961.
- Butsky, I. S., Fielding, D. B., Hayward, C. C., Hummels, C. B., Quinn, T. R., Werk, J. K. 2020. The Impact of Cosmic Rays on Thermal Instability in the Circumgalactic Medium. *The Astrophysical Journal* 903.
- Tremmel, M., Wright, A. C., Brooks, A. M., Munshi, F., Nagai, D., Quinn, T. R. 2020. The formation of ultradiffuse galaxies in the RomulusC galaxy cluster simulation. *Monthly Notices of the Royal Astronomical Society* 497, 27862810.
- Souza Lima, R., Mayer, L., Capelo, P. R., Bortolas, E., Quinn, T. R. 2020. The Erratic Path to Coalescence of LISA Massive Black Hole Binaries in Subparsec-resolution Simulations of Smooth Circumnuclear Gas Disks. *The Astrophysical Journal* 899.
- Sharma, R. S. and 6 colleagues 2020. Black Hole Growth and Feedback in Isolated ROMULUS25 Dwarf Galaxies. *The Astrophysical Journal* 897.
- Ricarte, A., Tremmel, M., Natarajan, P., Quinn, T. 2020. A Link between Ram Pressure Stripping and Active Galactic Nuclei. *The Astrophysical Journal* 895.
- Lentz, E. W., Quinn, T. R., Rosenberg, L. J. 2020. Condensate dynamics with non-local interactions. *Nuclear Physics B* 952, 114937.
- Lentz, E. W., Quinn, T. R., Rosenberg, L. J. 2020. Axion structure formation - II. The wrath of collapse. *Monthly Notices of the Royal Astronomical Society* 493, 5944.
- Barnes, R., and 16 colleagues 2020. VPLanet: The Virtual Planet Simulator. *Publications of the Astronomical Society of the Pacific* 132, 024502.
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- Iryna S. Butsky**, Burchett, J. N., Nagai, D., Tremmel, M., Thomas Quinn, Werk, J. K. 2019. Ultraviolet signatures of the multiphase intracluster and circumgalactic media in the ROMULUSC simulation. *Monthly Notices of the Royal Astronomical Society* 490, 4292.
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- Wallace, S. C. and Quinn, T. R., 2019, N-body simulations of terrestrial planet growth with resonant dynamical friction, *MNRAS*, 489, 2159.
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- Sanchez, N. N., Werk, J. K., Tremmel, M., Pontzen, A., Christensen, C., Quinn, T. and Cruz, A., 2019, Not So Heavy Metals: Black Hole Feedback Enriches the Circumgalactic Medium, *Ap. J.*, 881, 8.
- Liu, J., Robson, M., Quinn, T., & Kulkarni, M., 2019, Efficient GPU tree walks for effective distributed n-body simulations. In *Proceedings of the ACM International Conference on Supercomputing*, pp. 24-34.
- Lentz, E. W., Quinn, T. R., & Rosenberg, L. J. 2019, Axion structure formation - I: the co-motion picture, *MNRAS*, 485, 1809.
- Clarke, A. J., Debattista, V. P., Nidever, D. L., et al. 2019, The imprint of clump formation at high redshift - I. A disc  $\alpha$ -abundance dichotomy, *MNRAS*, 484, 3476.
- Du, M., Debattista, V. P., Ho, L. C., et al. 2019, The Formation of Compact Elliptical Galaxies in the Vicinity of a Massive Galaxy: The Role of Ram-pressure Confinement, *Ap. J.*, 875, 58.
- Tremmel, M., Quinn, T. R., Ricarte, A., et al. 2019, Introducing ROMULUSC: a cosmological simulation of a galaxy cluster with an unprecedented resolution, *MNRAS*, 483, 3336.
- Munshi, F., Brooks, A. M., Christensen, C., et al. 2019, Dancing in the Dark: Uncertainty in Ultrafaint Dwarf Galaxy Predictions from Cosmological Simulations, *Ap. J.*, 874, 40.
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- Bellovary, J. M., Cleary, C. E., Munshi, F., et al. 2019, Multimessenger signatures of massive black holes in dwarf galaxies, *MNRAS*, 482, 2913.
- Iryna S. Butsky**, & Quinn, T. R. 2018, The Role of Cosmic-ray Transport in Shaping the Simulated Circumgalactic Medium, *Ap. J.*, 868, 108.
- Christensen, C. R., Davé, R., Brooks, A., Quinn, T., & Shen, S. 2018, Tracing Outflowing Metals in Simulations of Dwarf and Spiral Galaxies, *Ap. J.*, 867, 142.
- Dunn, G., Bellovary, J., Holley-Bockelmann, K., Christensen, C., & Quinn, T. 2018, Sowing Black Hole Seeds: Direct Collapse Black Hole Formation with Realistic Lyman-Werner Radiation in Cosmological Simulations *Ap. J.*, 861, 39.
- Sanchez, N. N., Bellovary, J. M., Holley-Bockelmann, K., et al. 2018, Preferential Accretion in the Supermassive Black Holes of Milky Way-size Galaxies Due to Direct Feeding by Satellites, *Ap. J.*, 860, 20.
- Deitrick, R., Barnes, R., Bitz, C., et al. 2018, Exo-Milankovitch Cycles. II. Climates of G-dwarf Planets in Dynamically Hot Systems, *A. J.*, 155, 266
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- Tremmel, M., Governato, F., Volonteri, M., Pontzen, A., & Quinn, T. R. 2018, Wandering Supermassive Black Holes in Milky-Way-mass Halos, *Ap. J. Lett.*, 857, L22.
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- Loebman, S. R., Valluri, M., Hattori, K., et al. 2018, Beta Dips in the Gaia Era: Simulation Predictions of the Galactic Velocity Anisotropy Parameter ( $\beta$ ) for Stellar Halos, *Ap. J.*, 853, 196.
- Deitrick, R., Barnes, R., Quinn, T. R., et al. 2018, Exo-Milankovitch Cycles. I. Orbits and Rotation States, *A. J.*, 155, 60.
- Brooks, A. M., Papastergis, E., Christensen, C. R., et al. 2017, How to Reconcile the Observed Velocity Function of Galaxies with Theory, *Ap. J.*, 850, 97.
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- Wadsley, J. W., Keller, B. W., & Quinn, T. R. 2017, Gasoline2: a modern smoothed particle hydrodynamics code, *MNRAS*, 471, 2357.
- Tremmel, M., Karcher, M., Governato, F., et al. 2017, The Romulus cosmological simulations: a physical approach to the formation, dynamics and accretion models of SMBHs, *MNRAS*, 470, 1121.
- Erik W. Lentz**, Quinn, T. R., Rosenberg, L. J., & Tremmel, M. J. 2017, A New Signal Model for Axion Cavity Searches from N-body Simulations, *Ap. J.*, 845, 121.
- Lauren Anderson**, Governato, F., Karcher, M., Quinn, T., & Wadsley, J. 2017, The little Galaxies that could (reionize the universe): predicting faint end slopes & escape fractions at  $z > 4$ , *MNRAS*, 468, 4077.
- Harris, K. A., Debattista, V. P., Governato, F., et al. 2017, Quantifying the origin and distribution of intracluster Light in a Fornax-Like Cluster, *Monthly Notices of the Royal Astronomical Society*, Volume 467, p.4501.
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- Pontzen, A., Tremmel, M., Roth, N., et al. 2017, How to quench a galaxy, *Monthly Notices of the Royal Astronomical Society*, Volume 465, p.547.
- David Fleming**, & Quinn, T. R. 2017, Coevolution of binaries and circumbinary gaseous discs, *Monthly Notices of the Royal Astronomical Society*, Volume 464, p.3343.
- Szulágyi, J., Mayer, L., & Quinn, T. 2017, Circumplanetary discs around young giant planets: a comparison between core-accretion and disc instability, *Monthly Notices of the Royal Astronomical Society*, Volume 464, p.3158.



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- Kim, J.-h., Agertz, O., Teyssier, R., et al. 2016, The AGORA High-resolution Galaxy Simulations Comparison Project. II. Isolated Disk Test, *Astrophysical Journal*, Volume 833, 202.
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- Erik W. Lentz**, Quinn, T., Rosenberg, L. J. 2016. The Effects of Angular Momentum on Halo Profiles, *The Astrophysical Journal*, Volume 822, 89.
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- Fry, A. Bastidas, Governato, F., Pontzen, A., Quinn, T., Tremmel, M., **Lauren Anderson**, Menon, H., Brooks, A. M., Wadsley, J. 2015. All about baryons: revisiting SIDM predictions at small halo masses. *Monthly Notices of the Royal Astronomical Society*, Volume 452, p.1468-1479.
- Mayer, L., Fiacconi, D., Bonoli, S., Quinn, T., **Rok Roškar**, Shen, S., Wadsley, J. 2015. Direct Formation of Supermassive Black Holes in Metal-enriched Gas at the Heart of High-redshift Galaxy Mergers. *The Astrophysical Journal*, Volume 810, 51.
- Marasco, A., Debattista, V. P., Fraternali, F., van der Hulst, T., Wadsley, J., Quinn, T., Roškar, R. 2015. The effect of stellar feedback on a Milky Way-like galaxy and its gaseous halo. *Monthly Notices of the Royal Astronomical Society*, Volume 451, p.4223-4237.
- Tremmel, M., Governato, F., Volonteri, M., Quinn, T. R. 2015. Off the beaten path: a new approach to realistically model the orbital decay of supermassive black holes in galaxy formation simulations. *Monthly Notices of the Royal*

Astronomical Society, Volume 451, p.1868-1874.

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- Deitrick, R., Barnes, R., McArthur, B., Quinn, T. R., Luger, R., Antonsen, A., Benedict, G. F. 2015. The Three-dimensional Architecture of the *v* Andromedae Planetary System. *The Astrophysical Journal* 798, 46.
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