

Alexander Rawlings

Theoretical Extragalactic Astrophysics

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I am a doctoral candidate in theoretical extragalactic astrophysics at the University of Helsinki, Finland. I am modelling gas-free simulations of massive galaxy mergers to constrain the merger timescale of supermassive black hole binary systems. The simulations are conceptualised with observations in mind, providing physically-motivated models which bring us a step closer to understanding the distribution of supermassive black hole binary systems in the observed universe.

PROFESSIONAL EXPERIENCE

Present Sep 2021	Doctoral Candidate, University of Helsinki, Helsinki, Finland <ul style="list-style-type: none">> Design and analysis of gas-free merger simulations with realistic initial conditions> Orbit modelling> Reference: Prof. Peter JOHANSSON · peter.johansson@helsinki.fi <div>PythonC/C++</div>
Feb 2021 Sep 2020	Research Assistant, University of Helsinki, Helsinki, Finland <ul style="list-style-type: none">> Design and analysis of galaxy merger simulations to investigate the stalling of supermassive black hole binary systems at parsec scales> Reference: Prof. Peter JOHANSSON · peter.johansson@helsinki.fi <div>PythonC/C++</div>
Nov 2019 Jan 2019	Research Scholar, Sydney Institute for Astronomy, Sydney, Australia <ul style="list-style-type: none">> Determine the relationship between galaxy ellipticity and the spin parameter λ_R> Academic writing> Reference: Dr. Caroline FOSTER · caroline.foster@sydney.edu.au <div>Rbash</div>
Jun 2019 Dec 2018	Research Assistant, University of Southern Queensland, Toowoomba, Australia <i>with Observatoire de Paris</i> <ul style="list-style-type: none">> Creation of parameter lists for all stars within the BRITepol survey by script programming for literature searching> Reference: Assoc. Prof. Stephen MARSDEN · stephen.marsden@usq.edu.au <div>SQLR</div>
Dec 2018 Feb 2014	Research Assistant, University of Southern Queensland, Toowoomba, Australia <i>with James Cook University</i> <ul style="list-style-type: none">> Analysis and collection of UV data, including the calibration and use of UV and IR detectors to determine correlation between solar UV and solar IR exposure> Analysis of trends and modelling of results> Modelling of climate trends> Reference: Dr. Nathan DOWNS · nathan.downs@usq.edu.au <div>MATLAB</div>

PUBLICATIONS

- 2023 Reviving stochasticity: uncertainty in SMBH binary eccentricity is unavoidable — MNRAS vol. 526 pp. 2688-2695
- 2023 KETJU - resolving small-scale supermassive black hole dynamics in GADGET-4 — MNRAS vol. 524 pp. 4062-4082
- 2022 Modelling the accretion and feedback of supermassive black hole binaries in gas-rich galaxy mergers — MNRAS vol. 520 pp. 4463-4489
- 2022 Signatures of the Many Supermassive Black Hole Mergers in a Cosmologically Forming Massive Early-Type Galaxy — ApJ vol. 929 pp. 167-176
- 2020 The SAMI Galaxy Survey: Rules of Behaviour for Spin-Ellipticity Radial Tracks in Galaxies — MNRAS vol. 491 pp. 324-343
- 2019 Seasonal Minimum and Maximum Solar Ultraviolet Exposure Measurements of Classroom Teachers Residing in Tropical North Queensland, Australia — Photochem Photobiol vol. 95, pp. 1083-1093

EDUCATION

Present	Doctoral Researcher, School of Particle Physics and Universe Sciences, University of Helsinki, Helsinki, Finland
Sep 2021	<ul style="list-style-type: none">> Design and analysis of gas-free merger simulations with realistic initial conditions> Orbit modelling> Personal development courses
May 2021	Master's of Particle Physics and Astrophysical Sciences, University of Helsinki, Helsinki, Finland
Sep 2019	<ul style="list-style-type: none">> GPA: 4.85/5.00> Thesis: <i>The Final Parsec Problem in Massive Early-Type Galaxies</i>> Studies: Galactic dynamics and evolution, observational astronomy, general relativity, radiative transfer, and Monte Carlo methods.
Nov 2018	Bachelor of Science (Physical Sciences), University of Southern Queensland, Toowoomba, Australia
Feb 2016	<ul style="list-style-type: none">> GPA: 6.96/7.00> Thesis: <i>Insights into Stellar Dynamo Evolution: the Young Sun HD 106506</i>> Studies: Astronomical sciences, statistics, and programming.
Jan 2018	Exchange Studies, University of Zürich, Zürich, Switzerland
Aug 2017	<ul style="list-style-type: none">> Studies: Computational astrophysics (N-body simulations and smoothed particle hydrodynamics), mathematical methods for physics, and astrobiology

FUNDING AND AWARDS

- 2021 UH Research Foundation Doctoral Researcher — University of Helsinki
- 2019 Fully-Paid Tuition and Study Grant — University of Helsinki
- 2019 Denison Research Scholar — University of Sydney
- 2016 Chancellor's Scholarship — University of Southern Queensland

SKILLS

Communication

- > Confident and apt public speaker
- > Concise, professional academic writing
- > Effective group communicator

Languages

- > English (native)
- > German (basic)
- > Finnish (basic)

</> PROGRAMMING LANGUAGES

Python	●	●	●	●	○
C/C++	●	●	●	●	○
R	●	●	●	●	○
bash	●	●	●	○	○
Stan	●	●	●	○	○
L ^A T _E X	●	●	●	○	○
MATLAB	●	●	●	○	○
SQL	●	●	○	○	○
IRAF	●	●	○	○	○

+ SPECIFIC INTERESTS

- > Galactic dynamics
- > Galaxy formation & evolution
- > Supermassive black hole dynamics
- > Computational astrophysics
- > Bayesian Statistics
- > Hierarchical Modelling

TEACHING AND MENTORING

2021–Present	<i>University of Helsinki</i> : Graduate course assistant (astrophysics & statistics)
2019–2020	<i>University of Helsinki</i> : English language assistant
2017–2018	<i>University of Southern Queensland</i> : Undergraduate course assistant (physics)
2017–2019	Private Tutor

“ REFERENCES

Prof. Peter Johansson

Department of Physics

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Dr. Caroline Foster

Sydney Institute for Astronomy

UNIVERSITY OF SYDNEY

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