Elliot James Burke Marshall

elliot.marshall@monash.edu
+61 455 344 566

Education

PhD in Mathematics, February 2022 to Present
Monash University, Melbourne, Victoria, Australia
Thesis Topic: Stability of Relativistic Perfect Fluids in Expanding Spacetimes

Bachelor of Science (Honours), 2021
University of Otago, Dunedin, New Zealand
1st Class Honours in Mathematics
Thesis: Critical Phenomena: Numerical Observations in the Formation of Black Holes

Bachelor of Science, 2018 - 2020
University of Otago, Dunedin, New Zealand
Major: Mathematics
Minor: Music

Employment

Teaching Associate March 2023 to Present
School of Mathematics, Monash University, Melbourne, Victoria, Australia

- Ran weekly applied classes and marked assessments for the following courses
  - MTH2019 (Multivariate Mathematics for Data Science)
- Ran tutoring sessions at the Mathematics Learning Centre (MLC)

Department Tutor 2021
Department of Mathematics and Statistics, University of Otago, Dunedin, New Zealand

- Ran weekly tutorials and marked assignments for the following courses
  - COMO101 (Modelling and Computation)
  - MATH151 (General Mathematics)

Summer Research Intern November 2020 - February 2021
Department of Mathematics and Statistics, University of Otago, Dunedin, New Zealand

- Worked with Professor Jörg Frauendiener investigating the numerical methods used to examine critical phenomena in black hole formation.

Summer Research Intern November 2019 - February 2020
Department of Mathematics and Statistics, University of Otago, Dunedin, New Zealand

- Worked with Professor Jörg Frauendiener studying the acceleration independent Sagnac effect.

Publications and Preprints

- Beyer, F., **Marshall, E.**, Oliynyk, T.A., *Past instability of FLRW solutions of the Einstein-Euler-scalar field equations for linear equations of state $p = K\rho$ with $0 \leq K < 1/3$*, arXiv:2405.09095.
- Fournodavlos, G., **Marshall, E.**, Oliynyk, T.A., *Future stability of perfect fluids with extreme tilt and linear equation of state $p = c_s^2\rho$ for the Einstein-Euler system with positive cosmological constant: The range $1/3 < c_s^2 < 3/7$*, arXiv:2404.06789

- Beyer, F., **Marshall, E.**, Oliynyk, T.A., *Future instability of FLRW fluid solutions for linear equations of state $p = K\rho$ with $1/3 < K < 1$*, 2023, Phys. Rev. D, 107, 104030.
- **Marshall, E.**, Oliynyk, T.A., *On the stability of relativistic perfect fluids with linear equations of state $p = K\rho$ where $1/3 < K < 1$*, 2023, Lett. Math. Phys, 113, 102.

Awards and Scholarships

- University of Otago Young Alumni Award (2023)
- Monash Graduate Excellence Scholarship (2022-2025)
- RTP PhD Stipend (2022-2025)
- Staff Prize in Mathematics for excellence in honours year final exams (2021)
- Beverly Bursary in Mathematics (2021)
- University of Otago Scholarship in Science (2020)
- University of Otago Science Horizons Scholarship (2018-2020)

Conference Presentations

- *"Future Instability of Relativistic Perfect Fluids"* at the 12th Australasian Conference on General Relativity and Gravitation (ACGRG), Hobart, Tasmania, November 27 - December 1, 2023.
- *"Future Instability of Relativistic Perfect Fluids"* at the MATRIX conference on Hyperbolic PDEs and Non-Linear Evolution Problems, Creswick, Australia, September 18-29, 2023 *(Invited)*.
- *"Future Instability of Relativistic Perfect Fluids"* at the Australia-New Zealand Student Conference on Relativity, Cosmology, and Astrophysics (Online), May 8-10, 2023.
- *"The Future Stability of Relativistic Perfect Fluids"* at the Interdisciplinary junior scientist workshop: Mathematical General Relativity, Wildberg, Germany, February 26 - March 10, 2023.

Professional Activities

- Lead organiser of the first Australia-New Zealand Student Conference on Relativity, Cosmology, and Astrophysics, May 8-10, 2023.
- Student representative on external engagement committee, Department of Mathematics and Statistics, University of Otago.

Skills

- Extensive use of Python and Matlab programming to run numerical relativity simulations
- Proficient in Mathematica programming, including xTensor and xCoba packages
- Experience in data modelling and analysis

Outreach

- School of Mathematics Runner-up Three Minute Thesis Competition (2023)
- Organiser/Volunteer for Mathematics section of University of Otago Science Expo (2021)
- Volunteer at the Mathematics booth for the University of Otago open day (2021)

Referees

- Professor Todd Oliynyk
  School of Mathematics Monash University
  todd.oliynyk@monash.edu
- Dr Florian Beyer
  Department of Mathematics and Statistics, University of Otago
  florian.beyer@otago.ac.nz
- Professor Jörg Frauendiener, Chair of Applied Mathematics
  Department of Mathematics and Statistics, University of Otago
  joerg.frauendiener@otago.ac.nz