Curriculum Vitae

1. Personal Information

Name: Florian Beyer

2. Qualifications

(a)	Qualification name:	Institution:	Date of Graduation:
	PhD	University of Potsdam	September 2007.
	Diploma	University of Münster	February 2004.

(b) Are you **currently enrolled** in a higher degree qualification: No.

3. Professional Affiliations/Memberships (List)

Deutsche Physikalische Gesellschaft (German Physics Society).

New Zealand Mathematical Society (NZMS).

Australian and New Zealand Association of Mathematical Physics (ANZAMP).

Australia and New Zealand Industrial and Applied Mathematics (ANZIAM).

4. Employment History

(a) Present Position: Senior Lecturer (beyond the bar)..

(b) Employment History

Senior Lecturer, Department of Mathematics & Statistics, University of Otago, February 2015 – present.

Lecturer, Department of Mathematics & Statistics, University of Otago, November 2009 – 2015.

Postdoc, Department of Mathematics, Université Pierre et Marie Curie, Paris, January 2009 - October 2009.

Postdoc, Department of Mathematics, Kungliga Tekniska Högskolan, Stockholm, 2008.

5. Other Relevant Experience

(b) National/International Collaboration

Dr. Ellery Ames, Humboldt State University, USA.
Dr. Leon Escobar, Universidad del Valle, Colombia.
Prof. Jörg Frauendiener, University of Otago, NZ.
Prof. Helmut Friedrich, Albert-Einstein-Institute, Germany.
Dr. Jörg Hennig, University of Otago, NZ.
Prof. James Isenberg, University of Oregon, USA.
Prof. Philippe LeFloch, Université Pierre et Marie Curie, France.
Prof. Todd Oliynyk, Monash University, Melbourne, Australia.
Dr. Tim-Torben Paetz, University of Vienna, Austria.
Prof. Oscar Reula, Universidad Nacional de Córdoba, Argentina.
Dr. Chris Stevens, University of Otago, NZ.
Dr Ben Whale, University of Wollongong, Australia (previously).

6. Research Activities

(a) Research Expertise

Applied mathematics and mathematical physics. Mathematical and numerical general relativity and cosmology. Analytical and numerical aspects of partial differential equations.

(c) Research Grants (significant grants only)

(1) Please list below any research grants you have received where you are the first named principal or joint principal investigator.

Invited for full Marsden proposal (PI **Florian Beyer**), 2022. Not funded.

University of Otago CALT Grant "Solving the problem: Anchored instruction of mathematics using authentic problems" (PI **Florian Beyer**, AIs Boris Baeumer, Fabien Montiel, Sarah Wakes, $8,884*),* 2021, Funded.

University of Otago Research Grant "Taming the beast of the cosmological big bang singularity: Dynamics and degrees of freedom" (PI **Florian Beyer)**, 2020. Funded.

European Commission Grant 778010, "IPaDEGAN - Integrable Partial Differential Equations: Geometry, Asymptotics, and Numerics" (AI, EUR 540,000), 2017. Funded.

University of Otago Research Grant "Dynamical dark energy in the young universe and its consequences for the present and future history" (PI Prof Frauendiener, AI **Florian Beyer)**, 2016. Funded.

Fast-start Marsden grant "Causality and Cosmological Models in General Relativity" (PI Dr. Hennig, AI **Florian Beyer**, Prof. Frauendiener), 2012. Funded.

University of Otago Research Grant "Investigations of the dynamics of primordial black holes in expanding cosmological models" (PI **Florian Beyer)**, 2012. Funded.

Invited for full Marsden proposal (PI **Florian Beyer**, PI Prof. Frauendiener), 2012. Not funded.

Invited for full fast-start Marsden proposal (PI **Florian Beyer**, AI Prof. Frauendiener), 2011. Not funded.

University of Otago "Divisional assistance for non-funded Marsden" ($17,000), 2011. Funded.

Invited for full fast-start Marsden proposal (PI **Florian Beyer**, AI Prof. Frauendiener), 2010. Not funded.

(d) Supervision of Postgraduate Students

Currently:

Elliot Marshall, PhD students, Monash University (external co-supervisor).

Previously:

Joshua Ritchie, PhD student, University of Otago (Supervisors: **Florian Beyer,** Jörg Frauendiener). Start: August 2018. Completed: November 2021.

Oliver Schön, Masters student, University of Tübingen (Co/supervision with Prof Carla Cederbaum, Tübingen). I hosted Oliver's visit at Otago from October 2018 to March 2019.

Boris Daszuta, PhD student, University of Otago (Supervisors: Jörg Frauendiener, Jörg Hennig, **Florian Beyer).** Completed 2018. Boris' thesis was chosen as a Division of Sciences Exceptional Doctoral Thesis.

Joshua Ritchie, Masters student, University of Otago (Supervisors: **Florian Beyer,** Jörg Frauendiener). Completed: February 2018.

Leon Escobar, PhD student, University of Otago (Supervisors: **Florian Beyer**, Jörg Frauendiener). Start: November 2012. Completed: December 2015. Completed: May 2016.

Ellery Ames, PhD student, University of Oregon (Supervisors: James Isenberg; external co-supervisor **Florian Beyer)**. Ellery was awarded the "2014 PhD Thesis award" (US$200) of the University of Oregon.

External co-supervision of MSc thesis of Leon Escobar, Universidad del Valle, Cali, Colombia, Completed: May, 2011.

(e) Supervision of Undergraduate Students

Matt Slattery-Holmes, Summer student, University of Otago (Supervisors: **Florian Beyer**). Completed: February 2022.

Henry Mullen, Honours student, University of Otago (Supervisors: **Florian Beyer**). Completed: November 2020.

Dmitrij Coombs, PGDipSci student, University of Otago (Supervisors: **Florian Beyer** and Michael Jack, Physics). Completed: November 2019.

Daniel Jeong, Summer student, University of Otago (Supervisors: **Florian Beyer**). Completed: February 2019.

Joshua Mills, Honours student, University of Otago (Supervisors: **Florian Beyer**). Completed: November 2017.

Jay Bhana, Summer student, University of Otago (Supervisors: **Florian Beyer**, Jörg Frauendiener). Completed: February 2017.

Fergus O'Leary, Summer student, University of Otago (Supervisors: **Florian Beyer**), Completed: February 2016.

Sam Paulin, Honours student, University of Otago (Supervisors: **Florian Beyer**). Completed: November 2012. First class honours.

Sam Paulin, Summer student, University of Otago (Supervisors: **Florian Beyer**), Completed: March 2012.

Boris Daszuta, Honours student, University of Otago (Supervisors: **Florian Beyer**, Jörg Frauendiener), Completed: November 2011.

7. Distinctions

Awards:

2020 Division of Science Award "Outstanding Research Group".

2013 Early Career Award of the New Zealand Mathematical Society. This award was instituted in 2006 to reward early career New Zealand mathematicians and is awarded annually.
Citation: „For his contributions to the understanding of the global structure of cosmological solutions of Einstein's equations using numerical and analytical

methods, and, in particular, for the proof of the well-posedness of the singular initial-value-problem for Fuchsian PDEs."

Invitations as speaker:

Invited speaker at the programme "Hyperbolic Differential Equations in Geometry and Physics" at the Matrix Research Institute (Australia), April 2022. *https://www.matrix-inst.org.au/events/hyperbolic-differential-equations-in-geometry-and-physics/*

Invited speaker at the workshop "Mathematical Perspectives of Gravitation beyond the Vacuum Regime" at the Erwin Schrödinger International Institute for Mathematics and Physics, Vienna, Austria, February 2022. *https://www.esi.ac.at/events/e428/*

Invited speaker at the NZMS Seminar Series (Regular online seminars organised by the New Zealand Mathematics Society), February 2022.

Invited plenary talk at the conference "Grav19", Cordoba, Argentina, April 2019 (~80 participants). Title "*Big bang dynamics and velocity term dominance". http:// grg.famaf.unc.edu.ar/grav19/*

Invited plenary speaker at ANZAMP 2019 at Merimbula (Australia) in February 2019 (Yearly conference of the Australian and New Zealand Association of Mathematical Physics).

Invited speaker at the "Inaugural Sweden-New Zealand Joint Workshop on General Relativity" at KTH in Stockholm on April 26 2018.

Invited plenary talk at the conference "Grav17", Cordoba, Argentina, April 2017 (~80 participants). Title "*Self-gravitating Gowdy-symmetric fluids near the big bang singularity". http://www.famaf.unc.edu.ar/~ortiz/grav17/*

Invited keynote speaker at NZMASP16 (New Zealand Maths and Stats Postgraduate Conference 2016). Title "General Relativity – The beautiful beast". http://www.maths.otago.ac.nz/conferences/nzmasp16/

Invited speaker at the Workshop "Mathematical Aspects of General Relativity" (ID 1529) at the Mathematisches Forschungsinstitut Oberwolfach (Germany) in July 2015. https://www.mfo.de/occasion/1529/www_view.

Invited colloquium speaker at Institute of Theoretical Sciences (ITS), University of Oregon, June 2014 (a *colloquium* speaker receives significantly more funding from ITS than a *seminar* speaker).

Invited speaker at the workshop "Mathematical General Relativity", Paris, Feb 2014 (~10 participants). Title "Graceful exit from inflation for minimally coupled Bianchi A scalar field models*"*.

Invited speaker at the workshop “Mathematical General Relativity”, Paris, February 2013 (~10 participants). Title “*Asymptotics and conformal structures of solutions of Einstein’s field equations*”.

Invited plenary talk at the conference “6th Australasian Conference on General Relativity and Gravitation”, Queenstown, February 2012 (~50 participants). Title “*Guided tour through AVTD regions of the BKL world”.*

Invited plenary talk at the conference “Grav11”, Cordoba, Argentina, April 2011 (~50 participants). Title “*A singular initial value problem and applications in general relativity”.*

Invited speaker at the workshop “Mathematical General Relativity”, Paris, July 2010 (~10 participants). Title “*Theory of Fuchsian equations and applications to general relativity”.*

Invited speaker at the workshop “Mathematical General Relativity”, Paris, January 2010 (~10 participants). Title “*Second-order hyperbolic Fuchsian systems: Applications to Einstein vacuum spacetimes”.*

Invited participant at the conference “Space, Time and Beyond”, Potsdam, Germany, October 2009.

Other distinctions:

Invited participant at the programme “Hyperbolic Differential Equations in Geometry and Physics” at the Matrix Research Institute (Australia), April 2022. *https://www.matrix-inst.org.au/events/hyperbolic-differential-equations-in-geometry-and-physics/*

Invited to the program “Mathematical Perspectives of Gravitation beyond the Vacuum Regime" at the Erwin Schrödinger International Institute for Mathematics and Physics, Vienna, Austria, January to March, 2022.

Invitation to the special session "Geometric Analysis and PDE" at the 63rd Annual Meeting of the Australian Mathematical Society in 2019 at Monash University.

Invitations as a Courtesy Research Associate of the Department of Mathematics of the University of Oregon and as a visitor to the Technical University of Stockholm as part of my Sabbatical in Semester 1 2018.

Invitations to workshops “Mathematical Aspects of General Relativity” at the “Mathematisches Forschungsinstitut Oberwolfach” (participation by invitation only), Germany, July/August 2012, July 2015, August 2018 and August 2021.

Invited to the program “Mathematical General Relativity" at the Institute Henri Poincaré in Paris, September - December 2015.

Invited as a Visiting Scientific Researcher at the Fields Institute (Toronto, Canada) to participate in the program "Focus Program on 100 Years of General Relativity", June 2015.

Research Member at the MSRI (Mathematical Sciences Research Institute, Berkeley, USA) during the Fall 2013 semester (Program "Mathematical General Relativity").

8. Teaching Activities

(a) Range and level of teaching (Last three years only)

MATH160/101 Algebra stream of "Mathematics 1" for 1st year students.

Typically: 200 students.

S1 2017 (Lecturer for the full semester).

MATH151 "General mathematics" for 1st year students with a weaker background in mathematics.

SS 2017 (Summer school course coordinator).

SS 2018 (Summer school course coordinator).

SS 2019 (Summer school course coordinator).

S1 2019 (Lecturer and course coordinator; 142 students).

SS 2020 (Summer school coordinator).

S1 2020 (Lecturer of half of the paper and course coordinator; 107 students).

S1 2021 (Lecturer and course coordinator; 150 students).

MATH120 Mathematics for Science

Typically: 80 students.

S1 2022: This is a new paper. I taught and developed 40% of the paper.

MATH304 "Partial differential equations" for 3rd year maths and physics students.

Typically: 20-30 students.

S2 2017 (convened and lectured the full semester).

S2 2018 (convened and lectured the full semester).

S2 2019 (convened and lectured the full semester).

S2 2020 (convened and lectured the full semester).

S2 2021 (convened and lectured the full semester).

S2 2022 (convened and lectured the full semester).

MATH374 "Mathematical Physics" for 3rd year maths and physics students. Splits into three parts.

Typically: 20 students.

S2 2017 (lectured part 3 of 3).

S2 2018 (lectured part 3 of 3).

S2 2019 (convened and lectured part 3 of 3).

S2 2020 (convened and lectured part 3 of 3).

S2 2021 (convened and lectured part 3 of 3).

S2 2022 (convened and lectured part 3 of 3).

MATH4DG "Differential geometry" for 4th year maths and physics students.

Typically: 8 students.

S1 2017 (convened and lectured the full module).

S2 2018 (convened and lectured the full module).

S2 2019 (convened and lectured the full module).

S2 2020 (convened and lectured the full module).

S2 2021 (convened and lectured the full module).

S1 2022 (convened and lectured the full module).

MATH4MF "Mathematical Finance" for 4th students.

Typically: 4 students.

S2 2022: This is a new module. Co-developed and taught in equal parts together with Dr Tim Candy.

10. Publications

(c) Refereed Journal Articles (in date order preferably with the most recent publication first)

Florian Beyer, and Todd A. Oliynyk. "Relativistic perfect fluids near Kasner singularities". 2022 (48pp). Accepted in *Communications in Analysis and Geometry*.

Florian Beyer, Josh Ritchie. "Asymptotically hyperboloidal initial data sets from a parabolic–hyperbolic formulation of the Einstein vacuum constraints". Classical and Quantum Gravity. 21;39(14):145012 (2022). DOI: 10.1088/1361-6382/ac79f1

Ellery Ames, Florian Beyer, James Isenberg, and Todd A. Oliynyk, "Stability of Asymptotic Behavior Within Polarised T^2-Symmetric Vacuum Solutions with Cosmological Constant". Invited article in *Philosophical Transactions of the Royal Society A, 380(2222):20210173* (2022), (25pp). DOI: 10.1098/rsta.2021.0173

Ellery Ames, Florian Beyer, James Isenberg, and Todd A. Oliynyk, "Stability of AVTD Behavior within the Polarized T2-symmetric vacuum spacetimes", *Annales Henri Poincaré* 23(7):2299–343 (2022). DOI: 10.1007/s00023-021-01142-0 (45pp).

Florian Beyer, and Philippe G. LeFloch. "A numerical algorithm for Fuchsian equations and fluid flows on cosmological spacetimes", *Journal of Computational Physics* (2021). DOI:10.1016/j.jcp.2021.110145.

Florian Beyer, Todd A. Oliynyk, and J. Arturo Olvera-Santamaría, "The Fuchsian approach to global existence for hyperbolic equations", *Communications in Partial Differential Equations* (2020). DOI:10.1080/03605302.2020.1857402.

Florian Beyer, Jörg Frauendiener, and Jörg Hennig, "Explorations of the infinite regions of spacetime", *International Journal of Modern Physics D*., 29(10):2030007 (2020). Invited refereed review article. DOI: 10.1142/S0218271820300074.

Florian Beyer, Jörg Frauendiener, and Joshua Ritchie, "Asymptotically flat vacuum initial data sets from a modified parabolic-hyperbolic formulation of the Einstein vacuum constraint equations," *Physical Review D*, 101 (2020), 084013 (17pp). DOI: 10.1103/PhysRevD.101.084013.

Ellery Ames, Florian Beyer, and James Isenberg, "Contracting asymptotics of the linearized lapse-scalar field sub-system of the Einstein-scalar field equations," *Journal of Mathematical Physics*, 60(10) (2019), 102504 (37pp). DOI: 10.1063/1.5115104.

Florian Beyer, Leon Escobar, Jörg Frauendiener, and Joshua Ritchie, "Numerical construction of initial data sets of binary black hole type using a parabolic-hyperbolic formulation of the vacuum constraint equations," *Classical and Quantum Gravity*, 36(17) (2019), 175005 (31pp). DOI: 10.1088/1361-6382/ab3482.

Florian Beyer and Tim-Torben Paetz, *Analysis of a Bianchi-like equation satisfied by the Mars-Simon tensor*. Journal of Mathematical Physics, *59*(2) (2018), 022501 (38pp). DOI: 10.1063/1.4996700.

Ellery Ames, Florian Beyer, James Isenberg, Philippe G LeFloch, *A class of solutions to the Einstein equations with AVTD behavior in generalized wave gauges*. Journal of Geometry and Physics, 121 (2017) 42–71 (30pp). DOI: 10.1016/j.geomphys.2017.06.005.

Florian Beyer, Leon Escobar, Jörg Frauendiener, *Asymptotics of solutions of a hyperbolic formulation of the constraint equations*. Classical and Quantum Gravity, 34 (2017), 205014, (26pp). DOI: 10.1088/1361-6382/aa8be6.

Florian Beyer, Jörg Frauendiener, Chris Stevens, Ben Whale, *Numerical initial boundary value problem for the generalized conformal field equations*, *Physical Review D*, 96 (2017), 316 (24pp). DOI: 10.1103/PhysRevD.96.084020.

Florian Beyer, Philippe G LeFloch, *Dynamics of self–gravitating fluids in Gowdy-symmetric spacetimes near cosmological singularities*. Communications in Partial Differential Equations, 42 (2017), 1199-1248 (51pp). DOI: 10.1080/03605302.2017.1345938.

Florian Beyer, Leon Escobar, Jörg Frauendiener, *Criticality of inhomogeneous Nariai-like cosmological models*. Physical Review D, 95 (2017), 084030 (19pp). DOI: 10.1103/PhysRevD.95.084030.

Florian Beyer, Leon Escobar, Jörg Frauendiener, *Numerical solutions of Einstein's equations for cosmological spacetimes with spatial topology S3 and symmetry group U(1)*. Physical Review D, 93 (2016), 043009 (19pp). DOI: 10.1103/PhysRevD.93.043009.

Florian Beyer, Boris Daszuta, Jörg Frauendiener, *A spectral method for half-integer spin fields based on spin-weighted spherical harmonics*. Classical and Quantum Gravity *32* (2015), 175013 (27pp). DOI: 10.1088/0264-9381/32/17/175013.

Florian Beyer, Jörg Hennig, *An exact smooth Gowdy-symmetric generalized Taub-NUT solution.* Classical and Quantum Gravity 31 (2014), 095010 (33pp). DOI:10.1088/0264-9381/31/9/095010.

Florian Beyer, Boris Daszuta, Jörg Frauendiener, Ben Whale, *Numerical evolutions of fields on the 2-sphere using a spectral method based on spin-weighted spherical harmonics.* Classical and Quantum Gravity 31 (2014), 075019 (32pp). DOI: 10.1088/0264-9381/31/7/075019.

Florian Beyer, Leon Escobar, *Graceful exit from inflation for minimally coupled Bianchi A scalar field models*. Classical and Quantum Gravity 30 (2013), 195020 (34pp). DOI: 10.1088/0264-9381/30/19/195020.

Ellery Ames, Florian Beyer, James Isenberg, Philippe G. LeFloch, *Quasilinear hyperbolic Fuchsian systems and AVTD behavior in T2-symmetric vacuum*

spacetimes. Annales Henri Poincaré 14(6) (2013) 1445 (79pp), DOI: 10.1007/s00023-012-0228-2.

Florian Beyer, Georgios Doulis, Jörg Frauendiener, and Ben Whale, *Numerical space-times near space-like and null infinity. The spin-2 system on Minkowski space.* Classical and Quantum Gravity 29 (2012) 245013 (26pp). DOI:10.1088/0264-9381/29/24/245013.

Florian Beyer, Jörg Hennig, *Smooth Gowdy symmetric generalized Taub-NUT.* Classical and Quantum Gravity 29 (2012) 245017 (47pp). DOI:10.1088/0264-9381/29/24/245017.

Florian Beyer, Philippe LeFloch, *Second-order hyperbolic Fuchsian systems: Asymptotic behavior of geodesics in Gowdy spacetimes*, Physics Review D (2011) 084036 (18pp). DOI: 10.1103/PhysRevD.84.084036.

Florian Beyer, Philippe LeFloch, *Second-order hyperbolic Fuchsian systems and applications*, Classical and Quantum Gravity 27 (2010) 245012 (33pp). DOI: 10.1088/0264-9381/27/24/245012.

Florian Beyer, *Non-genericity of the Nariai solutions: II. Investigations within the Gowdy class*, Classical and Quantum Gravity 26 (2009) 235016 (22pp). DOI: 10.1088/0264-9381/26/23/235016.

Florian Beyer, *Non-genericity of the Nariai solutions: I. Asymptotics and spatially homogeneous perturbations*, Classical and Quantum Gravity 26 (2009) 235015 (16pp). DOI: 10.1088/0264-9381/26/23/235015.

Florian Beyer, *A spectral solver for evolution problems with spatial S3-topology*, Journal of Computational Physics 228 (2009) 6496 (18pp). DOI: 10.1016/j.jcp.2009.05.037.

Florian Beyer, *Investigations of solutions of Einstein's field equations close to lambda-Taub-NUT*, Classical and Quantum Gravity 25 (2008) 235005 (25pp). DOI: 10.1088/0264-9381/25/23/235005.

Erik Schnetter, Badri Krishnan, Florian Beyer, *Introduction to dynamical horizons in numerical relativity*, Physics Review D 74 (2006) 024028 (20pp). DOI: 10.1103/PhysRevD.74.024028.

Nigel T. Bishop, Florian Beyer, Michael Koppitz, *Black hole initial data from a non-conformal decomposition*, Physics Review D 69 (2004) 064010 (5pp). DOI: 10.1103/PhysRevD.69.064010.

(d) Non-refereed Journal Articles and Reports not included elsewhere

“Of speeding bullets and Einstein” in the “Ask A Scientist”-column of the ODT on April 24, 2020.

"Back to the beginning of time". Featured article about some of my work in "Catalyst" (Weekly Research page of all Fairfax Newspapers in NZ, for example, in The Press) on March 20, 2017.

Florian Beyer, Jörg Hennig. (2016). *Universal insights*. He Kitenga (University of Otago research highlights 2016).

Florian Beyer, *General relativity and PDEs*. Invited article in the Newsletter of the New Zealand Mathematical Society (2014), 122:7-8.

Blair Blakie, Florian Beyer, *Table-top cosmology with Bose-Einstein condensates.* Expert opinion in Annalen der Physik 525 (2013), pp.A163–A164 (2pp). DOI: 10.1002/andp.201300741.

Preprints (currently under review):

Beyer, F. & Oliynyk, T. A. Localized big bang stability for the Einstein-scalar field equations. *arXiv:2112.07730 [gr-qc]* (2021).

(g) Refereed Conference Proceedings (include pagination for all articles)

All of these are MyResearch Publication category E1**.**

Florian Beyer, *"Matter does not matter" for self-gravitating perfect fluids?* In M. Dafermos, J. Isenberg, and H. Ringström, Eds., "Mathematical Aspects of General Relativity," *Oberwolfach Reports* 12(3), 2015. DOI: 10.4171/OWR/2015/33.

Florian Beyer, George Doulis, Jörg Frauendiener, and Ben Whale, *The Spin-2 Equation on Minkowski Background*. Progress in Mathematical Relativity, Gravitation and Cosmology. Springer Proceedings in Mathematics & Statistics 60 (2014), 465 (4pp). DOI: 10.1007/978-3-642-40157-2_71.

Florian Beyer, George Doulis, Jörg Frauendiener, and Ben Whale, *Linearized gravitational waves near space-like and null infinity*. Progress in Mathematical Relativity, Gravitation and Cosmology. Springer Proceedings in Mathematics & Statistics 60 (2014), 3 (15pp). DOI: 10.1007/978-3-642-40157-2_1.

Ellery Ames, Florian Beyer, James Isenberg, and Philippe LeFloch, *Quasilinear symmetric hyperbolic Fuchsian systems in several space dimensions.* Contemporary Mathematics 591 (2013), 25 (19 pp). DOI: 10.1007/s00023-012-0228-2.

Florian Beyer*, The cosmic no-hair conjecture: A study of the Nariai solutions.* Proceedings of the Twelfth Marcel Grossman Meeting: On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics and Relativistic Field Theories, (pp. 759-761). Singapore: World Scientific. 2012 (3 pp).

(h) Other Significant Conference Involvement (*including conference abstracts)*

Nonlinear stability of fields near the big bang. Regular talk at the conference ASGRG2021 (Australasian Society for General Relativity and Gravitation). February 2022.

Self-gravitating Gowdy-symmetric fluids near the big bang singularity, talk during program "Mathematical General Relativity" at the Institute Henri Poincaré in Paris, December 2015.

AVTD solutions of Einstein's field equations, Conference "8th Australia New Zealand Mathematics Convention", Melbourne, 2014 (conference talk).

Graceful exit from inflation for minimally coupled Bianchi A scalar field models, talk during program "Mathematical General Relativity", Mathematical Sciences Research Institute, Berkeley, 2013.

AVTD solutions of Einstein's field equations, Conference "Central European Relativity Seminar 3", Potsdam, Germany, 2013 (conference talk).

AVTD solutions of Einstein's field equations, Conference "NZMS Colloquium 2012" (New Zealand Mathematical Society), Palmerston North, NZ, 2012 (conference talk).

Theory of second-order hyperbolic Fuchsian equations and applications to general relativity, Conference "GR19", Mexico City, 2010 (conference talk).

The cosmic no-hair conjecture: A study of the Nariai solutions, Conference "Marcel Grossmann Meeting", Paris, France, 2009 (conference talk with conference proceedings s.o.).

Investigations of instabilities of the Nariai solution, Mittag-Leffler Institute, Stockholm, Sweden, 2008, (talk during the program "Geometry, Analysis, and General Relativity").

Investigations of solutions of Einstein's field equations close to lambda-Taub-NUT, Conference "AMSI Workshop on GR", Melbourne, Australia, 2008 (conference talk).

Numerical investigations of cosmological solutions of Einstein's field equations, Conference "Grav07", La Falda, Argentina, 2007 (conference talk).

A new code for simulating future asymptotically de-Sitter spacetimes with spherical topology, Conference "Grav06", Cordoba, Argentina, 2006 (conference talk).

Conformal infinity and global properties of cosmological models with positive cosmological constant, Conference "Advanced Summer School on Modern Mathematical Physics", Dubna, Russia (conference talk).

Kerr-Schild Initial Data, Conference "Second Apples-with-Apples workshop", Universidad Nacional Autónoma de México, Mexico City, Mexico (conference talk).

(j) Computer Software

Developed several computer codes for my research:

- Code to solve the Einstein vacuum constraints for black hole initial data based on the "Cactus toolkit".
- Code to solve the Einstein evolution equations for various spatial topologies
- Code to solve the singular initial value problem for general Fuchsian systems.

11. University Service (not listed elsewhere) (Please include dates)

(a) Significant positions held within Department/School/Division

2022 Associate Dean International (Science Division)

2021 Chair of a cross departmental committee to investigate the possibility of a degree "Quantitative Finance" as part of the BAppSc shared by the Departments of Mathematics & Statistics and Accountancy & Finance.

2021 TEU observer on the promotion committee of the health science division.

2021 - Member of the departmental Equity Committee

2020 - 2022 Departmental Pacific Liaison

2017 Host of the William Evans Fellow Prof Philippe LeFloch (Université Pierre et Marie Curie, France), September 2017.

2017 and 2018 Mathematical and Information Sciences (MIS) UORG Panelist.

2017 - 2022 Director of study (400-level maths/honours).

2016 Director of study (100-level maths). Jointly with Dr Joerg Hennig.

2015 Physical Sciences UORG Panelist.

2015 Mathematics representative on the selection committee for a quantitative genetics post doc position in the department.

2014 - 2016 Member of the 100-level Mathematics Teaching committee of the Department of Mathematics and Statistics. Convenor of this committee since February 2015 (taken over from Dr Lisa Clark).

2014 Member of the working party of the Department of Mathematics and Statistics which considered possible contributions to the teaching in a future school of engineering at the University of Otago.

2013 TEU observer on the promotion committee of the commerce division.

2013 Member of the working party of the Department of Mathematics and Statistics which looked into merging the papers MATH262 and MATH361 with COMO papers.

2013 - 2020 Chair of the "Computing Committee" of the Mathematics & Statistics Department.

2012 Member of the working party of the Department of Mathematics and Statistics which reviewed the curriculum of 1st year mathematics papers.

2012 - 2016 Member of the "Social Committee" of the Department of Mathematics and Statistics.

2011 Member of the "Working party on Honours".

2011 Contribution to the organization of the conference "6th Australasian Conference on General Relativity and Gravitation" (Queenstown, February 2012).

2010 Member of the Committee to organize the conference "NZMS Mathematics Colloquium" (Dunedin, December 2010). NZMS = New Zealand Mathematics Society.

2010 – 2013 Organizer of the weekly seminar of the Department of Mathematics.

2010 – 2013 Member of the "Computing Committee" of the Mathematics & Statistics Department.

2009 – 2010 Member of the Hiring Committee for a postdoctoral fellow in applied mathematics.

2009 – 2010 Member of the Hiring Committee for a lecturer position in applied mathematics.

(b) Significant positions held at a University level

2022 - Elected member of the Senate of the University of Otago.

12. Professional Activities (Please include dates)

(b) Service to external academic and/or professional activities

Member of the speakers committee of the conference ANZAMP 2023.

Chair of the organisation committee of the Colloquium of the NZ Mathematics Society. University of Otago in December 2018 (~70 participants).

Co-organiser of Prof Frauendiener's 60th birthday colloquium in 2018.

Council member of the New Zealand Mathematical Society: First term 2014 - 2017. Second term 2017-2020.

Otago coordinator of the Maclaurin Lecturer Tour 2017 of the New Zealand Mathematical Society and the American Mathematical Society.

Otago coordinator of the Forder Lecturer Tour 2016 of the New Zealand Mathematical Society and the London Mathematical Society.

National coordinator of the Maclaurin Lecturer Tour 2015 of the New Zealand Mathematical Society and the American Mathematical Society.

Reviewer for "Mathematical Reviews" and their database "MathSciNet" (by invitation only) since 2014.

Referee for the journals "General Relativity and Gravitation", "Canadian Journal of Physics", "Annales Henri Poincaré", "Communication in Mathematical Physics", "Classical and Quantum Gravity", "New Zealand Journal of Mathematics". On average ~6 papers/year.

External examiner of MSc thesis of Bethan Cropp (Supervisor: Prof Visser, University of Wellington), Completed: May 2011.

13. Community Service (Please include dates)

(a) Continuing Education, Community Debate and Community Development

Invited to speak at "Thirst for Knowledge", 2022.
https://www.otago.ac.nz/news/events/otago228818.html

Chair coordinator of "Teiteivaki", a University of Otago math programme for Year 9 and 10 school kids with Pacific island backgrounds (together with Lisa Avery (Statistics) and Andrea Knowles (Education)).

Taught a Physics/Astrophysics class at "Cambridge Home School" (http://chsonline.org.uk) on November 27, 2015.

Co-organiser of the exhibition "Einstein - 100 years of the theory of general relativity" at the Otago Museum (November 2015 - January 2016).

Chair coordinator of the contribution of the Department of Mathematics and Statistics to the Science Expo, Dunedin, July 2014.

"*Mathematics – the language of science",* public lectures on the *"Dunedin Tertiary Information Day",* May 2011, April 2012, May 2013.

(e) Other Examples of Community Service