

Stephen M. McCormick

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Education

PhD in Mathematics

Monash University, Australia

THESIS TITLE: THE PHASE SPACE FOR THE EINSTEIN-YANG-MILLS EQUATIONS, BLACK HOLE MECHANICS, AND A CONDITION FOR STATIONARITY

2014

- Supervisor: Professor Robert Bartnik
- Co-supervisor: Associate Professor Todd Oliynyk

Bachelor of Science (Honours)

Monash University, Australia

SPECIALISATION: MATHEMATICS

2008

Bachelor of Science

Monash University, Australia

SPECIALISATION: MATHEMATICS & PHYSICS

2007

Academic Positions

Kungliga Tekniska högskolan

Stockholm, Sweden

POSTDOCTORAL RESEARCH FELLOW

August 2016 – Present*

University of New England

Armidale, Australia

POSTDOCTORAL RESEARCH FELLOW

June 2014 – June 2017*

*Concurrent appointments at 50% for a period

Publications and Preprints

- 2017 **McCormick, S.**, On a Minkowski-like inequality for asymptotically flat static manifolds, (preprint) [arXiv:1709.06550](https://arxiv.org/abs/1709.06550)
- 2017 **McCormick, S., Miao, P.**, On a Penrose-like inequality in dimensions less than eight, Int. Math. Res. Not. [doi:10.1093/imrn/rnx181](https://doi.org/10.1093/imrn/rnx181)
- 2017 **Cabrera Pacheco, A., Cederbaum, C., McCormick, S., Miao, P.**, Asymptotically flat extensions of CMC Bartnik data, Class. Quant. Grav. **34** 10 [doi:10.1088/1361-6382/aa6921](https://doi.org/10.1088/1361-6382/aa6921)
- 2017 **McCormick, S.**, The asymptotically flat scalar-flat Yamabe problem with boundary, J. Geom. Anal. **27**(3) [doi:10.1007/s12220-017-9760-0](https://doi.org/10.1007/s12220-017-9760-0)
- 2015 **McCormick, S.**, A note on mass-minimising extensions, Gen. Rel. Grav. **47**(12). [doi:10.1007/s10714-015-1993-2](https://doi.org/10.1007/s10714-015-1993-2)
- 2014 **McCormick S.**, First Law of Black Hole Mechanics as a Condition for Stationarity, Phys. Rev. D **90**, 104034 [doi:10.1103/PhysRevD.90.104034](https://doi.org/10.1103/PhysRevD.90.104034)
- 2014 **McCormick S.**, The Phase Space for the Einstein-Yang-Mills Equations and the First Law of Black Hole Thermodynamics, Adv. Theor. Math. Phys. **18**, 799 [doi:10.4310/ATMP.2014.v18.n4.a2](https://doi.org/10.4310/ATMP.2014.v18.n4.a2)

Competitive Awards & Scholarships

Funding under Australia-Germany Joint Research Cooperation Scheme

Universities Australia/DAAD

- PROJECT: ON BARTNIK'S QUASI-LOCAL MASS FUNCTIONAL WITH DR CARLA CEDERBAUM

2016-2017

UNE Research Seed Grant

University of New England, Australia

- PROJECT: THE YAMABE PROBLEM OUTSIDE A BALL AND THE BARTNIK MASS

2015

Faculty of Science Dean's Postgraduate Research Scholarship

Monash University, Australia

FUNDING FOR PHD PROJECT

2009

Mathematics Honours Scholarship

Monash University, Australia

2007

Selected Talks

A Penrose-like inequality in dimensions less than eight

INTERNATIONAL CONFERENCE ON PDES, GEOMETRIC ANALYSIS AND FUNCTIONAL INEQUALITIES

University of Sydney, Australia

Mar. 2017

The first law of black hole mechanics as a condition for stationarity and staticity

STATIC METRICS AND BARTNIK'S QUASI-LOCAL MASS CONJECTURE. (CONFERENCE; INVITED SPEAKER)

Universität Tübingen, Germany

May. 2016

Killing vectors as Lagrange multipliers

WORKSHOP ON ANALYSIS, GEOMETRY AND MATHEMATICAL RELATIVITY:
A CELEBRATION OF ROBERT BARTNIK'S 60TH BIRTHDAY

Monash University, Australia

Feb. 2016

The Phase Space for the Einstein-Yang-Mills Equations,

SEMINAR (INVITED)

Universität Regensburg, Germany

Oct. 2015

The Phase Space for the Einstein-Yang-Mills Equations and the First Law of Black Hole Thermodynamics

SEMINAR

University of Wollongong, Australia

Sep. 2014

Research Programs

Erwin Schrödinger Institute

GEOMETRY AND RELATIVITY PROGRAM

Vienna, Austria

Jul. - Aug. 2017

Institut Henri Poincaré

MATHEMATICAL GENERAL RELATIVITY PROGRAM

Paris, France

Sep. - Nov. 2015

Mathematical Sciences Research Institute (MSRI)

MATHEMATICAL GENERAL RELATIVITY PROGRAM

Berkeley, USA

Nov. 2013

Professional Memberships

Australasian Society for General Relativity and Gravitation.

Since 2015

Australian and New Zealand Association of Mathematical Physics

Since 2013

Australian Mathematical Society

Since 2010

Conference Organisation

Oct. 2014 **Mini-Workshop on Nonlinear PDEs,**
Website: turing.une.edu.au/maam/workshop2014/

Jul. 2013 **2nd Annual Australian Mathematical Sciences Students' Conference,**
Website: maths.anu.edu.au/events/amssc

Jul. 2011 **Inaugural Australian Mathematical Sciences Students' Conference*,**
Website: No longer active
Lead organiser

**The Australian Mathematical Sciences Students' Conference has now become a regular event.*

Website: www.amssc.org/

Conferences & Workshops (Since 2014)

Jul. 2017	Between Geometry and Relativity,	<i>Erwin Schrödinger Institute, Vienna, Austria</i>
Mar. 2017	International Conference on PDEs, Geometric Analysis and Functional Inequalities,	<i>University of Sydney, Australia</i>
May 2016	Static metrics and Bartnik's quasi-local mass conjecture,	<i>Universität Tübingen, Germany</i>
Feb. 2016	Workshop on Analysis, Geometry and Mathematical Relativity: a celebration of Robert Bartnik's 60th birthday,	<i>Monash University, Australia</i>
Nov. 2015	General Relativity: A Celebration of the 100th Anniversary,	<i>Institute Henri Poincaré, France</i>
Oct. 2015	Dynamics of Self-Gravitating Matter,	<i>Institute Henri Poincaré, France</i>
Sep. 2015	Geometric Aspects of Mathematical Relativity,	<i>Université de Montpellier, France</i>
Sep. 2015	Recent Advances in General Relativity,	<i>Institute Henri Poincaré, France</i>
Mar. 2015	Andrejewski Days: 100 years of General Relativity,	<i>Brandenburg an der Havel, Germany</i>
Oct. 2014	Mini-Workshop on Nonlinear PDEs,	<i>University of New England, Australia</i>
Sep. 2014	Mini-Workshop on Geometric Analysis,	<i>University of Wollongong, Australia</i>
Jul. 2014	AMSI/AustMS Conference on Geometric Analysis and Stochastic Methods in Geometry,	<i>University of Queensland, Australia</i>

Committees

Jul. 2010 –	Faculty of Science Postgraduate Committee, Representative for the School of Mathematical
Mar 2014	Sciences, Monash University
2011 –	Council of the Australian Mathematical Society, Student observer (non-voting member)
2012	

Teaching Experience

Postdoctoral Research Fellow	<i>University of New England, Australia</i>
• LECTURING ALL LEVELS OF UNDERGRADUATE MATHEMATICS	2014 – 2017
Sessional Lecturer	<i>Monash University, Australia</i>
• LECTURING FIRST YEAR MATHEMATICS	2014
Teaching Associate	<i>Monash University, Australia</i>
• RUNNING ALL LEVELS OF MATHEMATICS SUPPORT CLASSES	2008 – 2014
Laboratory Demonstrator	<i>Monash University, Australia</i>
• RUNNING FIRST YEAR PHYSICS LABORATORY CLASSES FOR NON-PHYSICS MAJORS	2007