

Stephen M. McCormick

Matematiska institutionen, Uppsala universitet, 752 36 Uppsala, Sweden.

✉ quasilocal@gmail.com | 🏠 www.quasilocal.com

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 Appointments

Uppsala universitet

Uppsala, Sweden

POSTDOCTORAL RESEARCH FELLOW

December 2017 – Present

Kungliga Tekniska högskolan

Stockholm, Sweden

POSTDOCTORAL RESEARCH FELLOW

August 2016 – December 2017*

University of New England

Armidale, Australia

POSTDOCTORAL RESEARCH FELLOW

June 2014 – June 2017*

*Concurrent appointments at 50% for a period

Publications and Preprints

- 2018 **Cabrera Pacheco, A. J., Cederbaum, C., McCormick, S.**, Asymptotically hyperbolic extensions and an analogue of the Bartnik mass [arXiv preprint:1802.03331](#)
- 2018 **McCormick, S.**, On a Minkowski-like inequality for asymptotically flat static manifolds, Proc. Am. Math. Soc. (to appear, doi: doi.org/10.1090/proc/14047) [arXiv preprint:1709.06550](#)
- 2017 **McCormick, S., Miao, P.**, On a Penrose-like inequality in dimensions less than eight, Int. Math. Res. Not., rnx181 [doi:10.1093/imrn/rnx181](#)
- 2017 **Cabrera Pacheco, A. J., Cederbaum, C., McCormick, S., Miao, P.**, Asymptotically flat extensions of CMC Bartnik data, Class. Quant. Grav. **34** 10 [doi:10.1088/1361-6382/aa6921](#)
- 2017 **McCormick, S.**, The asymptotically flat scalar-flat Yamabe problem with boundary, J. Geom. Anal., [doi: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](#)
- 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](#)
- 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](#)

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

University of Sydney, Australia

INTERNATIONAL CONFERENCE ON PDES, GEOMETRIC ANALYSIS AND FUNCTIONAL INEQUALITIES

Mar. 2017

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

Universität Tübingen, Germany

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

May. 2016

Killing vectors as Lagrange multipliers

Monash University, Australia

WORKSHOP ON ANALYSIS, GEOMETRY AND MATHEMATICAL RELATIVITY:

A CELEBRATION OF ROBERT BARTNIK'S 60TH BIRTHDAY

Feb. 2016

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

Universität Regensburg, Germany

SEMINAR (INVITED)

Oct. 2015

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

University of Wollongong, Australia

SEMINAR (INVITED)

Sep. 2014

Research Programs

Erwin Schrödinger Institute

Vienna, Austria

GEOMETRY AND RELATIVITY PROGRAM

Jul. - Aug. 2017

Institut Henri Poincaré

Paris, France

MATHEMATICAL GENERAL RELATIVITY PROGRAM

Sep. - Nov. 2015

Mathematical Sciences Research Institute (MSRI)

Berkeley, USA

MATHEMATICAL GENERAL RELATIVITY PROGRAM

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

Elected Positions

- 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

- LECTURING ALL LEVELS OF UNDERGRADUATE MATHEMATICS

University of New England, Australia

2014 – 2017

Sessional Lecturer

- LECTURING FIRST YEAR MATHEMATICS

Monash University, Australia

2014

Teaching Associate

- RUNNING ALL LEVELS OF MATHEMATICS SUPPORT CLASSES

Monash University, Australia

2008 – 2014

Laboratory Demonstrator

- RUNNING FIRST YEAR PHYSICS LABORATORY CLASSES FOR NON-PHYSICS MAJORS

Monash University, Australia

2007