

# Stephen M. McCormick

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## Education

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### PhD in Mathematics

*Monash University, Australia*

THE PHASE SPACE FOR THE EINSTEIN–YANG–MILLS EQUATIONS, BLACK HOLE MECHANICS,  
AND A CONDITION FOR STATIONARITY

2014

- Supervisor: Prof. Robert Bartnik

### Bachelor of Science (Honours)

*Monash University, Australia*

SPECIALISATION: PURE MATHEMATICS

2008

### Bachelor of Science

*Monash University, Australia*

SPECIALISATIONS: PURE MATHEMATICS & THEORETICAL PHYSICS

2007

## Academic appointments

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### Uppsala University

*Uppsala, Sweden*

RESEARCHER  
POSTDOCTORAL RESEARCH FELLOW

*December 2019 – December 2021  
December 2017 – December 2019*

### KTH Royal Institute of Technology

*Stockholm, Sweden*

POSTDOCTORAL RESEARCH FELLOW

*August 2016 – December 2017\**

### University of New England

*Armidale, Australia*

POSTDOCTORAL FELLOW

*June 2014 – June 2017\**

*\*Concurrent appointments at 50% for a period.*

## Teaching experience

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### Uppsala University

*Uppsala, Sweden*

- FULL TEACHING RESPONSIBILITY FOR SEVERAL BACHELOR'S COURSES
- SUPERVISION OF ONE BACHELOR'S THESIS
- OTHER TEACHING DUTIES INCLUDING GRADING AND EXERCISE SESSIONS

*2017 – 2021*

### University of New England

*Armidale, Australia*

- FULL TEACHING RESPONSIBILITY FOR SEVERAL BACHELOR'S COURSES
- SUPERVISION OF TWO BACHELOR'S PROJECTS
- OTHER TEACHING DUTIES INCLUDING GRADING AND EXERCISE SESSIONS

*2014 – 2017*

### Monash University

*Melbourne, Australia*

- LECTURER FOR A BACHELOR'S COURSE
- LUNCHTIME DROP-IN HELP STAFF MEMBER
- PHYSICS LABORATORY TEACHER
- OTHER TEACHING DUTIES INCLUDING GRADING AND EXERCISE SESSIONS

*2007 – 2014*

## Research funding

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### Funding under Australia–Germany Joint Research Cooperation Scheme

*Universities Australia/DAAD*

- PROJECT: ON BARTNIK'S QUASI-LOCAL MASS FUNCTIONAL  
APPROXIMATE VALUE OF €12500; JOINTLY FUNDED WITH PROF. DR. CARLA CEDERBAUM (TÜBINGEN).

*2016-2017*

### UNE Research Seed Grant

*University of New England, Australia*

- PROJECT: THE YAMABE PROBLEM OUTSIDE A BALL AND THE BARTNIK MASS  
APPROXIMATE VALUE OF €3300.

*2015*

## Extended research programmes

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### Institut Mittag-Leffler

GENERAL RELATIVITY, GEOMETRY, AND ANALYSIS: BEYOND THE FIRST 100 YEARS AFTER EINSTEIN

*Djursholm, Sweden*

*September – December 2019*

### Erwin Schrödinger Institute

GEOMETRY AND RELATIVITY PROGRAM

*Vienna, Austria*

*July – August 2017*

### Institut Henri Poincaré

MATHEMATICAL GENERAL RELATIVITY PROGRAM

*Paris, France*

*September – November 2015*

### Mathematical Sciences Research Institute (MSRI)

MATHEMATICAL GENERAL RELATIVITY PROGRAM

*Berkeley, USA*

*November 2013*

## Selected talks

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### Gluing collars to manifolds; how and why

FHST MEETING ON GEOMETRY AND ANALYSIS

*Universität Freiburg*

*January 2020*

### Gluing collars to manifolds; how and why

GENERAL RELATIVITY, GEOMETRY, AND ANALYSIS: BEYOND THE FIRST 100 YEARS AFTER EINSTEIN

*Institut Mittag-Leffler, Sweden*

*November 2019*

### Bartnik's quasi-local mass

MATHEMATICAL RELATIVITY: A RIEMANNIAN APPROACH

*CIMAT (Guanajuato), Mexico*

*May 2019*

### Some recent developments on Bartnik's quasi-local mass

INVITED SEMINAR

*Queen Mary University of London, UK*

*March 2019*

### Some recent results pertaining to Bartnik's quasi-local mass

INVITED SEMINAR

*University of Miami, USA*

*October 2018*

### Asymptotically hyperbolic extensions and estimates for an analogue of the Bartnik mass

WORKSHOP ON ASYMPTOTICALLY HYPERBOLIC MANIFOLDS

*Banff International Research Station, Canada*

*May 2018*

### A Penrose-like inequality in dimensions less than eight

INTERNATIONAL CONFERENCE ON PDES, GEOMETRIC ANALYSIS AND FUNCTIONAL INEQUALITIES

*University of Sydney, Australia*

*March 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)

*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*

*February 2016*

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

INVITED SEMINAR

*Universität Regensburg, Germany*

*October 2015*

### The First Law of Black Hole Mechanics as a Condition for Stationarity

INVITED SEMINAR

*ICMAT, Spain*

*October 2015*

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

MINI-WORKSHOP ON NONLINEAR PDES

*University of New England, Australia*

*October 2014*

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

INVITED SEMINAR

*University of Wollongong, Australia*

*September 2014*

## Conferences & workshops (Since 2014)

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- Jan. 2020 **2nd FHST Meeting on Geometry and Analysis**, Freiburg, Germany
- Jun. 2019 **Geometric Analysis and General Relativity: A conference in honour of Gerhard Huisken's 60th birthday**, ETH Zürich, Switzerland
- May 2019 **Mathematical Relativity: A Riemannian Approach**, CIMAT (Guanajuato), Mexico
- Aug. 2018 **Mathematical General Relativity**, Mathematisches Forschungsinstitut Oberwolfach, Germany
- May. 2018 **Asymptotically Hyperbolic Manifolds**, Banff International Research Station, Canada
- Apr. 2018 **Mass in General Relativity**, Simons Center for Geometry and Physics, NY, USA
- Jul. 2017 **Between Geometry and Relativity**, Erwin Schrödinger Institute, Vienna, Austria
- Mar. 2017 **International Conference on PDEs, Geometric Analysis and Functional Inequalities**, University of Sydney, Australia
- May 2016 **Static metrics and Bartnik's quasi-local mass conjecture**, Universität Tübingen, Germany
- Feb. 2016 **Workshop on Analysis, Geometry and Mathematical Relativity: a celebration of Robert Bartnik's 60th birthday**, Monash University, Australia
- Nov. 2015 **General Relativity: A Celebration of the 100th Anniversary**, Institute Henri Poincaré, France
- Oct. 2015 **Dynamics of Self-Gravitating Matter**, Institute Henri Poincaré, France
- Sep. 2015 **Geometric Aspects of Mathematical Relativity**, Université de Montpellier, France
- Sep. 2015 **Recent Advances in General Relativity**, Institute Henri Poincaré, France
- Mar. 2015 **Andrejewski Days: 100 years of General Relativity**, Brandenburg an der Havel, Germany
- Oct. 2014 **Mini-Workshop on Nonlinear PDEs**, University of New England, Australia
- Sep. 2014 **Mini-Workshop on Geometric Analysis**, University of Wollongong, Australia
- Jul. 2014 **AMSI/AustMS Conference on Geometric Analysis and Stochastic Methods in Geometry**, University of Queensland, Australia

## Miscellaneous

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### Outreach

#### Interview for Cosmos Magazine and associated video

PROMOTIONAL PIECE FOR UNE (LINK: [HTTPS://BIT.LY/3G3RE1P](https://bit.ly/3G3RE1P))

2016

#### Talk – Complicated ideas in less than 140 characters

PART OF A SERIES TO GET STAFF AT UNE INVOLVED IN SCIENCE COMMUNICATION (LINK: [HTTPS://GOO.GL/8WKWHU](https://goo.gl/8wkWHU))

2016

#### Presenter for Far Out Science at UNE

A PROGRAMME FOR SCHOOL STUDENTS TO BE INTRODUCED TO FUN SCIENCE

2015 – 2016

#### Multiple radio interviews

I WAS INTERVIEWED ON ABC RN TAMWORTH (NEW ENGLAND RADIO) ON A FEW OCCASIONS TO SPEAK ABOUT MATHEMATICS, PHYSICS AND SCIENCE COMMUNICATION

2015 – 2016

#### Presenter for the Science Experience at Monash University

A PROGRAMME FOR SCHOOL STUDENTS TO BE INTRODUCED TO FUN SCIENCE (LINK: [HTTPS://GOO.GL/KNRJnH](https://goo.gl/kNRJnH))

2012 – 2014

#### Casual Calculations

A (NOW OUTDATED) BLOG AIMED AT PRESENTING TOPICS RELATED TO MATHEMATICS AND MATHEMATICS EDUCATION TO THE AVERAGE INTERESTED READER (LINK: [HTTPS://GOO.GL/4P12GM](https://goo.gl/4P12GM))

2013 – 2014

## Elected positions

### Faculty of Science Postgraduate Committee

REPRESENTATIVE FOR THE SCHOOL OF MATHEMATICAL SCIENCES

*Monash University, Australia*

*July 2010 – March 2014*

### Council of the Australian Mathematical Society

STUDENT OBSERVER (NON-VOTING MEMBER)

*Australia*

*2011 – 2012*

## Conference organisation

- Oct. 2014 **Mini-Workshop on Nonlinear PDEs,**
- Jul. 2013 **2nd Annual Australian Mathematical Sciences Students' Conference,**
- Jul. 2011 **Inaugural Australian Mathematical Sciences Students' Conference\*,**  
I was the primary organiser of this conference

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

*Website: [www.amssc.org/](http://www.amssc.org/)*

## Reviewing

I have recently reviewed for the following journals:

**Communications in Contemporary Mathematics,**  
**Classical and Quantum Gravity,**  
**International Mathematics Research Notices,**  
**Journal of Geometric Analysis,**  
**Journal of Mathematical Physics,**  
**Mathematische Nachrichten,**  
**SIGMA (Symmetry, Integrability and Geometry: Methods and Applications),**

## Languages

**English:** Native.

**Swedish:** Good working knowledge.

**German:** Elementary communication.