MATTHEW BURKE

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EDUCATION

2011-2015	**PhD Mathematics, Macquarie University, Sydney** Analysed the problem of integrating Lie algebroids in theoretical physics, identified its key components, designed and built an abstract framework extending and simplifying the theory.
2010-2011	**Part III Mathematics (MMath), Christ's College, University of Cambridge** Pass with Merit. Part III Essay scored 95/100.
2007-2010	**Bachelor's Degree in Mathematics (BA), Christ's College, University of Cambridge** Upper Second Class Honours. Completed seven optional computational projects all of which gained alpha quality marks. Christ's College Whelan Prize in 2008 for First Class Examination Performance.

WORK EXPERIENCE

2016.11-Present	**Chief Technology Officer at MathSpire Ltd** Extended existing course structure and developed new courses for A-level mathematics students. Created interactive mathematics lessons and tests for desktop computers and mobile devices with JavaScript and the Xamarin Framework.
2016.06-2016.11	**Software Developer and Content Creator at MathSpire Ltd** Created database of mathematics videos, tests and graphics using F# and SQL.
2015.10-11	**Visiting Postdoctoral Researcher, Masaryk University, Brno** Plenary speaker at the multi-disciplinary Eduard Čech Institute Workshop.

TEACHING EXPERIENCE

2016.07-08	**Tutor at Debate Chamber Mathematics Summer School** Guided A-level students through undergraduate level mathematics topics including Linear Algebra, Analysis, Differential Equations, Turing Machines, Infinity and Cryptography.
2013-2014	**Tutor for Macquarie University** Demonstrated solutions on the whiteboard for three undergraduate mathematics courses and provided additional individual assistance.
2012	**Tutor at Macquarie University Numeracy Centre** Guided and motivated first year students individually and in small groups at the drop-in centre.
2010.06	**GCSE Tutor for Blue Tutors**

PUBLICATIONS AND PREPRINTS

2016.06.29	*Ordinary Connectedness Implies Internal Connectedness and Integrability for Lie Groupoids* Symmetry, Integrability and Geometry: Methods and Applications Accepted Pending Corrections Available at http://arxiv.org/abs/1606.06120
2016.11.14	*A Synthetic Version of Lie's Second Theorem* Submitted to Applied Categorical Structures Available at http://arxiv.org/abs/1605.06378

CONFERENCES AND PRESENTATIONS

2016.10.07	**Calgary Mathematics Department Colloquium** Infinitesimals in Lie Theory University of Calgary
2016.09.30	**Calgary Peripatetic Seminar in Logic and Category Theory** Lie Theory for Categories using Infinitesimals

	University of Calgary
2015.11.17	**Category Theory Seminar**
	A Synthetic Version of Lie's Second Theorem
	University of Cambridge
2015.12.04	**Séminaire de géometrie et physique mathématique**
	Multi-object Lie theory using synthetic differential geometry
	Université Paris Diderot, Paris 7
2015.11.05	**Algebra Seminar**
	Lie's Second Theorem
	Masaryk University, Brno
2015.10.28	**Algebra Seminar**
	Jet Part of a Category
	Masaryk University, Brno
2015.10.26	**Differential Geometry Seminar**
	An Introduction to Synthetic Differential Geometry
	Masaryk University, Brno
2015.10.10	**Plenary Speaker at Eduard Cech Institute Workshop**
	Synthetic Lie Theory
	Trest, Czech Republic
2015.05.13ff	**Centre of Australian Category Theory**
	Jet Categories in the Cahiers Topos (2 talks)
	Macquarie University
2014.07.04	**Category Theory 2014**
	Synthetic Lie Theory
	University of Cambridge
2014.06.19	**MCDC 2014**
	A Synthetic Perspective on the Integrability of Lie Algebroids
	Macquarie University
2014.05.21ff	**Centre of Australian Category Theory**
	A Synthetic Perspective on the Integrability of Lie Algebroids (3 talks)
	Macquarie University
2013.07.04	**MCDC 2013**
	Cohomology from the Perspective of Restriction Categories and Atlases
	Macquarie University
2012.06.15	**MCDC 2012**
	Applications of Logic in Differential Geometry
	Macquarie University
2011	**Part III talk**
	Synthetic Differential Geometry
	University of Cambridge

TECHNICAL SKILLS

- **Programming Languages:** Six months experience with F#, the .NET and Xamarin Frameworks to build cross-platform mobile and desktop applications. Six months experience with JavaScript to create interactive mathematics lessons and presentations. C, C++ and Haskell programming languages and GiNaC C++ library used in undergraduate computational projects. Some experience with Python, curses, Git, HTML, CSS, web.py and OpenShift PaaS. GitHub account at: https://github.com/mwpb.
- **Online Courses:** Using Python to Access Web Data by the University of Michigan on Coursera. Certificate earned on February 28, 2016. Passed with score of 99.3%. Using Databases with Python by the University of Michigan on Coursera. Certificate earned on May 10, 2016. Passed with score of 98.9%.
- **Operating Systems:** Windows 10 (current), Macintosh OS X, Arch Linux and Fedora operating systems.