

JOSHUA CHEN

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I'm a first-year Ph.D. student in the Computational Logic group of the University of Innsbruck, currently working on both practical and foundational aspects of interactive proof systems. My background is in pure mathematics with some experience in machine learning and natural language processing.

EDUCATION

Ph.D. Computer Science Advisor: Assoc. Prof. Cezary Kaliszyk	University of Innsbruck 2019–present
Masters in Mathematics German GPA 1.9 Advisor: Prof. Dr. Peter Koepke	University of Bonn 2015–2018
B.Sc. (Honours) Mathematics First Class Honours, GPA 80% (Scale: 0–100%) Advisor: Assoc. Prof. Scott Morrison	The Australian National University 2013–2014
B.Sc. Mathematics Dean's Congratulations, GPA 8.64 (Scale: 0–9)	University of Canterbury 2010–2012

RESEARCH & WORK

Homotopy type theory in Isabelle/Pure University of Bonn
Masters thesis 2017–2018

Masters thesis project in type theory and interactive formal proof. I implemented a homotopy type theory object logic for the interactive proof assistant Isabelle, capable of formalizing large portions of standard presentations of homotopy type theory. I continue to actively maintain and develop the code, available at <https://github.com/jaycech3n/Isabelle-HoTT>.

Targeted topic modeling for the E2mC emergency response system Fraunhofer IAIS
Research assistant 2017–2018

I worked in the Knowledge Discovery group of the Fraunhofer Institute for Intelligent Analysis and Information Systems, applying probabilistic models to analyze and classify topics in tweet corpora. I implemented targeted topic models in Java and also used Python for natural language processing of Twitter data. This work was part of the European Union's E2mC project, a pilot project aiming to use social media data to enhance the EU's emergency management and response system.

Visualization and enumeration of planar trivalent graphs Australian National University
Research assistant 2015

I developed and implemented algorithms in Scala to enumerate and automatically draw certain classes of planar graphs. This was part of research in quantum algebra investigating subfactors and planar algebras. My code was incorporated into the repository at <https://bitbucket.org/scottmorrison/toolkit/>.

The Temperley-Lieb categories and skein modules*Honours research thesis*

Australian National University

2013–2014

Final year Honours research thesis in category theory, quantum algebra, and applications to low-dimensional topological invariants. Available online at [arXiv:1502.06845](https://arxiv.org/abs/1502.06845) [math.QA].

Integer houses in cyclotomic fields*Summer research program*

Australian National University

Nov 2012–Jan 2013

Eight-week selective international undergraduate research program. I investigated questions concerning the dimensions of objects in fusion categories with the aid of Wolfram Mathematica.

TEACHING ASSISTANCE

Machine Learning*MA-INF 4111*

University of Bonn

Winter 2017/18

Data Mining and Knowledge Discovery*MA-INF 4112*

University of Bonn

Summer 2017

Engineering Mathematics 1B*EMTH119*

University of Canterbury

Fall 2015

Mathematics and Applications 1*MATH103*

University of Canterbury

Fall 2014

Discrete Mathematics*MATH120*

University of Canterbury

Fall 2013

ACTIVITIES, ACHIEVEMENTS & AWARDS

Conference speaker*An Introduction to Topological Quantum Field Theory*

Australian Mathematical Sciences Student Conference

2014

Mathematical Sciences Institute Honours Scholarship

Australian National University

2013

Summer Research Scholarship

Australian National University

2012

Peter Bryant Prize for pure mathematics

University of Canterbury

2011