

# ZHICHENG HAN

## Curriculum Vitae

✉ hanzc.kernel@gmail.com

🌐 hanzc.kernel

✉ Belderberg 18

📍 53111 Bonn, Germany

☎ +49(0)157-72680155

## RESEARCH

**Research Interest:** Spectral method on locally symmetric spaces

### Analytic aspects of $L^2$ -Invariants

*Application of Harish-Chandra's Plancherel Formula and Lie group cohomology to computation of  $L^2$ -invariants on locally symmetric spaces*

📅 Feb 2017 – Jan 2018      Advisor: Prof. Dr. Wolfgang Lück

- The progress of this work was presented in both topology and analysis Oberseminars

### Workshop on Index Theory and Application to Geometry

*1-year workshop among doctoral and post-doctoral students from topology group*

📅 Jan 2017 – Jan 2018

- Discussed the proof of Atiyah-Singer index theorem both from the original K-theory approach and the heat kernel asymptotic approach
- Conducted 50+% of the talks, presented the final results in topology Oberseminar.

### Primer on Index Theorem

*Discussion of Clifford algebras and  $K$ -theory used for  $C\ell_k$ -index Theorem*

📅 Oct 2014 – Jun 2015      Advisor: Prof. Dr. Fei Han

## PROJECT EXPERIENCES

### Github Project on Option Pricing

*Volatility calibration of various local (stochastic) volatility models from both numerical and heat kernel approach*

📅 Apr 2019 - now      📍 Bonn

**Models & Methods:** Applied primal-dual algorithms to price 6-asset FX convertible bond with high accuracy( $\pm 30$ bps); Applied particle method to quickly calibrate (5s) hybrid Ho-Lee/Dupire model;

**Extensions:** Streamlined the process from algorithm/model design to GUI implementation via PyQt; Launching web-based application via Dash/Docker, with Django/Node.js-based data managements;

### Machine Learning

*Application of statistical/deep learning methods to time series/factor analysis*

📅 Feb 2019 - now      📍 Bonn

**Application to Finance:** Incorporated GloVe Algorithm to Keras- based LSTM, Gated Recurrent Unit (GRU) and MLP model for text analysis on SEC 8-K documents to predict S&P 500 index sentiment;

**Customization:** Compared different ensemble methods and optimizer on MNIST to test efficiency and speed of convergence; Designed activation functions for model performance tests

## PROGRAMMING EXPERTISE

Scientific Computing: Scipy Keras Sklearn Tensorflow

UI & App Design: PyQt Dash Heroku Docker git Plotly

Database Management: Node.js Express MySQL Django

## REFEREES

### Prof. Dr. Wolfgang Lück

✉ wolfgang.lueck@him.uni-bonn.de

### Prof. Dr. Werner Müller

✉ mueller@math.uni-bonn.de

### Prof. Dr. Matthias Lesch

✉ lesch@math.uni-bonn.edu

## EDUCATION

M.Sc. in Pure Mathematics

🎓 Universität Bonn

📅 Oct 2015 – Mar 2018      📊 1,4(German)

B.Sc. in Pure Mathematics

🎓 National University of Singapore

📅 Aug 2011 – June 2015      📊 3.76

## ACCOLADES

### 🏆 Singapore Maths Olympiad

*Two Gold, One Silver & One Bronze Medals*

📅 2007 – 2010      📍 Singapore

### 🌟 Special Programme of Maths

*8 courses offered solely to distinctive students*

📅 2012 – 2015      📍 Singapore

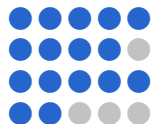
## LANGUAGES

English, Chinese

German

TeX, Python

Javascript, C++



## LEADERSHIP

### Singapore Rubiks Competitions

*Annual event which attracts 200+ participants across South-East Asia*

📅 2012 – 2015      📍 Singapore

- In charge of procurement, promotion and coordination with sponsors
- Planned and oversaw the whole flow of events

### NUS Mathematics Society Bazaar

*3-day bazaar garnering annual net society fund of S\$6500+ ( $\approx$  €4000+)*

📅 2012 – 2015      📍 Singapore

- Responsible for achieving 50%+ increment of profit compared with previous years, thereby providing 90% of Society expenditures
- Designed floor plan, outsourcing 95% booths to 40+ external vendors
- Obtained catering sponsorship of Nestlé® to popularize the event

## SERVICES

### Studentshilfskraft

*Built local archive for theses of 1960-2010s*

📅 2016 – 2018      📍 Uni Bonn

### Community Service Tutor

*Tutored 30+ primary school fifth-grade kids*

📅 2010 – 2011      📍 Pasir Ris, Singapore