Peter Mühlbacher

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EDUCATION

Warwick University, Coventry, UK
Ph.D, Mathematics   Expected July **2022**
Concentrations: Probability Theory, Quantum Spin Systems, Monte Carlo Simulations

Cambridge University, Cambridge, UK
MASt., Mathematics   **2017**

Vienna University, Vienna, Austria
BSc., Mathematics   **2016**

EXPERIENCE

Dissertation Research   **2018—2022**
Dissertation: "Probabilistic Methods for Quantum Spin Systems"
- Designed algorithms to efficiently sample from high-dimensional distributions
- Taught in part master's/Ph.D courses on Quantum Mechanics and Statistical Mechanics
- Collaborated & co-authored papers with groups based in Europe, America, and Asia
- Presented original research at international conferences with 50—500 attendees

Unicredit Bank Austria (risk management)   **2018**
- Analysed & advised on the implementation of an EU regulation
- Communicated amendments to this implementation to the Austrian Financial Market Authority

Institute for Science & Technology (Vienna)   **2016—2018**
- Awarded the OeAD research scholarship (€2200) and a paid internship (acceptance rate: 3%)
- Published a paper on Random Matrix Theory

Institute for Quantum Optics and Quantum Information (Vienna)   **2015—2016**
- Assisted with study design, to be carried out by the European Space Agency

Webdesign and Databases   **2008—2012**
- Developed several companies' websites, both frontend and backend

Forecasting on Metaculus   **2021—present**
- Public track record of my probabilistic predictions on Covid, economics, etc.
- Investigated a potential "arbitrage" opportunity by analysing historical data

SELECT PUBLICATIONS AND PRESENTATIONS (3 OF 8)

J. Björnberg, P. Mühlbacher, B. Nachtergaele, D. Ueltschi, *"Dimerization in Quantum Spin Chains with O(n) Symmetry"*,
Communications in Mathematical Physics volume 387, pages 1151–1189 (2021)
- Presented at ICMP (and at Harvard by B. Nachtergaele)

P. Mühlbacher, *"A New Loop Algorithm with Theoretical Implications", pending publication.*
- Introduced a novel Monte Carlo algorithm for quantum spin systems and used it to prove new results

P. Mühlbacher, *"Elliptic Curves and their Applications in Public Key Cryptography"* (in German)
- Won the Dr. Hans-Riegel award, worth €600

SKILLS

Languages: German (native), English (fluent), French, Russian, Chinese (basics)
Programming: Git, Python (NumPy, SymPy, Jupyter), Java (Processing), LaTeX, Webdesign and PHP, SQL
Former paramedic (full-time for a year), former gymnast, taught a German language course (~15 students, 1 year)