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RESEARCH INTERESTS

Quantum information and quantum computation; especially quantum cryptography and key distribution, topological quantum computation, topological order, classical and quantum simulation of many-body systems, quantum reference frames, and foundations of quantum mechanics.

EDUCATION

PhD, Physics, University of New Mexico, May 2004.
Thesis: *Frames, Designs, and Codes in Quantum Information Theory*.
Advisor: Carlton M. Caves.

MS, Physics, University of New Mexico, 2002.

BS with Honor, Physics, California Institute of Technology, 1999.

RESEARCH EXPERIENCE

2007–present	Wissenschaftliche Mitarbeiter
2006–2007	Alexander von Humboldt Postdoctoral Fellow Group of G. Alber, Technische Universität Darmstadt
2005–2006	Alexander von Humboldt Postdoctoral Fellow Group of N. Lütkenhaus, Universität Erlangen-Nürnberg
2005	Visiting researcher Group of M. Nielsen, University of Queensland
2004	Wissenschaftliche Mitarbeiter Group of Th. Beth, Universität Karlsruhe
1999–2004	Graduate research assistant Group of C. Caves, University of New Mexico
2001	Visiting researcher Group of C. A. Fuchs, Bell Laboratories
2000	Complex Systems Summer School Participant Santa Fe Institute
1999	Summer Undergraduate Research Fellow Group of J. Preskill, California Institute of Technology
1998	Summer Undergraduate Research Fellow Group of B. Filippone, California Institute of Technology

TEACHING EXPERIENCE

- 2007 Teaching Assistant for Classical Particles and Fields
lecture course for Bachelor students at the Technical University of Darmstadt
- 2007 Teaching Assistant for Theoretical Quantum Optics
lecture course for Diplomanden at the Technical University of Darmstadt
- 2005 Teaching Assistant for Quantum Information Theory I
lecture course for Diplomanden at University of Erlangen-Nuremberg
- 1999–2000 Teaching Assistant for Physics 102
freshman physics laboratory at University of New Mexico
- 1999 Teaching Assistant for Ph 7
sophomore physics laboratory at Caltech

PUBLICATIONS

10. J. M. Renes, *Equiangular Tight Frames from Paley Tournaments*, *Linear Algebra and its Applications* **426**, 497 (2007); [math.FA/0408287](#).
9. J. M. Renes and G. Smith, *Noisy Processing and Distillation of Private Quantum States*, *Physical Review Letters* **98**, 020502 (2007); [quant-ph/0603262](#).
8. J. M. Renes and M. Grassl, *Generalized decoding, effective channels, and simplified security proofs in quantum key distribution*, *Physical Review A* **74**, 022317 (2006); [quant-ph/0505061](#).
7. J.-C. Boileau, K. Tamaki, J. Batuwantudawe, R. Laflamme, and J. M. Renes, *Unconditional Security of Three State Quantum Key Distribution Protocols*, *Physical Review Letters* **94**, 040503 (2005); [quant-ph/0408085](#).
6. J. M. Renes, *Equiangular Spherical Codes in Quantum Cryptography*, *Quantum Information and Computation* **5**(1), 080-091 (2005); [quant-ph/0409043](#).
5. J. M. Renes, *Optimal Protocols and Tradeoffs in Quantum Key Distribution*, *AIP Conference Proceedings (Quantum Communication, Measurement, and Computing, Glasgow, Scotland)* **734**, 327 (2004).
4. J. M. Renes, *Spherical Code Key Distribution Protocols for Qubits*, *Physical Review A* **70**, 052314 (2004); [quant-ph/0402135](#).
3. J. M. Renes, R. Blume-Kohout, A. J. Scott, and C. M. Caves, *Symmetric Informationally Complete Quantum Measurements*, *Journal of Mathematical Physics* **45**(6), 2171–2180 (2004); [quant-ph/0310075](#).
2. C. M. Caves, C. A. Fuchs, K. K. Manne, and J. M. Renes, *Gleason-Type Derivations of the Quantum Probability Rule for Generalized Measurements*, *Foundations of Physics* **34**(2), 193–209 (2004); [quant-ph/0306179](#).
1. A. M. Childs, J. Preskill, and J. Renes *Quantum Information and Precision Measurement*, *Journal of Modern Optics* **47**(2), 155–176 (2000); [quant-ph/9904021](#).

PREPRINTS

- O. Kern and J. M. Renes, *Improved one-way rates for BB84 and 6-state protocols*, submitted to *Quantum Information and Computation*; [arXiv:0712.1494v1](#) [[quant-ph](#)].
- J. M. Renes, and J.-C. Boileau, *Privacy Amplification, Private States, and the Uncertainty Principle*, submitted to *Physical Review Letters*; [quant-ph/0702187](#).

G. Smith, J. M. Renes, and J. A. Smolin, *Better codes for BB84 with one-way post-processing*, submitted to Physical Review Letters; [quant-ph/0607018](#).

H. Barnum, C. A. Fuchs, J. M. Renes, and A. Wilce, *Influence-free states on compound quantum systems*, submitted to Physical Review A; [quant-ph/0507108](#).

PRESENTATIONS

Private States in Quantum Key Distribution, Theory and Realisation of Practical Quantum Key Distribution, Waterloo, Canada, 13 June 2007

Quantum Communication and Cryptography, Fifth Informal Quantum Information Gathering, Innsbruck, Austria, 12 April 2007

Private States, Privacy Amplification, and the Uncertainty Principle, Spring Meeting of the German Physical Society, Düsseldorf, Germany, 21 March 2007

Quantum key distribution for the lazy and careless: Noisy preprocessing and twisted states, CAS Seminar, University of New Mexico, 26 October 2006.

Quantum key distribution for the lazy, faulty, and careless: Noisy preprocessing, twisted states, and degenerate codes, IQC Colloquium, University of Waterloo, 16 October 2006.

Quantum Perspectives on Classical Problems: Quantum Information Theory and Quantum Key Distribution, Theory Colloquium, TU Darmstadt, 22 May 2006.

Effective Channels in Quantum Key Distribution, Spring Meeting of the German Physical Society, Frankfurt, Germany, 16 March 2006.

Effective Channels in Quantum Key Distribution, Fourth Informal Quantum Information Gathering, Paris, France, 24 July 2005.

Encoding Quantum Information in Transverse Modes of Light, Max Planck Research Group, Institute of Optics, Information, and Photonics, Erlangen, Germany, 25 June 2005.

Two Protocols for Spherical Codes in Quantum Cryptography, Seventh International Conference on Quantum Communication, Measurement and Computing, Glasgow, Scotland, 26 July 2004.

Equiangular Spherical Codes in Quantum Cryptography, Sixth Annual Workshop of the Southwest Quantum Information and Technology (SQuInT) Network, La Jolla, CA, 21 February 2004.

Spherical Codes and Designs in Quantum Cryptography, Quantum Institute Visitor Symposium “Quantum Lunch,” Los Alamos, NM, 5 February 2004.

Spherical Codes and Designs in Quantum Key Distribution, University of Erlangen-Nuremberg, 21 January 2004.

Spherical Codes and Designs in Quantum Cryptography, University of Potsdam, 19 January 2004.

Use of Spherical Codes in Quantum Cryptography, University of Hannover, 14 January 2004.

Quantum Cryptography with Spherical Codes, University of Karlsruhe, 19 December 2003.

Towards a Quantum de Finetti Theorem, Sixth Biennial Conference of the International Quantum Structures Association (IQSA), Vienna, 5 July 2002.

Frame Functions for Qubits, MSI International conference “Quantum Theory: reconsideration of foundations”, Växjö University, Sweden, 21 June 2001.

AWARDS

Alexander von Humboldt Postdoctoral Fellowship, 2005–2007.

UNM Physics & Astronomy Department Chairman's Award for Best Dissertation, 2005.

Caltech Haren Lee Fisher Memorial Prize in Junior Physics, 1998.

PROFESSIONAL ACTIVITIES

Referee for Physical Review Letters, Physical Review A, and Quantum Information & Computation, Physics Letters A, and the International Journal of Quantum Information.

Member of the American Physical Society and the Deutsche Physikalische Gesellschaft.

Co-organizer of the third biannual SQuInT Student Summer School and Retreat, Monterey, CA, 15-19 June 2003.

PERSONAL DETAILS

Born 4 July 1977 in Moscow, Idaho, USA. US Citizen.

Language abilities: English (native) and German (fluent).