

Curriculum Vitae

Name: Martin Hendrych
Date of Birth: July 13th, 1971
Place of Birth: Ústí nad Orlicí, Czech Republic
Home Institution: Joint Laboratory of Optics of Palacký University and Physical Institute of Czech Academy of Sciences
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Nationality: Czech
Marital Status: Married
Languages: English (fluent), Spanish (intermediate), Czech (native)

Education and Professional Experience:

- 1995: Received my MSc in optoelectronics from Palacký University, Olomouc, Czech Republic. Thesis: Optical Implementations of Neural Networks.
- 1996 – present: Research fellow at Joint Laboratory of Optics of Palacký University and Physical Institute of Czech Academy of Sciences, Olomouc, Czech Rep.
- 1997 – present: Research fellow (part time) at Department of Optics, Palacký University, Olomouc, Czech Republic.
- 1998: Winter College on Optics at International Centre for Theoretical Physics, Trieste, Italy.
- 2000 – present: Research fellow (part time) at Research Center for Optics, Olomouc, Czech Republic.
- 2000: Winner of the NATO Advanced Science Fellowship (Experimental Implementation of Quantum Secret Sharing).
- 2000/2001: 12-month stay at Quantum Imaging Laboratory of Boston University, Boston, USA. Hosts: Profs. Malvin C. Teich and Alexander V. Sergienko.
- 2001: Certified training at Coherent, Inc., Santa Clara, USA, in operation, maintenance and alignment of femtosecond oscillators Mira 900-F, femtosecond regenerative amplifiers RegA 9000/9050, optical parametric amplifiers OPA 9400/9450, and CW diode-pumped, solid-state lasers Verdi.
- 2003: Received my PhD in quantum optics from Palacký University, Olomouc, Czech Republic. Supervisor: Prof. Jan Peřina. Thesis: Experimental Quantum Cryptography (<http://optics.upol.cz/hendrych/thesis/>).

Research interests:

Experimental quantum and nonlinear optics
Experimental quantum cryptography
Quantum information
Quantum communications
Entangled photon pairs
Nonlinear parametric downconversion

Research Accomplishments:

- 1998: Construction of a quantum key distribution apparatus, based on weak coherent states and phase encoding in a fiber time-multiplexing 0.5-km long Mach-Zehnder interferometer [4,8,9]
- 1999: Construction of a quantum identification apparatus – an expansion of the previous QKD experiment [4,8,10].
- 1999: Construction of a fiber-based Mach-Zehnder interferometer for comparing different operational phase concepts in quantum optics [7].
- 2000: Construction of a quantum random number generator (initially classified).
- 2001: Construction of a quantum secret sharing apparatus, based on polarization-entangled photons generated by spontaneous parametric downconversion [4,5].
- 2002: An experiment to measure the overlap, fidelity and purity of polarization-entangled quantum states [3].
- 2003: An experiment to nonlocally induce interference by spectral filtering of energy-entangled photon pairs [2].

Skills: alignment and maintenance of Coherent CW and pulsed lasers; detection of single-photon states; optical fiber splicing; building bulk and fiber-based interferometers; building nonlinear parametric down conversion sources

Professional Membership: International Association for Cryptographic Research

Other scientific activities:

Co-author of 3 popularization movies:

Quantum Cryptography for the Ministry of Interior and Czech National Bank, shown at the International Festival of Documentary, Scientific and Pedagogical Programs Academia Film Olomouc '99;
Photons – Couriers of Secret Codes for Czech Television (2000);
Research Centers Olomouc – Center for Optics for Studio JAK, Krátký Film Praha (2002).

Participation in projects of the Grant Agency of the CR, Czech Ministry of Education, Czech Ministry of Interior and National Security Authority of the CR.

List of Publications

- [1] N. Lütkenhaus, M. Hendrych, M. Dušek, *Quantum Cryptography*, accepted in Progress in Optics, ed. E. Wolf (Elsevier, Amsterdam 2004).
- [2] J. Soubusta, J. Peřina Jr., M. Hendrych, O. Haderka, P. Trojek, M. Dušek, *Experimental Verification of Energy Correlations in Entangled Photon Pairs*, Phys. Lett. A, **319**, pp. 251-262 (2003).
- [3] M. Hendrych, M. Dušek, R. Filip, and J. Fiurášek, *Simple Optical Measurement of the Overlap and Fidelity of Quantum States*, Phys. Lett. A **310**, pp. 95-100 (2003).
- [4] M. Hendrych, *Experimental Quantum Cryptography*, doctoral thesis, Palacký University, Olomouc, September 2002, available at <http://optics.upol.cz/hendrych/thesis/>.
- [5] M. Hendrych, *Quantum Secret Sharing*, Technical Report, NATO Advanced Science Fellowship Programme, February 2002.
- [6] M. Hendrych is a co-author of Secs. IV and VIII in the book J. Peřina *et al.*, *Nonlinear Phenomena in Quantum Optics*, In: Modern Nonlinear Optics, Part I, ed. M. Evans, Advances in Chemical Physics, vol. **119**, (J. Wiley & Sons, Inc. New York, 2001).
- [7] J. Řeháček, Z. Hradil, M. Dušek, O. Haderka, and M. Hendrych, *Testing Operational Phase Concepts in Quantum Optics*, J. Opt. B: Quant. Semiclass. Opt. **2**, pp. 237-244 (2000).
- [8] M. Dušek, O. Haderka, M. Hendrych, and Robert Myška, *Quantum Identification System*, Phys. Rev. A **60**, pp.149-156 (1999).
- [9] M. Dušek, O. Haderka, and M. Hendrych, *Generalized Beam-Splitting Attack in Quantum Cryptography with Dim Coherent States*, Opt. Commun. **169**, pp. 103-108 (1999).
- [10] M. Dušek, O. Haderka, and M. Hendrych, *Application of Quantum Key Distribution for Mutual Identification – Experimental Realization*, Acta Phys. Slov. **48**, pp. 169-176 (1998).
- [11] M. Hendrych, M. Dušek, and O. Haderka, *The Effect of Beam-Splitter Imperfections and Losses on Fringe Visibility in a Mach-Zehnder Interferometer*, Acta Phys. Slov. **46**, pp. 393-398 (1996).

Published about our research:

- [1] *A Quantum Encryption Method Worth 'Czeching' Out* – Inside R&D Alert, September 25, 1998 (John Wiley & Sons, Inc. New York).
- [2] *Encryption Makes a Quantum Leap: The State of Key Distribution Research* – Technical Insights' Futuretech No. 228, December 1998 (John Wiley & Sons, Inc. Englewood, New Jersey).