

# Curriculum Vitae

---

## PERSONAL INFORMATION

First name / Surname: Piotr Migdal  
Date of birth: 1986-03-13  
Citizenship: Polish  
E-mail: [pmigdal@gmail.com](mailto:pmigdal@gmail.com)  
Homepage: <http://migdal.wikidot.com>  
Phone: +1 (415) 231-8022 (US), +34 644 226 536 (Spain)  
Profiles: [GitHub](#), [StackExchange](#)

## RESEARCH INTERESTS

complex systems, complex networks, data science, mathematical modelling in psychology, geometry of quantum states, quantum optics, quantum information

## EDUCATION

- ICFO - The Institute of Photonic Sciences**, Castelldefels (Barcelona), Spain  
Quantum Optics Theory Group, advisor: prof. Maciej Lewenstein **Feb 2011 –**
- Symmetries and self-similarities of quantum states, application of sequence-analysis methods for quantum states.
  - Complex quantum networks: walks, community detection.
  - Collaboration: mathematical psychology.
- University of Warsaw**, Warsaw, Poland  
*Inter-faculty Studies in Mathematics and Natural Sciences* **2005 – 2011**
- Master's Degree (5 year programme) Jan 2011  
Physics (Theoretical Physics — Quantum Optics and Atomic Physics)  
thesis: [Quantum codes immune to collective decoherence and photon loss](#),  
advisor: Konrad Banaszek, grade: 5/5
  - Bachelor's Degree, Mathematics Sept 2009  
thesis: [A mathematical model of the mafia game](#), advisor: Jacek Miekisz, grade: 5/5

**Startup Compass Inc.**, San Francisco, CA, USA

Data Science Intern

**Jul – Oct 2013**

- Designing distance function for software companies, based on a multidimensional dataset.
- Data processing (Python: SciPy, Pandas; MongoDB), data exploration and visualization (Gephi, D3.js).

**ISI Foundation**, Turin, Italy

Jacob Biamonte Gorup

**May – Jun 2013**

- Quantum complex networks: quantum walks, community detection, weak time-symmetry.

**Interdisciplinary Centre for Mathematical and Computational Modelling, University of Warsaw**, Warsaw, Poland

Dariusz Plewczyński Group, mathematical psychology

**Nov 2010 –**

- Cognitive computing: human information sharing models, models of human perception.

**Institute of Theoretical Physics, University of Warsaw**, Warsaw, Poland

Konrad Banaszek Group, quantum optics (theoretical physics) , TEAM Programme operated by the Foundation for Polish Science

**Jan – Sep 2010**

- Quantum-enhanced protocols in realistic environments: Generation schemes for robust entangled states.

**ICFO - The Institute of Photonic Science**,

Castelldefels (Barcelona), Spain

Maciej Lewenstein Group, quantum optics (theoretical physics)

**Oct 2009**

- Ultra-cold atomic gases in non-abelian gauge fields.

**Faculty of Physics, Nicolaus Copernicus University**, Toruń, Poland

Konrad Banaszek Group, quantum optics (theoretical physics)

**2007 – 2009**

- Analysis of spontaneous parametric down-conversion, estimation of the quantum noise.
- Averaging procedures for generating decoherence-free states.

**Faculty of Physics, University of Warsaw**, Warsaw, Poland

Czesław Radzewicz Group, applied optics (experimental physics)

**2006 – 2007**

- Wavefront sensor with Fresnel zone plates for use in an undergraduate laboratory.

**Francis Bitter Magnet Laboratory, Massachusetts Institute of Technology**,

Jagadeesh Moodera Group, spintronics (experimental physics)

Cambridge (MA), USA

during the Research Science Institute 2005 scholarship

**Jul — Aug 2005**

- Experimental work on organic tunnelling barriers.

PROJECTS,  
ACTIVITIES

Teaching, popularization and organizational work

- Started an unconference series [Offtopicarium](#) Jan 2012–
- a moderator of [Theoretical Physics - Stack Exchange](#) Nov 2011–May 2012
- prepared and lead a month-length course *Introduction to quantum cryptography* for 2 talented high-school students for Caixa Catalunya (Jovenes y Ciencia) Jun 2011, Jul 2012
- co-organizer of the [6th and 7th Summer Scientific Schools](#) 2010–2011
- co-organizer of [Flaszki](#) (a series of 5-min talks) 2010
- member of the *Neurobiology Students' Scientific Society*, Univ. of Warsaw 2008–2011
- voluntary tutor of the [Polish Children's Fund](#) during 9 scientific workshops (for gifted high school individuals), the last one: [Physics of Herd](#) 2006–2011
- 9 talks on students' conferences (physics, mathematics, psychology) 2006–2010
- 5 scientific and didactic shows 2006–2010
- mentor of A. Kubica and W. Pilewski, winners (1st prize) of the [21st European Union Contest for Young Scientists in Paris](#) 2009
- head organizer of the 7th Polish Physics Students' Societies Conference 2007–2009  
(7–10.11.2008, University of Warsaw, 80 participants from 15 universities, 36 talks)
- co-founder and president of the [Physics Students' Society](#), Univ. of Warsaw 2006–2009
- problem setter of the Polish Physics Olympiad 2006–2008

Courses and conferences — participant

- [BigDive](#) (a 4-week long hands-on workshop in data science and big data processing, for 20 participants), Turin, Italy 2012
- [Quantum Information meets Statistical Mechanics](#), Innsbruck, Austria 2012
- [ECCS12](#): European Conference on Complex Systems, Brussels, Belgium 2012
- [QCMC2012](#): 11th Intl. Conference on Quantum Communication, Measurement and Computing, Vienna, Austria 2012
- [44 Symposium on Mathematical Physics: New Developments in the Theory of Open Quantum Systems](#), Toruń, Poland 2012
- [ECCS2011](#): European Conference of Complex Systems, including events: [Complex Dynamics of Human Interactions](#) and [PhD 'Research in Progress' Workshop](#), Vienna, Austria 2011
- [NetSci 2011](#): The International School and Conference on Network Science 2011
- [Balaton Summer School in Physics](#): Self-organization and complex systems, Hungary 2010
- [International Conference on Optical Angular Momentum](#), York, UK 2010
- Summer Course: Quantum Engineering, Advanced Level, Warsaw, Poland 2009
- [Quantum Optics VII - Quantum Engineering of Atoms and Photons](#) Zakopane, Poland 2009
- Quantum Optics and Quantum Information, Toruń, Poland 2008

Other

- co-founder of [Confrenzy](#) — a website listing scientific events 2011–2012

AWARDS,  
SCHOLARSHIPS

- ICFO Innovation Fund grant awarded for Confrenzy Oct 2011
- Scholarship of the Minister of Science and Higher Education for exceptional achievements in science 2007–2010
- 2nd place in the Didactic Show Competition (Faculty of Physics, University of Warsaw) 2008
- Research Science Institute (Massachusetts Institute of Technology, Cambridge, MA, USA) 2005
- Scholarship of the Polish Children's Fund 2003–2005
- Scholarship of the Minister of Education, Science and Sport 2003–2005
- Bronze Medal in the International Physics Olympiad (Pohang, South Korea) 2004
- 2nd place in the 53rd Polish Physics Olympiad 2004
- 7th place in the 52nd Polish Physics Olympiad 2003

TECHNICAL SKILLS

- Languages: Polish (native), English (fluent)
- Programming languages: Mathematica, Python, MATLAB, LabView, LaTeX, JavaScript
- Systems (user): Mac OS X, Linux, Windows

## Papers

- M. Faccin, T. Johnson, J. Biamonte, S. Kais, P. Migdał, [Degree Distribution in Quantum Walks on Complex Networks](#), arXiv:1305.6078, accepted to PRX, featured on [Azimuth blog](#)
- P. Migdał, J. Rodriguez-Laguna, M. Lewenstein, [Entanglement classes of permutation-symmetric qudit states: symmetric operations suffice](#), Phys. Rev. A 88, 012335 (2013), arXiv:1305.1506
- J. Rodriguez-Laguna, P. Migdał, M. Ibanez Berganza, M. Lewenstein, G. Sierra, [Qubism: self-similar visualization of many-body wavefunctions](#), New J. Phys. 14 053028 (2012), arXiv:1112.3560
- P. Migdał, M. Denkiewicz, J. Rączaszek-Leonardi, D. Plewczynski, [Information-sharing and aggregation models for interacting minds](#), arXiv:1109.2044 (after a positive review from the Journal of Mathematical Psychology)
- P. Migdał, K. Banaszek, [Immunity of information encoded in decoherence-free subspaces to particle loss](#), Phys. Rev. A 84, 052318 (2011), arXiv:1107.3786
- P. Migdał, [A mathematical model of the Mafia game](#), arXiv:1009.1031
- P. Migdał, W. Wasilewski, [Noise reduction in 3D noncollinear parametric amplifier](#), Appl. Phys. B 99, 657-671 (2010), arXiv:0908.2207
- K. Banaszek, R. Demkowicz-Dobrzański, M. Karpinski, P. Migdał, C. Radzewicz, [Quantum and semiclassical polarization correlations](#), Opt. Comm. 283, 713-718 (2010), arXiv:0908.3548
- P. Migdał, P. Fita, C. Radzewicz, Ł. Mazurek, [Wavefront sensor with Fresnel zone plates for use in an undergraduate laboratory](#), Am. J. Phys. 76, 229 (2008)
- T. S. Santos, J. S. Lee, P. Migdał, I. C. Lekshmi, B. Satpati, J. S. Moodera, [Room-Temperature Tunnel Magnetoresistance and Spin-Polarized Tunneling through an Organic Semiconductor Barrier](#), Phys. Rev. Lett. 98, 016601 (2007)

## Conference talks — presenting author

- P. Migdał, M. Denkiewicz, J. Rączaszek-Leonardi, D. Plewczynski, *Two and more heads deciding: models of information-sharing and aggregation for two-choice discriminative tasks*, [Complex Dynamics of Human Interactions](#) (a [ECCS2011](#) satellite) (12-16.09.2011, Vienna, Austria)

## Conference posters — presenting author

- J. Rodriguez-Laguna, P. Migdał, M. Ibanez Berganza, M. Lewenstein, G. Sierra, [Self-similar visualization and sequence analysis of many-body wavefunctions](#) (2012)
- [Immunity of information encoded in singlet states against one particle loss](#) (2012)
- A. Kubica, P. Migdał, [The spatial shape of the Spiral Zone Plate foci](#) (2010)
- P. Migdał, W. Wasilewski, [Optimization of a 3D noncollinear parametric amplifier](#) (2009)

## Popular science and education-related articles (selected)

- M. Kotowski, M. Kotowski, P. Marczewski, P. Migdał, [An independent camp for high school geeks](#), Summer Scientific School (2012)
- M. Kotowski, P. Migdał, [Open Science and Science 2.0](#), 1st Offtopicarium (2012)
- P. Migdał, S. Krawczyk, [Zespół Aspergera, nauki ścisłe i kultura nerdów](#) (Asperger Syndrome, Hard Science and Nerd Culture), V Krakowska Konferencja Kognitywistyczna (2011), a popular science article
- P. Migdał, [Szczypa magii w każdym promyku – o polaryzacji światła](#) (A bit of magic in every ray - on the polarization of light), III Sylwestrowe Warsztaty Naukowe, 65-67 (2010), a popular science article
- M. Kotowski, M. Kotowski, P. Migdał, K. Sołtys, [Drogowskaz Pasjonata, czyli jak rozwijać się w szkole i w trakcie studiów](#) (Guidelines for the Curious - how to develop oneself during high school and university years), (2010), a collection of advice
- P. Migdał, [Mafia, zdradziecka parzystość oraz pi](#) (Mafia, treacherous parity and pi), Delta - miesięcznik popularnonaukowy, 14-15, 07/2010 (2010), a short popular science article
- P. Migdał, [Zapaleńcy i Wypaleńcy, czyli rzecz o utracie pasji w trakcie studiów](#) (Flames of passion... and of burnout, or: about the loss of motivation during studies), (2010), an essay
- eds: M. Zientkiewicz, P. Migdał, M. Nowaczyk, M. Pomorski, B. Szczygieł, [7th Polish Physics Students' Societies Conference - proceedings](#), ISBN: 978-83-61026-05-1, (2009), a book (132 pages, 10 reviewed papers)