

Mateusz Chwastyk | CV

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Education and employment

- **Arizona State University** **Tempe, USA**
Department of Physics, Pressé Group — Postdoctoral Researcher
Scope: *Enzymes activity*
2017–present
- **Polish Academy of Sciences** **Warsaw, Poland**
Institute of Physics — International Post-Graduate Studies
December 15, 2016 — Ph.D. with honors in Physics, advisor: Prof. Marek Cieplak
Dissertation: *Dynamics of proteins with knots, cavities and cellulosomal proteins*
2011–2016
- **Nicolaus Copernicus University** **Toruń, Poland**
Faculty of Physics, Astronomy and Applied Informatics — M.Sc. Studies
September 9, 2011 — M.Sc. in Physics, advisor: Dr. Michał Zieliński
Dissertation: *Screening of the Coulomb interaction in semiconductor quantum dots*
2009–2011
- **Nicolaus Copernicus University** **Toruń, Poland**
Faculty of Physics, Astronomy and Applied Informatics — B.Sc. Studies
August 27, 2009 — B.Sc. in Physics, advisor: Prof. Włodzimierz Jaskólski
Dissertation: *Quantum dots — zero-dimensional semiconductor structures*
2006–2009

Research stays abroad

- **University of Limerick** **Limerick, Ireland**
Department of Physics
Jun 8–Aug 16, 2015
- **University of Limerick** **Limerick, Ireland**
Department of Physics
Jun 8–Aug 17, 2014
- **Tyndall National Institute at UCC** **Cork, Ireland**
Tyndall Theory, Modelling & Design Centre
Jul 29–Sep 6, 2013

List of publications

1. **M. Chwastyk**, P. Rózański, M. Zieliński
Atomistic Calculation of Coulomb Interactions in Semiconductor Nanocrystals: Role of Surface Passivation and Composition Details
Acta Phys. Pol. A 122, 312–314 (2012)
2. **M. Chwastyk**, A. Galera-Prat, M. Sikora, À. Gómez-Sicilia, M. Carrión-Vázquez, M. Cieplak
Theoretical tests of the mechanical protection strategy in protein nanomechanics
Proteins: Struct., Funct., Bioinf. 82, 717–726 (2014)
3. **M. Chwastyk**, M. Jaskólski, M. Cieplak
Structure-based analysis of thermodynamic and mechanical properties of cavity-containing proteins — case study of plant pathogenesis-related proteins of class 10
FEBS J. 281, 416–429 (2014)
4. **M. Chwastyk**, M. Cieplak
Knotted Proteins under Tension
Israel J. Chem. 54, 1241–1249 (2014)
5. B. Sikora, K. Fronc, I. Kamińska, K. Koper, **M. Chwastyk**, P. Stępień, W. Paszkowicz, T. Wojciechowski, K. Sobczaka, D. Elbaum
Fluorescence resonance energy transfer between ZnO/MgO/carboxymethyl- β -cyclodextrin and Nile Red in HeLa cells — biosensing applications
RSC Adv. 5, 1323 (2015)
6. I. Kamińska, K. Fronc, B. Sikora, K. Koper, R. Minikayev, W. Paszkowicz, K. Sobczak, T. Wojciechowski, **M. Chwastyk**, A. Reszka, B. J. Kowalski, P. Stępień, D. Elbaum
Synthesis of $ZnAl_2O_4:(Er^{3+}, Yb^{3+})$ spinel-type nanocrystalline upconverting luminescent marker in HeLa carcinoma cells, using a combustion aerosol method route
RSC Adv. 4, 56596 (2014)
7. **M. Chwastyk**, M. Cieplak
Cotranslational folding of deeply knotted proteins
J. Phys.: Condens. Matter — special issue: Knots 27, 354105 (2015)
8. **M. Chwastyk**, A. Poma, M. Cieplak
Statistical radii associated with amino acids to determine the contact map: fixing the structure of a type I cohesin domain in the Clostridium thermocellum cellulosome
Phys Biol. 12, 046002 (2015)
9. A. Poma, **M. Chwastyk**, M. Cieplak
Polysaccharide-protein complexes in a coarse-grained model
J. Phys. Chem. B 119, 12028–12041 (2015)
10. **M. Chwastyk**, M. Cieplak
Multiple folding pathways of proteins with shallow knots and co-translational folding
J. Chem. Phys. 143, 045101 (2015)

11. A. B. Poma, **M. Chwastyk**, M. Cieplak
Coarse-grained model of the native cellulose α and the transformation pathways to the $I\beta$ allomorph
Cellulose 23, 2247 (2016)
12. **M. Chwastyk**, M. Jaskólski, M. Cieplak
Volume of cavities in proteins and virus capsids
Proteins: Struct., Funct., Bioinf. 84, 1275–1286 (2016)
13. Y. Zhao, **M. Chwastyk**, M. Cieplak
Topological transformations in proteins: effects of heating and proximity of an interface
Sci. Rep. 7, 39851 (2017)
14. Y. Zhao, **M. Chwastyk**, M. Cieplak
Structural entanglements in protein complexes
J. Chem. Phys. 146, 225102 (2017)
15. **M. Chwastyk**, A. M. Vera, A. Galera-Prat, M. Gunnoo, D. Thompson, M. Carrión-Vázquez, M. Cieplak
Non-local effects of point mutations on the stability of a protein module
(under review at J. Chem. Phys.)
16. A. B. Poma, **M. Chwastyk**, M. Cieplak
Elastic moduli of biological fibers in a coarse-grained model: crystalline cellulose and β -amyloids
(under review at Soft Matter)

Awards

- Scientific Prize of the Director of the Institute of Physics, Polish Academy of Sciences **Apr 27, 2017**
Warsaw, Poland

Schools, conferences and seminars

- Workshop on astronomy **Dec 1–6, 2003**
Piwnice, Poland
Centre for Astronomy at the Nicolaus Copernicus University
- Workshop on number theory **Jan 12–16, 2004**
Warsaw, Poland
Faculty of Mathematics, Informatics and Mechanics of Warsaw University
- Workshop on astronomy **Jun 4–11, 2004**
Ostrowik, Poland
Astronomical observatory of Warsaw University
- First Young Polish Mathematicians Conference **Sep 17–19, 2004**
Warsaw, Poland
The Polish Mathematical Society

- Workshop on astronomy
Centre for Astronomy at the Nicolaus Copernicus University
Nov 26–Dec 3, 2004
Piwnice, Poland
- 40th Jaszowiec International School & Conference on the Physics of Semiconductors
- **poster presentation:** *Atomistic Calculation of Screened Coulomb Interactions in Semiconductor Nanostructures*
Jun 25–Jul 1, 2011
Krynica-Zdrój, Poland
- WELCOME Scientific Meeting On Hybrid Nanostructures
- **poster presentation:** *Atomistic Calculation of Screened Coulomb Interactions in Semiconductor Nanostructures*
Aug 28–31, 2011
Toruń, Poland
- Biomolecules and Nanostructures — Będlewo
- **poster presentation:** *Atomistic Calculation of Screened Coulomb Interactions in Semiconductor Nanostructures*
Sep 4–8, 2011
Będlewo, Poland
- Workshop on Physical Virology
International Centre for Theoretical Physics
Sep 24–28, 2012
Trieste, Italy
- Biomolecules and Nanostructures 4
- **poster presentation:** *Theoretical tests of the mechanical protection strategy in protein nanomechanics*
May 15–19, 2013
Pułtusk, Poland
- E-MRS Fall Meeting 2013
- **poster presentation:** *Theoretical tests of the mechanical protection strategy in protein nanomechanics*
Sep 16–20, 2013
Warsaw, Poland
- The Seminar on Biological Physics and Bioinformatics at the Institute of Physics and the Institute of Biochemistry and Biophysics Polish Academy of Sciences
- **oral presentation:** *Proteins with cavities and proteins with knots*
May 7, 2014
Warsaw, Poland
- VI Doctoral Symposium IP PAS
- **oral presentation:** *Proteins with cavities and proteins with knots*
May 16–17, 2014
Małdralin, Poland
- NanoFun Conference
- **poster presentation:** *Theoretical tests of the mechanical protection strategy in protein nanomechanics*
Mar 28, 2014
Warsaw, Poland
- Significance of Knotted Structures for Function of Proteins and Nucleic Acids
- **poster presentation:** *PR10 — Proteins with cavities*
Sep 17–21, 2014
Warsaw, Poland
- CellulosomePlus Kick-Off meeting
Jan 16, 2014
Madrid, Spain
- Repetitive, Non-Globular Proteins: Nature to Nanotechnology
- **oral presentation:** *Pathways of folding of knotted proteins and the effects of co-translation*
Mar 30–Apr 1, 2015
York, England

- Biomolecules and Nanostructures 5
 - **oral presentation:** *Pathways of folding of knotted proteins and the effects of co-translation.*

May 13–17, 2015
Jaroszwice, Poland
- VII Doctoral Symposium IP PAS

May 25–27, 2015
Maðralin, Poland
- The "Rice Masterclass" given by Professor Stuart Rice
 The Royal Irish Academy

Jul 9, 2015
Dublin, Ireland
- Challenges In Molecular Biology, Biophysics, and Biomedicine
 - **poster presentation:** *Pathways of folding of knotted proteins and the effects of co-translation*

Sep 17–19, 2015
Warsaw, Poland
- 1st Rolling Conference
 - **oral presentation:** *Coarse-grained models for proteins: on-ribosome proteins folding*

Dec 17, 2015
Warsaw, Poland
- Condensed Matter Physics Seminar at the Institute of Physics Polish Academy of Sciences
 - **oral presentation:** *Proteins with knots*

Mar 8, 2016
Warsaw, Poland
- Skype Seminar at Institute for Computational Science and Technology HCM City
 - **oral presentation:** *Proteins with knots*

Mar 18, 2016
Ho Chi Minh, Vietnam
Warsaw, Poland
- The Seminar on Biological Physics and Bioinformatics at the Institute of Physics and the Institute of Biochemistry and Biophysics Polish Academy of Sciences
 - **oral presentation:** *Topological changes in knotted proteins*

Oct 26, 2016
Warsaw, Poland
- Public defense of Ph.D. dissertation
 - **oral presentation:** *Dynamics of proteins with knots, cavities and cellulosomal proteins*

Dec 13, 2016
Warsaw, Poland
- Arizona BioPhest meeting
 - **poster presentation:** *Proteins with knots*

Apr 22, 2017
Tempe, USA

Grants

- **October 1, 2010–September 31, 2011** — Investigator of a grant of Foundation for Polish Science: *Control of exciton levels in quantum dots: atomistic theory as a step towards entangled photon pairs generation.*
 Grant director: Dr. Michał Zieliński from Department of Quantum Physics, Institute of Physics NCU Toruń, Poland

- **August 29, 2013–August 29, 2014** — Principal Investigator of a computational grant of The Irish Centre for High-End Computing (ICHEC): *All-atom molecular dynamics simulations of the heteromeric polypeptide fusions of cohesin I modules*.
- **November 28, 2016–November 20, 2017** — Investigator of a computational grant of Polish Infrastructure for Supporting Computational Science in the European Research Space: *Mutations of cellulosomal proteins and simulations of creation of knotted proteins in presence of the ribosome*. Grant director: Prof. Marek Cieplak from Institute of Physics, Polish Academy of Sciences, Warsaw, Poland
- **November 1, 2013–October 31, 2017** — Investigator of European grant FP7-NMP: *Boosting Lignocellulose Biomass Deconstruction with Designer Cellulosomes for Industrial Applications*. Grant director: Prof. Marek Cieplak from Institute of Physics, Polish Academy of Sciences, Warsaw, Poland

Software development

- Author and administrator of the SPACEBALL server (<http://www.ifpan.edu.pl/~chwastyk/spaceball>)

Developing interests

- Interdisciplinary Scientific Camp in Świder, Poland, May 30–Jun 6, 2004
- Japanese Language and Culture Course, Poland, 2007
- Japanese Language Course, Poland, 2007
- Stipend and member of the research group under the Homing Plus project at Department of Quantum Physics, Institute of Physics NCU Toruń, Poland, 2010–2011

Skills

- Polish native speaker
- Advanced in English
- Basic in German and Japanese
- Programming languages: C, C++, Fortran, PHP, HTML, AWK, Python, OpenMP, Bash
- Operating systems: Linux, Windows 95/98/XP/Vista/7
- Software for quantum chemistry: GAMES, Gaussian, MOLDEN
- Software for molecular dynamics: GROMACS, PyMOL, VMD, NAMD

- Graphics software: Inkscape, GIMP, Gnuplot, Xmgr
- Office software: Microsoft Office, OpenOffice, LaTeX

Interests

- Quantum physics: mechanics, simulations, numerical methods, quantum field theory
 - Nanotechnology: Applied nanotechnology for diagnosing, treating, and preventing cancer
 - Quantum informatics, cryptography, biophysics, biotechnology
 - Neuroscience, brain networks
 - Algorithms and programming languages
 - Amateur astronomy observations, marathons & running races
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July 1, 2017