

Curriculum Vitae

Anna Ochab-Marcinek, Ph. D. (dr hab.)

Affiliation Dioscuri Centre for Physics and Chemistry of Bacteria
Institute of Physical Chemistry
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Employment and professional experience

Jan 2024 – present Researcher (as *Specjalista*) at Dioscuri Centre for Physics and Chemistry of Bacteria, Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland

May 2018 – Dec 2023 Principal Investigator (*Kierownik Zespołu Tematycznego*) at the Biophysical Chemistry Group (as *Specjalista*), Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland

08 Oct 2018 Habilitation in chemistry, Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland

Jan 2013 – Apr 2018 Principal Investigator (*Kierownik Zespołu Tematycznego*) at the Biophysical Chemistry Group (as *Adiunkt*), Department of Soft Condensed Matter, Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland

May 2009 – Dec 2012 Postdoc (as *Adiunkt*), Department of Soft Condensed Matter, Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland

Apr 2009 Postdoc (as *Specjalista*), Department of Soft Condensed Matter, Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland

Oct 2007 – Sep 2008 Postdoc (as *Wissenschaftliche Mitarbeiterin*), Lehrstuhl für Theoretische Physik I, Institut für Physik, Mathematisch-Naturwissenschaftlich-Technische Fakultät, Universität Augsburg, Augsburg, Germany

Oct 2006 – Sep 2009 *Asystent*, Department of Statistical Physics, M. Smoluchowski Institute of Physics, Jagiellonian University, Kraków, Poland

30 Jun 2020 – 31 Dec 2022 Member of the Interdisciplinary COVID-19 Advisory Team affiliated with the President of the Polish Academy of Sciences

2008 - 2010 Head of a popular-science authors team writing blog and texts for *Tygodnik Powszechny* weekly (one of the most recognized and reputable social and cultural weekly magazines in Poland)

Research interests

- Software development for automated recognition of bacteria in microscopic images
 - Modeling of biological evolution
 - Stochastic modeling of gene expression
 - Diffusion in a crowded environment
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Publications

1. J. Jędrak, M. Rubin, A. Ochab-Marcinek, Generalization of Powell's results to population out of steady state, *Physical Review E* 108 (2), 024405 (2023)
2. J. Jędrak, A. Ochab-Marcinek, Contributions to the 'noise floor' in gene expression in a population of dividing cells, *Scientific Reports* 10, 13533 (2020)
3. A. Ochab-Marcinek, M. Kwiatkowski, J. Jędrak, Exactly solvable model of gene expression in proliferating bacterial cell population with stochastic protein bursts and protein partitioning, *Phys. Rev. E*, , 99 (2019) 042416
4. A. Ochab-Marcinek, J. Jędrak, M. Tabaka, Hill kinetics as a noise filter: The role of transcription factor autoregulation in gene cascades , *Phys. Chem. Chem. Phys.*, 2017, 19, 22580-22591
5. G. Angulo, J. Jedrak, A. Ochab-Marcinek, P. Pasitsuparoad, C. Radzewicz, P. Wnuk, A. Rosspeintner, How good is the generalized Langevin equation to describe the dynamics of photo-induced electron transfer in fluid solution? , *J. Chem. Phys.* 146 (2017) 244505
6. J. Jędrak, A. Ochab-Marcinek, Influence of gene copy number on self-regulated gene expression, *J. Theor. Biol.*, 2016, 408, 222-236
7. J. Jędrak, A. Ochab-Marcinek, Time-dependent solutions for a stochastic model of gene expression with molecule production in the form of a compound Poisson process, *Phys. Rev. E*, 2016, 94, 032401
8. T. Kalwarczyk, K. Sozański , A. Ochab-Marcinek, J. Szymański, M. Tabaka, S. Hou, R. Hołyst, Motion of nanoprobe in complex liquids within the framework of the length-scale dependent viscosity model, *Advances in Colloid and Interface Science*, 2015, 223, 55-63
9. A. Ochab-Marcinek, M. Tabaka, Transcriptional leakage versus noise: A simple mechanism of conversion between binary and graded response in autoregulated genes, *Phys. Rev. E*, 2015, 91(1), 012704
10. K. Sozanski, A. Wisniewska, T. Piasecki, K. Waszczuk, A. Ochab-Marcinek, T. Gotszalk, R. Hołyst, Depletion Layer in Polymer Solutions at an Interface Oscillating at the Subnano-to Submicrometer Scale, *Soft Matter* 2014, 10, 7762-7768
11. T.K. Piskorz, A. Ochab-Marcinek, A Universal Model of Restricted Diffusion for Fluorescence Correlation Spectroscopy, *J. Phys. Chem. B*, 2014, 118 (18), 4906–4912
12. A. Lewandowska, A. Majcher, A. Ochab-Marcinek, M. Tabaka, R. Hołyst, Taylor Dispersion Analysis in Coiled Capillaries at High Flow Rates, *Analytical Chemistry* 2013, 85 (8), 4051–4056
13. A. Ochab-Marcinek, S.A. Wieczorek, N. Ziębacz, R. Hołyst, The effect of depletion layer on diffusion of nanoparticles in solutions of flexible and polydisperse polymers , *Soft Matter* 2012, 8, 11173-11179
14. A. Ochab-Marcinek, R. Hołyst, Scale-dependent diffusion of spheres in solutions of flexible and rigid polymers: mean square displacement and autocorrelation function for FCS and DLS measurements, *Soft Matter* 7 (2011) 7366-7374
15. A. Ochab-Marcinek, M. Tabaka, Bimodal gene expression in noncooperative regulatory systems, *PNAS* 107(51) (2010) 22096-22101
16. A. Ochab-Marcinek, Extrinsic noise passing through a Michaelis-Menten reaction: A universal

response of a genetic switch, *J. Theor. Biol.*, 263(4) (2010) 510-520

17. A. Ochab-Marcinek, E. Gudowska-Nowak, E. Nasonova, S. Ritter, Modelling radiation-induced cell cycle delays, *Rad. Env. Biophys.* 48(4) (2009) 361
18. A. Ochab-Marcinek, G. Schmid, I. Goychuk, P. Hanggi, Noise-assisted spike propagation in myelinated neurons, *Phys. Rev. E* 79, 011904 (2009)
19. A. Fiasconaro, A. Ochab-Marcinek, B. Spagnolo, E. Gudowska-Nowak, Monitoring noise-resonant effects in cancer growth influenced by external fluctuations and periodic treatment, *Eur. Phys. J. B* 65, 435-442 (2008)
20. Anna Ochab-Marcinek, Predicting the asymmetric response of a genetic switch to noise, *J. Theor. Bio.* 254 (2008) 37-44
21. B. Spagnolo, A.A. Dubkov, A.L. Pankratov, E.V. Pankratova, A. Fiasconaro, A. Ochab-Marcinek Lifetime of Metastable States and Suppression of Noise in Interdisciplinary Physical Models, *Acta Physica Polonica B* 38(5) 2007, 1925
22. Anna Ochab-Marcinek, Alessandro Fiasconaro, Ewa Gudowska-Nowak, Bernardo Spagnolo, Coexistence of resonant activation and noise-enhanced stability in a model of tumor-host interaction: Statistics of extinction times, *Acta Physica Polonica B* 37(5) 2006, 1651
23. Alessandro Fiasconaro, Bernardo Spagnolo, Anna Ochab-Marcinek, Ewa Gudowska-Nowak, Co-occurrence of resonant activation and noise-enhanced stability in a model of cancer growth in the presence of immune response, *Physical Review E* 74, 041904 (2006)
24. Anna Ochab-Marcinek: Transient pattern formation in a stochastic model of cancer growth, *Fluctuation and Noise Letters* 5(2) (2005) L331
25. Anna Ochab-Marcinek: Pattern formation in a stochastic model of cancer growth, *Acta Physica Polonica B* 36(6) (2005) 1963
26. Anna Ochab-Marcinek, Ewa Gudowska-Nowak: Population growth and control in stochastic models of cancer development, *Physica A*, 343 (2004) 557-572

Selected other publications (non peer-reviewed)

J. Duszyński, A. Afelt, A. Ochab-Marcinek, R. Owczuk, K. Pyrc, M. Rosińska, A. Rychard, T. Smiatcz, Zrozumieć COVID-19, *ACADEMIA - magazyn Polskiej Akademii Nauk* 4 (64) 2020 pp. 1-80

J. Duszyński, A. Afelt, A. Ochab-Marcinek, R. Owczuk, K. Pyrc, M. Rosińska, A. Rychard, T. Smiatcz, Understanding COVID-19, *ACADEMIA - The magazine of the Polish Academy of Sciences* 4 (68) 2020 pp. 1-80

J. Duszyński, A. Afelt, M. Kossowska, A. Ochab-Marcinek, R. Owczuk, W. Paczos, A. Plater-Zyberk, K. Pyrc, M. Rosińska, A. Rychard, T. Smiatcz, Kroniki Pandemii: lata 2020-2021, *ACADEMIA - magazyn Polskiej Akademii Nauk* 4(68) 2021 pp. 1-118

J. Duszyński, A. Afelt, M. Kossowska, A. Ochab-Marcinek, R. Owczuk, W. Paczos, A. Plater-Zyberk, K. Pyrc, M. Rosińska, A. Rychard, T. Smiatcz, Chronicles of a Pandemic, *ACADEMIA - The magazine of the Polish Academy of Sciences* 4(72) 2021 pp. 1-120

Patents

A. Lewandowska, A. Majcher, M. Tabaka, A. Ochab-Marcinek, R. Hołyst *Sposób wyznaczania współczynnika dyfuzji D substancji chemicznej w buforze TRIS (Method for determining chemical diffusion coefficients in the rolled capillary at high flow speed)* patent no. 220250 (Polish Patent Office), application 10.8.2012, patent granted 4.12.2014.

Honours, awards, grants, scholarships

15.5.2017-14.5.2023	Awarded the National Science Centre grant SONATA Bis 6 no. 2016/22/E/ST2/00558 (628,200 PLN) for the project: <i>Evolution of gene regulation as a stochastic process: Savageau's demand theory, cost of regulation and noise</i>
2013	Awarded the Polish Ministry of Science <i>Iuventus Plus</i> grant no. 0501/IP1/2013/72 (301,600 PLN) for the project: <i>Theoretical study of conditions for precise regulation of genes in a 2-gene cascade with autoregulation</i>
2012	Award in the „Young researchers IPC PAS” competition organized by the Institute of Physical Chemistry, Polish Academy of Sciences, for the publications in last 3 years
12.2011-12.2014	Awarded the National Science Centre grant SONATA no. 2011/01/D/ST3/00751 (800,000 PLN) for the project: <i>Transition from nano- to macroviscosity in diffusion of nano particles in a crowded environment: Theoretical and experimental study of the depletion layer effect</i>
2011	1 st award in the competition for the best IPC PAS publication of the year 2010, for the paper: A. Ochab-Marcinek, M. Tabaka, <i>Bimodal gene expression in noncooperative regulatory systems</i> , PNAS 107(51) (2010) 22096-22101
8.11.2011-31.10.2014	Awarded the Polish Ministry of Science Scholarship for Outstanding Young Researchers (contract no. 30/E-64/STYP/6/2011)
2011	Award in the „Young researchers IPC PAS” competition organized by the Institute of Physical Chemistry, Polish Academy of Sciences, for the publications in last 3 years
12.2010-12.2011	Awarded the <i>Iuventus Plus</i> grant no. IP2010 028870 of Polish Ministry of Science (150,000 PLN) for the project: <i>Modeling the depletion layer effect in diffusion of nanoparticles in crowded environment</i>
2009 - 2013	Participation in Polish Science Foundation / European Union TEAM grant: <i>From nano to macroscale: motion of proteins, protein charge ladders and nanoparticles in complex liquids and diffusion limited reactions in crowded environment</i>
2008	Awarded a Highly Commended diploma in the „Popularyzator Nauki 2008” competition organized by Polish Press Agency and Polish Ministry of science, for popular-science articles and blog written for <i>Tygodnik Powszechny</i> weekly
2008	Participation in the Volkswagen Foundation grant no. I/80424: <i>New Conceptual Approaches to Modeling and Simulation of Complex Systems</i>
2007-2008	Participation in the German Research Foundation grant: <i>Nano- und Mikrofluidik: Von den molekularen Bewegung zur kontinuierlichen Strömung</i>
2006	PhD in physics with honours
2005-2006	Polish State Committee for Scientific Research grant no. 1P03B15929 (16 000 PLN) for the project <i>Fluctuations and delays in cell cycle models</i>
2005	ESF STOCHDYN grant no. 785 (895 EUR) for a visit at the Group of Interdisciplinary Physics in Palermo, Italy, 1-7 February 2006
2002-2006	Granted a PhD scholarship during all years of study
2002	Graduated with honours in theoretical physics
2000	Granted a TEMPUS Scholarship at Friedrich-Schiller-Universität, Jena, Germany
1998-2002	Granted a Jagiellonian University student scholarship for very good academic results (during all provided years of study: 2nd-5th year)

Invited talks (conferences)

26-29.10.2023	Conceptual workshop “Procesy i przemiany w układach złożonych” (“Processes and transformations in complex systems”) – Symposium of the Centre for Systemic Risk Research of the University of Warsaw and the Centre for Advanced Studies, Warsaw
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University of Technology; European Centre for Geological Education of the University of Warsaw, Korzecko in Chęciny.

Invited talk (in Polish): *Zespół doradczy ds. COVID-19 przy Prezesie PAN, 30/06/2020 – 31/12/2022 (COVID-19 Advisory Panel to the President of the Polish Academy of Sciences, 30/06/2020 - 31/12/2022)*

- 23-25.9.2020 Dynamics of biological systems: from viruses to populations, virtual conference, Institute of Theoretical Physics, Jagiellonian University, Kraków, Poland
Invited talk: *How cell growth, division, and stochastic gene expression contribute to the protein noise floor*
- 4-5.6.2018 Jędrzej Śniadecki BioMedical Workshop (3rd edition), Bydgoszcz, Poland,
Invited talk: *Modeling of random fluctuations in gene expression and cell division*
- 6-9.3.2018 Information transmission in biological systems, Będlewo, Poland,
I was invited by the conference organizer to co-organize it and to give the invited talk: *Bursty gene expression and cell division*
- 3-8.9.2017 30th Marian Smoluchowski Symposium on Statistical Physics, Kraków, Poland,
Invited talk: *Stochastic gene expression in cells undergoing division*
- 8-9.12.2016 BIOFIZMAT 5 Workshop, Banach Center, Warsaw, Poland,
Invited talk: *Modele stochastycznej ekspresji genów z losowymi burstami i deterministycznym rozpadem białek (Models of stochastic gene expression with random bursts and deterministic protein degradation)*
- 15-17.9.2016 7. Forum Matematyków Polskich z Udziałem Matematyków Ukraińskich (7th Forum of Polish Mathematicians with Participation of Ukrainian Mathematicians), Olsztyn, Poland
Co-organizer and chairperson of the thematic session *Matematyczne modele regulacji genów i szlaków sygnalizacyjnych w komórkach (Mathematical models of gene regulation and signalling pathways in cells)*
I was invited by the session organizer to co-organize it and to give the invited talk within that session: *Gene multiplication: A simple phenomenon that may cause non-intuitive effects*
- 14-17.9.2015 Conference: 28th Marian Smoluchowski Symposium on Statistical Physics, Kraków, Poland
Invited talk: *Modeling stochastic gene expression: a few solutions by geometric construction*
- 7.9.2015 43rd Congress of Polish Physicists, Kielce, Poland
Invited talk within the specialistic session *Fizyka Statystyczna (Statistical Physics): Modelowanie dyfuzji w zatłoczonym środowisku dla spektroskopii korelacji fluorescencji (Modeling of diffusion in a crowded environment for fluorescence correlation spectroscopy)*
- 11.5.2013 Conference: *Biological Complexity in Cracow*, Kraków, Poland
Invited talk: *Gene regulation as a nonlinear noise filter*
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Popular science publications

For *Tygodnik Powszechny* weekly:

1. Anna Ochab-Marcinek, *Klucz do komórki*, *Tygodnik Powszechny* 2 (3209), 9.1.2011
2. Anna Ochab-Marcinek, *Geniusz z Wrocławia*, *Tygodnik Powszechny* 1-2 (3104-05), 4-11.1.2009
3. Anna Ochab-Marcinek, *Patent hochsztaplera* *Tygodnik Powszechny* 50 (3101) 14.12.2008
4. Anna Ochab-Marcinek, *Doktorat z telepatii*, *Tygodnik Powszechny* 45 (3096) 9.11.2008
5. Anna Ochab-Marcinek, *Więcej niż mrówek* *Tygodnik Powszechny* 37 (3088), 14.09.2008

2008-2010: *Świat: Jak to działa?* (*World: how does it work?*) <http://swiat-jaktodziala.blog.onet.pl>
Popular science blog commenting news in physics, for *Tygodnik Powszechny*. **10000 visits/month**

For Agora SA (the editor of *Gazeta Wyborcza* and *gazeta.pl*, the largest daily newspaper and news portal in Poland): Blog articles: 1. *Bez szumu nie ma rozumu?*, 2. *Drogi Watsonie, dlaczego ten izolator nadprzewodzi?*, 3. *O co naprawdę oskarżono Galileusza?* written to order for Agora SA and published on <http://jaktodziala.blox.pl>.

Selected other publications and interviews:

Anna Ochab-Marcinek, *Porządek z przypadku*, Academia, magazine of the Polish Academy of Sciences, 4/11(28)

9.7.2011 **Radio interview** [Polish]: *Dlaczego sklonowany kot wygląda inaczej niż oryginał?* (*Why does a cloned cat look different from the original?*) Wieczór Odkrywców, Polish Radio I

2.3.2011 **Radio interview** [Polish]: *Dlaczego sklonowany kot jest inny od oryginału?* (*Why does a cloned cat is different from the original?*) Radiowa Akademia Nauk, Radio TOK FM

2006 - 2014: Popular science blog, debunking pseudo-science: *Będać młodym fizykiem* (*Being a young physicist*) <http://mlodyfizyk.blox.pl> .**10000 visits/month**

Education

08 Oct 2018	Habilitation in chemistry, Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland
28 Sep 2006	Doctor of Philosophy in physics with honors
Ph.D. thesis:	"Spatio-temporal effect of noises on nonlinear dynamical systems" (Supervisor: prof. Ewa Gudowska-Nowak)
2002-2006	Ph.D. study M. Smoluchowski Institute of Physics, Jagiellonian University, Kraków, Poland
2002	Master of Science in theoretical physics with honors
M.Sc. thesis:	"Stochastic models of population growth and control" (Supervisor: prof. Ewa Gudowska-Nowak)
1997-2002	M.Sc. study in physics M. Smoluchowski Institute of Physics, Jagiellonian University, Kraków, Poland Specialization: theoretical physics

Programming and software

- C, C++, Python
 - Fortran 77, 95
 - html, php, javascript
 - Unix/Linux shell scripting
 - Arduino C++ programming (basic level)
 - R (basic level)
 - Symbolic algebra packages: Maple, Mathematica
 - Scientific graphing and data analysis software: Origin, Gnuplot, Grace
 - Computer graphics software: Adobe Photoshop, Corel, Gimp etc.
 - LaTeX
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Teaching

- Numerical methods
 - Introductory theory of informatics
 - Self-organization in physics, chemistry and biology
 - C++ programming
 - Symbolic algebra (Maple)
 - Introductory physics
 - Introductory mathematics
 - Wave physics
 - Physics laboratory
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Languages

- Polish (native)
 - English (Cambridge Certificate in Advanced English)
 - German
 - Russian
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