

Dr Aljaž Godec

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Education and Positions:

Diploma (2007) and Doctorate (2012), University of Ljubljana, Slovenia
2017 - present Head of the Mathematical Biophysics Group, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany
2014 - 2017 Alexander von Humboldt postdoctoral fellow, Theoretical Physics Group at the Institute of Physics and Astronomy, University of Potsdam, Germany (with Ralf Metzler)
2012 - 2017 research associate, National Institute of Chemistry, Ljubljana, Slovenia (on leave)
2012 - 2014 postdoctoral fellow, Theoretical Physics at the Institute of Physics and Astronomy, University of Potsdam, Germany (with Ralf Metzler)
2007 - 2012 young researcher, National Institute of Chemistry, Ljubljana, Slovenia

Other education and training:

2009 Training on intellectual property, patent practice and academics entrepreneurship (1-day workshop organized by the Slovenian research agency ARRS in Ljubljana)
2008 39th IFF Spring School on soft matter physics: Soft Matter – From Synthetic to Biological Materials (2 week intensive spring-school), Research Centre Jülich (GER)

Languages:

Slovene (mother tongue), English (proficient), German (proficient); FORTRAN (proficient), Mathematica (proficient)

Publications and citations:

49 journal articles, 1 book chapter; Hirsch factor (H-index) Web of Science 19, Google Scholar 21; >900 citations, >45 citations in 2014, >70 citations in 2015, >80 citations in 2016, >100 citations in 2017, >100 citations in 2018, >120 citations in 2019, > 200 citations in 2020

Awards, prizes and honors:

2020 Institute of Physics (IOP) trusted reviewer
2020 Outstanding Reviewer for Journal of Physics A: Math. Theor.
2017 DFG Emmy Noether research group
2017 Karl-Scheel prize of the Berlin Physical Society

- 2017 Academy of Finland fellow (declined)
- 2016 Journal of Physics A Emerging talent
- 2015 participant in the 65th Lindau Nobel laureate meeting
- 2015 Jozef Stefan Golden Emblem Prize for PhD thesis with the highest impact
- 2014 Alexander von Humboldt fellowship for postdoctoral researchers
- 2012 Pregl award for exceptional PhD thesis

Research key words:

Statistical physics, biological physics, chemical physics, soft matter physics, single-molecule dynamics, stochastic processes, complex analysis, asymptotic analysis, functional analysis, non-equilibrium statistical mechanics, ergodicity, ageing, mathematical modeling, cellular signaling, macromolecular dynamics, hydration and hydrophobic effect

Refereeing

Referee for: Science Advances; Physical Review Letters; Physical Review X; Physical Review E; New Journal of Physics; Journal of Statistical Mechanics; Journal of Chemical Physics; Scientific Reports; Journal of Physics A: Mathematical and Theoretical; PlosONE; Chaos, Solitons & Fractals; Journal of Biological Physics; Europhysics Letters; Langmuir; Physics Letters A; Applied Mathematics and Computation; Physica A; Physical Biology; Acta Biomaterialia

Editor role: Associate editor in Frontiers in Physics

Teaching experience

- i) Full faculty member of GGNB (Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences) & GAUSS (Georg-August University School of Science)
- ii) Lecturing:
 - *Advanced methods in statistical mechanics* (GGNB/GAUSS graduate course in the program 'Physics of Biological and Complex systems' – PBCS)
 - *Current Topics in Biophysics* (GGNB/GAUSS program PBCS)
 - *Theoretical Physics* and *Theory and applications of stochastic processes* and *Biophysics* (at University of Potsdam, substituting for Prof. Ralf Metzler)

1 LIST OF PUBLICATIONS

1 Journal articles:

- A.1 A. Lapolla, M. Vossel, & **A. Godec**, *Time- and ensemble-average statistical mechanics of the Gaussian Network Model*. Under review (2021). (arXiv:2102.11847)
- A.2 A. Lapolla, J. C. Smith, & **A. Godec**, *Ubiquitous dynamical time asymmetry in biological and materials systems*. Under review, (2021). (arXiv:2102.01666)
- A.3 D. Hartich & **A. Godec**, *Thermodynamic Uncertainty Relation Bounds the Extent of Anomalous Diffusion*. Under review (2021). (arXiv:2102.06678)
- A.4 A. Lapolla & **A. Godec**, *A Toolbox for Quantifying Memory in Dynamics Along Reaction Coordinates*. Under review (2021). (arXiv:2101.05237)
- A.5 K. Blom & **A. Godec**, *Criticality in the mechanical regulation of cell adhesion*. Under review (2021). (arXiv:2011.05310)
- A.6 D. Hartich & **A. Godec**, *Emergent memory and kinetic hysteresis in strongly driven networks*. Under review, (2020).
- A.7 A. Lapolla & **A. Godec**, *Single-file diffusion in a bi-stable potential: signatures of memory in the barrier-crossing of a tagged-particle*. J. Chem. Phys. **153**, 194104 (2020).
- A.8 A. Lapolla & **A. Godec**, *Faster uphill relaxation in thermodynamically equidistant temperature quenches*. Phys. Rev. Lett. **125** 110602 (2020). **Editors' Suggestion & Focus story in *Physics***: <https://physics.aps.org/articles/v13/144>)
- A.9 A. Lapolla, D. Hartich, & **A. Godec**, *Spectral theory of fluctuations in time-average statistical mechanics of reversible and driven systems*. Phys. Rev. Res. **2**, 043084 (2020).
- A.10 A. Lapolla & **A. Godec**, *BetheSF: Efficient computation of the exact tagged-particle propagator in single-file systems via the Bethe eigenspectrum*. Comp. Phys. Commun. **258** 107569 (2021).
- A.11 T. Ukmar-Godec, P. Fang, A. Ibáñez de Opakua, F. Henneberg, **A. Godec**, M.-S. Cima-Omori, A. Chari, E. Mandelkow, H. Urlaub & M. Zweckstetter, *Proteasomal degradation of the intrinsically disordered protein tau at single-residue resolution*. Science Adv. **6**, eaba3916 (2020).
- A.12 A. Lapolla and **A. Godec**, *Manifestations of projection-induced memory: general theory and the tilted single file.*, Front. Phys. **7**, 182 (2019).
- A.13 D. Hartich and **A. Godec**, *Extreme value statistics of ergodic Markov processes from first passage times in the large deviation limit*, J. Phys. A: Math. Theor. **52**, 244001 (2019) (Invited for a special issue 'New trends in first-passage methods and applications in the life sciences and engineering') (arXiv:1902.00439).
- A.14 D. Hartich and **A. Godec**, *Interlacing Relaxation and First-Passage Phenomena in Reversible Discrete and Continuous Space Markovian Dynamics*, J. Stat. Mech. **024002** (2019) (arxiv.org/abs/1802.10049).
- A.15 D. Hartich and **A. Godec**, *Duality between relaxation and first passage in reversible Markov dynamics: rugged energy landscapes disentangled*, New. J. Phys. (Fast Track Communication), **20**, 112002 (2018).
- A.16 A. Lapolla and **A. Godec**, *Unfolding tagged Particle Histories in Single-File Diffusion: Exact Single- and Two-Tag Local Times Beyond Large Deviation Theory*, New. J. Phys. **20**, 113021 (2018).
- A.17 M. Schwarzl, **A. Godec** and R. Metzler, *Quantifying non-ergodicity of anomalous diffusion with higher order moments*, Sci. Rep., **7**, 3878 (2017).

- A.18 T. Ukmar-Godec, L. Bertinetti, J. Dunlop, **A. Godec**, M. Grabiger, A. Masic, H. Nguyen, I. Zlotnikov, P. Zaslansky and D. Faivre, *Materials Nanoarchitecturing via Cation-Mediated Protein Assembly: Making Limpet Teeth without Mineral*, Adv. Mat., 1701171 (2017).
- A.19 **A. Godec** and R. Metzler, *First passage-time statistics for two-channel diffusion*, J. Phys. A: Math. Theor. **50**, 084001 (2017) ([Invited for a special issue 'Emerging talents'](#))
- A.20 **A. Godec** and R. Metzler, *Universal proximity effect in target search kinetics in the few-encounter limit*, Phys. Rev. X, **6**, 041037 (2016).
- A.21 **A. Godec** and R. Metzler, *Active transport improves the precision of linear long distance molecular signalling*, J. Phys. A: Math. Theor. **49**, 364001 (2016); [arXiv:1605.07965]. ([Invited for a special issue on Marian Smoluchowski's 1916 paper – a century of inspiration](#))
- A.22 M. Schwarzl, **A. Godec**, G. Oshanin and R. Metzler, *A single predator charging a herd of prey: effects of self volume and predator-prey decision-making*, J. Phys. A: Math. Theor. **49**, 225601 (2016). (see also accompanying press release: <http://phys.org/news/2016-04-theoretical-tiger-statistical-sheep-probe.html>)
- A.23 **A. Godec** and R. Metzler, *First passage time distribution in heterogeneity controlled kinetics: going beyond the mean first passage time*, Sci. Rep. **6**, 20349 (2016).
- A.24 **A. Godec** and R. Metzler, *Signal focusing through active transport*, Phys. Rev. E **92**, 010701(R) (2015).
- A.25 H. Krüsemann, **A. Godec** and R. Metzler, *Ageing first passage time density in continuous time random walks and quenched energy landscapes*, J. Phys. A: Math. Theor. **48**, 285001 (2015). ([selected by the editorial board as highlight for IOP-select](#))
- A.26 **A. Godec** and R. Metzler, *Optimization and universality of Brownian search in a basic model of quenched heterogeneous media*, Phys. Rev. E **91**, 052134 (2015).
- A.27 **A. Godec**, A. V. Chechkin, E. Barkai, H. Kantz and R. Metzler, *Localisation and universal fluctuations in ultraslow diffusion processes*, J. Phys. A: Math. Theor. (FTC) **47**, 492002 (2014). ([selected as 2014 Highlight of J. Phys. A](#))
- A.28 M. Bauer, **A. Godec** and R. Metzler, *Diffusion of finite-size particles in two-dimensional channels with random wall configurations*, Phys. Chem. Chem. Phys. **16**, 6118 (2014).
- A.29 **A. Godec**, M. Bauer and R. Metzler, *Collective dynamics effect transient subdiffusion of inert tracers in flexible gel networks*, New. J. Phys. (FTC) **16**, 092002 (2014). ([selected as New. J. Phys. Highlight 2014](#))
- A.30 H. Krüsemann, **A. Godec** and R. Metzler, *First-passage statistics for aging diffusion in systems with annealed and quenched disorder*, Phys. Rev. E **89**, 040101(R) (2014).
- A.31 **A. Godec**, J. C. Smith and F. Merzel, *Soft collective fluctuations governing hydrophobic association*, Phys. Rev. Lett. **111**, 127801 (2013).
- A.32 **A. Godec** and R. Metzler, *Linear response, fluctuation-dissipation relation, and finite-system-size effects in superdiffusion*, Phys. Rev. E **88**, 012116 (2013).
- A.33 **A. Godec** and R. Metzler, *Finite-Time Effects and Ultraweak Ergodicity Breaking in Superdiffusive Dynamics*, Phys. Rev. Lett. **110**, 020603 (2013).
- A.34 **A. Godec** and F. Merzel, *Physical origin underlying the entropy loss upon hydrophobic hydration* J. Am. Chem. Soc. **134**, 17574 (2012).
- A.35 T. Ukmar, U. Maver, O. Planinšek, A. Pintar, V. Kaučič, **A. Godec** and M. Gaberšček, *Guest-host van der Waals interactions decisively affect the molecular transport in mesoporous media*, J. Mater. Chem. **22**, 1112 (2012).

- A.36 **A. Godec**, J. C. Smith and F. Merzel, *Increase of both order and disorder in the first hydration shell with increasing solute polarity*, Phys. Rev. Lett. **107**, 267801 (2011).
- A.37 A. Žnidaršič, **A. Godec** and M. Gaberšček. *pH-based one pot synthesis of biocompatible olive shaped inorganic particles*, Mater. Res. Bull. **47**, 967 (2012).
- A.38 T. Ukmar, U. Maver, O. Planinšek, A. Pintar, V. Kaučič, M. Gaberšček and **A. Godec**, *Understanding controlled drug release from mesoporous silicates: Theory and Experiment*, J. Control. Rel. **155**, 409 (2011).
- A.39 T. Ukmar, M. Gaberšček, F. Merzel and **A. Godec**, *Modus operandi of controlled release from mesoporous matrices: a theoretical perspective*, Phys. Chem. Chem. Phys. **13**, 15311 (2011).
- A.40 T. Ukmar, **A. Godec**, O. Planinšek, V. Kaučič, G. Mali and M. Gaberšček, *Phase (trans)formation and physical state of a model drug in mesoscopic confinement* Phys. Chem. Chem. Phys. **13**, 16046 (2011).
- A.41 **A. Godec**, T. Ukmar, M. Gaberšček and F. Merzel, *Inversion of pore size dependence of solute transport kinetics from increasingly attractive ordered porous matrix*, Europhys. Lett. **92**, 60011 (2010).
- A.42 U. Maver, A. Žnidaršič, D. Saboti, S. Srčič, M. Gaberšček, **A. Godec** and O. Planinšek, *The relation between the interfacial contact and SiO₂ coating efficiency and properties in the case of two clarithromycin polymorphs*, Coll. Surf. A: Physicochem. Eng. Aspects **371**, 119 (2010).
- A.43 **A. Godec**, M. Gaberšček, J. Jamnik, D. Janežič and F. Merzel, *Ion-size effect within the aqueous solution interface at the Pt(111) surface : molecular dynamics studies*, Phys. Chem. Chem. Phys. **12**, 13566 (2010).
- A.44 O. Planinšek, J. Zadnik, M. Kunaver, S. Srčič and **A. Godec**, *Structural evolution of indomethacin particles upon milling: time-resolved quantification and localization of disordered structure studied by IGC and DSC*, J. Pharm. Sci. **99**, 1968 (2010).
- A.45 **A. Godec**, M. Gaberšček, J. Jamnik and F. Merzel, *14. Nonlinear diffusion in two-dimensional ordered porous media based on a free volume theory*, J. Chem. Phys. **131**, 234106 (2009).
- A.46 T. Ukmar, **A. Godec**, U. Maver, O. Planinšek, M. Bele, J. Jamnik and M. Gaberšček, *Suspensions of modified TiO₂ nanoparticles with supreme UV filtering ability*, J. Mater. Chem. **19**, 8176 (2009).
- A.47 **A. Godec**, M. Gaberšček and J. Jamnik, *Comment on the article "A new understanding of the relationship between solubility and particle size"*, J. Sol. Chem. **38**, 135 (2009).
- A.48 **A. Godec**, U. Maver, M. Bele, O. Planinšek, S. Srčič, M. Gaberšček and J. Jamnik, *Vitrification from solution in restricted space: formation and stabilization of amorphous nifedipine in a nanoporous silica xerogel carrier*, Int. J. Pharm. **343**, 131 (2007).
- A.49 U. Maver, **A. Godec**, M. Bele, O. Planinšek, S. Srčič, M. Gaberšček and J. Jamnik, *Novel hybrid silica xerogels for stabilization and controlled release of drug*, Int. J. Pharm. **330**, 164 (2007).

2 Chapters in books

- B.1 D. Hartich & **A. Godec**, *Reaction kinetics in the few-encounter limit*. In *CHEMICAL KINETICS BEYOND THE TEXTBOOK*, Ed: K. Lindenberg, R. Metzler, & G. Oshanin. (World Scientific, 2019, in press) [<https://doi.org/10.1142/q0209>].