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Deniz Mostarac

ABOUT ME

Research Profile

- focus on computer simulations of soft matter using Molecular Dynamics simulations.
- currently working on simulations and the theory behind the self-assembly of non-canonical DNA conformations such as the G-quadriplex, in the telomeric region of human cells.
- primarily interested in equilibrium properties and dynamics of magnetoresponsive, polymeric systems
- expert in Fluid Dynamics with a focus on mesh-based solvers such as the Lattice-Boltzmann method.
- interested in Machine learning approaches in physics.
- looking to expand expertise to research concerned with physics at an interface with tribology in mind, and interested in soft matter systems with sophisticated self-assembly with a focus on engineering systems for complex-fluid viscosity control and encapsulation.

EDUCATION AND TRAINING

PhD degree in Physics

University of Vienna [01/09/2018 – 05/09/2022]

City: Vienna | **Country:** Austria | **Field(s) of study:** Natural sciences, mathematics and statistics: ● Physics | **Final grade:** with distinction | **Thesis:** Characterising the Relationship Between the Magnetic Response and Architecture of Magnetic Filaments (Advisor: Univ.-Prof. Dr. Sofia Kantorovich, Privatdoz.

Masters degree in Physics

University of Vienna [15/10/2016 – 04/06/2018]

City: Vienna | **Country:** Austria | **Field(s) of study:** Natural sciences, mathematics and statistics: ● Physics | **Thesis:** Partial wave analysis as a tool for central exclusive production studies with ALICE (Advisor: Hon.-Prof. Dipl.-Phys. Dr. Eberhard Widmann)

Bachelors degree in Physics

University of Vienna [01/10/2014 – 14/10/2016]

City: Vienna | **Country:** Austria | **Field(s) of study:** Natural sciences, mathematics and statistics: ● Physics | **Thesis:** Bachelor Thesis: Nuclear Fission (Advisor: Dipl.-Phys. Dr. Johannes Lachner)

PUBLICATIONS

[2024]

Polymeric Properties of Higher-Order G-Quadruplex Telomeric Structures: Effects of Chemically Inert Crowders.

Mostarac, Deniz, et al. arXiv preprint arXiv:2408.07415 (2024).

[2024]

Thermal Stoner-Wohlfarth Model for Magnetodynamics of Single Domain Nanoparticles: Implementation and Validation

Mostarac, Deniz, et al. arXiv preprint arXiv:2408.06136 (2024).

[2023]

Relating the length of a magnetic filament with solvophobic, superparamagnetic colloids to its properties in applied magnetic fields

Mostarac, Deniz, et al. Physical Review E 108.5 (2023): 054601.

[2022]

Rheology of a nanopolymer synthesized through directional assembly of DNA nanochambers, for magnetic applications

Mostarac, Deniz, et al. Macromolecules 55.15 (2022): 6462-6473.

[2022]

Nanopolymers for magnetic applications: how to choose the architecture?

Mostarac, Deniz, et al. Nanoscale14.31 (2022): 11139-11151.

[2021]

Divalent multilinking bonds control growth and morphology of nanopolymers

Xiong, Yan, et al. Nano letters 21.24 (2021): 10547-10554.

[2020]
Characterisation of the magnetic response of nanoscale magnetic filaments in applied fields

Mostarac, Deniz, et al. Nanoscale 12.26 (2020): 13933-13947.

[2020]
The impact of magnetic field on the conformations of supracolloidal polymer-like structures with super-paramagnetic monomers

Mostarac, Deniz, et al. Journal of Molecular Liquids305 (2020): 112761.

[2020]
The influence of crosslinkers and magnetic particle distribution along the filament backbone on the magnetic properties of supracolloidal linear polymer-like chains

Mostarac, Deniz, et al. Journal of Magnetism and Magnetic Materials 497 (2020): 166029.

WORK EXPERIENCE

Post-doc position
University of Rome "La Sapienza" [01/03/2024 – Current]

City: Rome | **Country:** Italy

- Working on an interdisciplinary project entitled: "Taming Structure, Conformation, and Stability of Multimeric G-quadruplex DNA (TAMeQUAD)"
- Published an open-source library espressoSq for fast structure factor calculations (physics-based, SIMD, and GPGPU optimizations)
- Published an open-source python framework pressomancy, built on top of Espresso MD, designed to streamline and abstract the management of simulation objects in molecular simulations.
- Testing and validation of various algorithms for simulations in the NPT ensemble

Wolfgang Pauli Institute Mobility Fellow
Wolfgang Pauli Institute [01/01/2024 – 01/03/2024]

City: Rome | **Country:** Italy

Post-doc position
University of Vienna [01/10/2022 – 01/10/2023]

City: Vienna | **Country:** Austria

Staff Associate
Department of Chemical Engineering, Columbia University [01/09/2019 – 01/12/2019]

City: New York | **Country:** United States

Doctoral Researcher
University of Vienna [01/09/2018 – 01/10/2022]

City: Vienna | **Country:** Austria

Student researcher
Stephan Meyer Institute [01/04/2017 – 01/07/2018]

City: Vienna | **Country:** Austria

CONFERENCES AND SEMINARS

[2024] Perugia, Italy
Italian Meeting on G-quadruplex (G4) Talk

[2024] Berlin, Germany
DPG-Frühjahrstagung 2024 Talk

[2023] Osaka, Japan

International Soft Matter Conference 2023 Talk

[2023] Granada, Spain
International Conference on Magnetic Fluids 2023 Poster

[2023] Dresden, Germany
DPG-Frühjahrstagung 2023 Talk

[2023] Andalo, Italy
XVI International Workshop on Complex Systems Poster

[2022] Vienna, Austria
Vienna Soft Matter Days Talk

[2022] London, United Kingdom
13th International Conference on the Scientific and Clinical Applications of Magnetic Carriers Talk

[2022] Lisbon, Portugal
11th International Colloids Conference Poster

[2021] Online
Advanced School in Soft Condensed Matter "Solutions in the Summer" Poster

[2021] Ljubljana, Slovenia
18th International Conference on Ferroelectric Liquid Crystals 2021 Poster

[2021] Online
DPG-Frühjahrstagung 2021 Poster

[2021] Online
Complex and Magnetic Soft Matter Systems Talk

[2020] Online
65th Annual Conference on Magnetism and Magnetic Materials Talk

[2019] Catania, Italy
Italian National Conference on the Physics of Matter Talk

[2019] Paris, France
International Conference on Magnetic Fluids 2019 Poster

[2019] Eger, Hungary
Chemistry Physics and Biology of Colloids and Interfaces Talk

[2019] Regensburg, Germany
DPG-Frühjahrstagung 2019 Talk

[2019] Perm, Russia
XXI Winter School on Continuum Mechanics Talk

[2018] Benediktbeuern, Germany
6th Colloquium of DFG Priority Program 1681 Poster

[2018] Braunschweig, Germany
17th German Ferrofluid Workshop Poster

[2017] Vienna, Austria
International Conference on Exotic Atoms and Related Topics Staff

[2017] Geneva, Switzerland
Swiss Physical Society-Joint Annual Meeting 2017 Poster

HONOURS AND AWARDS

[2024] Wolfgang Pauli Institute
Wolfgang Pauli Institute Mobility Scholarship

[2021] Liquids and Complex Fluids Advanced School
2021 Liquids and Complex Fluids Advanced School in Soft Condensed Matter – Solutions in the Summer 2021 Poster Prize

[2019] Marshall Plan Foundation
Marshall Plan Scholarship Grant

[2018] Vienna Doctoral School of Physics
Vienna Doctoral School of Physics Mobility Fellow

TEACHING

[2022]
STEOP 2: Introduction to Calculus

University of Vienna, Vienna, Austria

[2020]
Theoretical Physics II: Electrodynamics

University of Vienna, Vienna, Austria

[2020]
Theoretical Physics II for teacher students

University of Vienna, Vienna, Austria

[2018]
STEOP 2: Introduction to Calculus

University of Vienna, Vienna, Austria

WORKSHOPS

[09/2024]
Exploring bio-inspired systems: a synergy between multiscale experimental and computational approaches

Vienna, Austria

[04/2022]
Physics of Life Summer School

Edinburgh, United Kingdom

[03/2022]
HPC: Intermediate C++ Course Stuttgart

Online

[10/2021]
Py-ESPReSso Summer School

Stuttgart, Germany

[02/2020]
Winter School on Machine Learning in Physics

Vienna, Austria

OUTREACH

[05/2022]

Long Night of Research

Vienna, Austria; Organizing a booth introducing children and the general public to ferrofluids and the basics of computational physics, with experiments and interactive simulations

[05/2022]

175 Year Anniversary of OeaW meets Children's University

Vienna, Austria; Assisting with demonstrations and setup at an interactive talk for children through the children's university (KinderUni) program to celebrate the 175th anniversary of the Austrian Academy of Sciences (OeaW)

[2019]

Junior Science Club

Vienna, Austria; introducing magnetism to visiting groups of schoolchildren

[2018]

University of Vienna Campus Festival 2018

Vienna, Austria

[2018]

Belgrade Science Fair

- introducing children and the public to ferrofluids and computational physics, with experiments and movies.
- TV interview on Dipolar Soft Matter Group participation on the Belgrade Science Fair

SERVICE TO PROFESSION

[2021 – 2022]

Vienna Doctoral School in Physics Student Speaker

representing the students in the steering committee, and serving as contact for students and the management in questions concerning student input for events, activities, and strategies.

LANGUAGE SKILLS

Other language(s):

Bosnian

LISTENING C2 **READING** C2 **WRITING** C2

SPOKEN PRODUCTION C2 **SPOKEN INTERACTION** C2

English

LISTENING C2 **READING** C2 **WRITING** C2

SPOKEN PRODUCTION C2 **SPOKEN INTERACTION** C2

German

LISTENING C1 **READING** C1 **WRITING** C1

SPOKEN PRODUCTION C1 **SPOKEN INTERACTION** C1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user