

CV – Sarah A. M. Loos

DAMTP, University of Cambridge
Wilberforce Road, Cambridge CB3 0WA, UK

Born 1991 in Saarbrücken, GER
Email: sl2127@cam.ac.uk

Corpus Christi College, Cambridge
Trumpington St, Cambridge CB2 1RH, UK

Professional Experience

Since June 2022: **Marie Skłodowska-Curie Fellow (MSCA)** at the **University of Cambridge, UK**, in the Soft Matter group led by **Michael E Cates**

Since Oct 2023: Research Fellow (NSRF) at **Corpus Christi College, Cambridge, UK**

April 2021 – May 2022: Postdoctoral Researcher at **ICTP, Trieste, IT**, group of Édgar Roldán

Aug 2020 – Mar 2021: Postdoctoral Researcher at **Leipzig University, GER**, group of Klaus Kroy

Mar 2020 – Aug 2020: Postdoctoral Researcher at **Technical University of Berlin (TU Berlin), GER**

Oct 2015 – Mar 2020: Doctorate at **TU Berlin, GER**, Supervisor: Sabine H.L. Klapp

Oct 2013 – Mar 2014: 6-month research internship at **Duke University, NC, US**, group of Joshua Socolar

Education

2020: Dr. Rer. Nat. at TU Berlin, Grade: **Summa cum laude** (“with highest honours”)

PhD Thesis: *Stochastic systems with time delay: probabilistic and thermodynamic descriptions of non-Markovian processes far from equilibrium*, (Defense: 13 March 2020)

<https://www.springer.com/gp/book/9783030807702>

2015: Master in Physics at TU Berlin, **Final grade: 1.0 (Best achievable grade*)**

Master thesis supervised by A. Zakharova and E. Schöll, Grade 1.0

2013: Bachelor in Physics at TU Berlin, **Final grade 1.1**

Bachelor thesis supervised by R. Gernert and S. Klapp, Grade 1.0

2009: Highschool graduation (Abitur), in Saarbrücken, GER, **Final grade 1.0 (Best achievable grade*)**

2007: Junior student in Mechatronics at UdS (“Program for outstanding pupils” / “Begabtenförderung”)

*German grading scale: 1.0 – 1.5 very good (A), 1.6 – 2.5 good (B), 2.6 – 3.5 satisfactory (C), 3.6 – 4.0 sufficient (D), 4.1 – 6.0 insufficient (F)

Distinctions and Awards

2024: **Early Career Award** by the **Statistical Mechanics and Thermodynamics Group of the Royal Society of Chemistry** (endowed with 500 GBP), <https://www.rsc.org/>

2023: **Peter-Debye Lecture** at Leipzig University, <https://www.physes.uni-leipzig.de/>

2023: **SigmaPhi Prize for Best Oral presentation for Early Career Scientists** with title: *Stochastic thermodynamics of a particle in a correlated field* (endowed with 500 EUR)

2021: German-wide **SKM Dissertation Prize 2021** of the German Physical Society (DPG), Condensed Matter Section (SKM), endowed with 1500 EUR

2020: **Springer Thesis Award for Dissertation** by Springer Nature (endowed with 500 EUR)

2020: **Carl-Ramsauer Preis** of the DPG in Berlin for Dissertation (endowed with 1500 EUR)

2019: **Europhysics Letters – EPL poster prize** (first place) shared with S. Hermann, at the EPS Meeting on Statistical Physics of Complex Systems, Stockholm (endowed with 200 EUR)

2016: **Physik-Studienpreis of the DPG Berlin** “for excellent Master thesis”, (endowed with 1000 EUR)

2009: Awards for highschool graduation on “Best overall grade” and “Best grade in physics” by **DPG**

Grants and Fellowships

2024: Invitation to the KITP program *Active Solids: From Metamaterials to Biological Tissue* at **Kavli-Institute of Theoretical Physics, Santa Barbara, US**, Oct - Dec 2024

2023: **Research Fellowship** (NSRF) at Corpus Christi College, Cambridge, UK

2022: **Marie Skłodowska-Curie Actions (MSCA) Postdoctoral Fellowship** endowed with > 220.900 EUR, originally by the European Commission, undertaken by **UKRI** due to Brexit

2022: **Postdoctoral Walter Benjamin Fellowship by DFG** - German Research Foundation, endowed with >74.000 EUR (June 2022 – Aug 2023)

2022: **Funding from ICTP for Conference** on *Non-Markovian dynamics far from equilibrium*, together with B. Walter (SISSA), E. Roldan (ICTP), and A. Gambassi (SISSA)

2022: **Funding from Joachim-Herz Stiftung** for Workshop on *Adaptivity in nonlinear dynamical systems*, together with R. Berner (HU Berlin) and J. Sawicki (PIK)

2023: Scholarship of the **Studienstiftung des Deutschen Volkes** (Oct 2013 – Sept 2015)

2013: **TASSEP Programme of TU Berlin** for 6-month research stay at Duke University, North Carolina, US

Invited Conference Talks

Upcoming: CSH Workshop on **Statistical Mechanical Approaches of Complex Systems**, in Vienna, AT (17-18 June 2024), Invited talk

Upcoming: Workshop on **Out of equilibrium nanothermodynamics with levitated particles**, Université Paris Saclay, FRA (24-25 June 2024), Invited lecture

Upcoming: Workshop on **Dissipative Processes in Molecular Systems**, U Padova, IT (17-21 June 2024), Invited

April 2024: **ESI Workshop on Transport properties in Soft Matter Systems**, Vienna, AT, Invited talk

March 2024: **DPG-Frühjahrstagung der SKM**, Berlin, GER, Invited Symposium talk

Nov. 2023: **5th Nottingham Workshop on Quantum Non-Equilibrium Dynamics**, UK, invited talk

Sept. 2023: **CMD30-FisMat2023** conference by the EPS Condensed Matter Division and the Italian community of condensed matter physics, optics, liquids and soft matter, Milano, IT, invited talk

July 2023: **SigmaPhi Europhysics Conference**, Chania-Crete, GRC, invited talk

June 2023: **IOP Theory of Condensed Matter Group Meeting 2023**, U Warwick, UK, Invited talk

March 2023: **LMS Workshop on the Mathematics of Delayed Phenomena – Theory, Numerics and Applications**, at Northumbria University, Newcastle upon Tyne, UK, Invited talk

Dec. 2022: **Conference on Quantum Non-Markovianity**, Newcastle, AUS, Invited talk

Nov. 2022: **Conference on Control of Self-Organizing Nonlinear Systems**, Potsdam, GER, Invited

May 2022: Workshop on Stochastic Thermodynamics **WOST III**, virtual meeting, hosted by University of Tokyo, JPN, Invited talk

March 2022: **APS March Meeting**, in Chicago, US, Invited talk

Sept. 2021: **DPG-Frühjahrstagung der SKM** (virtual meeting), GER, Invited talk

Invited Seminars and Colloquia

Upcoming: Seminar at **MPI-PKS**, Dresden, GER (Jan. 2025)

Upcoming: Biophysics Seminar at **Massachusetts Institute of Technology (MIT)**, Cambridge, US (Nov. 2024)

Upcoming: Seminar at **MPI fuer Dynamik und Selbstorganisation**, Goettingen, GER (Aug. 2024)

Upcoming: BioSoft Theory seminar at **University of Oxford**, UK (June 2024)

Upcoming: Faculty of Physics at the **University of Vienna**, AT (July 2024)

Upcoming: **SISSA**, Trieste, IT (June 2024)

Feb. 2024: Mathematical Physics seminar series at **Imperial College London**, UK (

Jan 2024: Seminar of SFB 1238 invited by Sebastian Diehl at **Universität Köln**, GER

Dec. 2023: Seminar talk at **LOMA, CNRS, Bordeaux**, FRA

Dec. 2023: Seminar of SFB 1027 at **Universität des Saarlandes**, GER

Nov. 2023: Seminar at **Queen Mary University London**, UK

Oct. 2023: Peter-Debye lecture at the **Leipzig University**, GER, invited by Frank Cichos

June 2023: Theoretisch Physikalisches Kolloquium at **University of Kaiserslautern-Landau**, GER

Feb. 2023: Seminar of the Statistical Physics Group at **Coventry University**, UK

Jan. 2023: Colloquium talk at **Universität Konstanz**, GER, invited by Clemens Bechinger

Nov. 2022: Seminar of Disordered Systems Group, **King's College London**, UK, invited by Izaak Neri

Oct. 2022: Seminar in **Edinburgh Statistical Physics and Complexity group**, UK, by Martin Evans

June 2022: Seminar at **IFISC, Palma de Mallorca**, ESP, invited by Tobias Galla

May 2022: Seminar at **University of Padova**, IT, invited by Gianmaria Falasco

April 2022: Seminar at **Queen Mary University London**, UK

March 2022: CSCS Seminar at the **University of Michigan**, US, invited by Jordan Horowitz

Jan. 2022: CeNos Colloquium at **Universität Münster**, GER
Oct. 2021: Soft Matter Seminar at **University of Cambridge** at DAMTP, UK
Dec. 2020: Seminar of AG Höfling at **Freie Universität Berlin**, GER
July 2019: Seminar of the Department of Quantitative Life Science at **ICTP**, Trieste, IT
June 2019: Seminar of the AG Netz at **Freie Universität Berlin**, GER
May 2019: Seminar of AG Kroy at **Universität Leipzig**, GER
Feb. 2019: Seminar of AG Kuehn at **Technische Universität München**, GER
Nov. 2018: Seminar of AG Ihle at **Universität Greifswald**, GER
June 2018: Seminar of AG Fieldler at **Freie Universität Berlin**, GER
June 2017: Seminar of AG Fiedler at **Freie Universität Berlin**, GER

Teaching, Supervision and Examining

Teaching

Teaching a course on *Fundamentals of Statistical Mechanics* at ICTP, including the preparation, supervision, and grading of the exam (winter term 2021)
Teaching a seminar on *Active Matter* at Leipzig University (winter term 2020 – 2021)
Tutor for “*Mathematical methods for physicists*” at TU Berlin (01/04/2012 – 30/09/2012)

Supervision

Supervision of Part III Physics project of Noah Grodzinski at U Cambridge, UK (since Oct 2023)
External supervision of Doctorate by Thomas Suchanek at Leipzig University, GER (since 2023)
Supervision of Diploma Project by Kristian Pajanonot at ICTP, IT (2022)
Supervision of Master Thesis by Thomas Suchanek, at Leipzig University, GER (2021 – 2022)
Supervision of Master Thesis by Timo Doerries at TU Berlin, GER (2019 – 2021)
Supervision of Bachelor Thesis by Jan Meyer at TU Berlin, GER (2017)

Examining

2024: Examiner for **Part III Physics Thesis** at the **University of Cambridge**, UK, by Noah Grodzinski, Title of Thesis: “A Non-Reciprocal XY Model with Quenched Disorder”
2023: External Examiner for **Doctoral thesis** at the Mathematical, Physical & Life Sciences Division at **University of Oxford**, UK, by Mr Jonathan Utterson (Doctor of Philosophy)
Title of Thesis: “An Investigation of Molecular Dynamics for Simple Liquids”, Supervisor: R Erban
2022: Examiner for **Diploma thesis** by Kristian Pajanonot on “Fluctuations and Response in Non-reciprocal Biophysical Models” at **ICTP**, Trieste, IT
2022: Examiner for **Master thesis** by Thomas Suchanek on “Steady-state entropy production in dynamical field theories with non-reciprocal coupling” at **Leipzig University**, GER

Organization of Scientific Events

Upcoming: CECAM Workshop on **Out-of-Equilibrium Phenomena in the Presence of Curvature and Non-Reciprocal Interactions (1505)**, at CECAM in Lausanne, CHE, (2-5 July 2024)

Since April 2023: Organization of the DAMTP Statistical Physics and Soft Matter Seminar, at the Centre for Mathematical Sciences, University of Cambridge, UK

Nov. 2023: **Workshop on Modelling non-Markovian movement** at Isaac Newton Institute, Cambridge, UK, Scientific Organizers: Guillermo Abramson, SAML, Tomas Alarcon

Sept. 2022: **Workshop on Adaptivity in nonlinear dynamical systems**, hosted at PIK (Potsdam, GER) as hybrid meeting. Scientific organizers: Rico Berner, SAML, and Jakub Sawicki

May 2022: **Conference on Non-Markovian dynamics far from equilibrium**, Trieste, hosted by ICTP, IT, as hybrid meeting. Scientific organizers: SAML, Benjamin Walter, Andrea Gambassi

Nov. 2019: Session on **Nonequilibrium Processes in different fields: from extreme weather events to black holes** at Conference of Women in Physics, TU Berlin, GER

May 2019: SFB 910 Symposium on Embedding strategies for delay problems in different fields, TU Berlin, GER

Public Outreach and Engagement

Since Nov. 2022: Mentor for students *Women and non-binary mentorship scheme*, CMS, U Cambridge

Panellist in EDI session on *Gender Equality in Science* at INI, U Cambridge (Nov. 2023)

Speaker at German Conference for Women in Physics, TU Berlin (Nov. 2019)

Speaker at Soapbox Event Berlin, GER (Talk: *Entropy and the arrow of time*) (June 2019)

<http://soapboxscience.org/soapbox-science-2019-berlin/>

Speaker at Perspectivencafé (Mentoring of high school students), TU Berlin (May 2019)

Speaker at Perspectivencafé (Mentoring of high school students), TU Berlin (May 2018)

Speaker at German Conference for Women in Physics, DESY Hamburg, GER (Nov. 2016)

Refereeing and Editorial Activities

Since May 2024: **Member of Editorial Board of IOP Journal of Physics A: Mathematical and Theoretical**

2022 - 2024: Guest Editor for IOP Journal of Physics A: Mathematical and Theoretical, Special Issue on *Non-Markovian Effects in Nonequilibrium Systems*, together with Aljaz Godec

Refereeing Activities for *Physical Review Letter*, *Physical Review Research*, *Physical Review E*, *Entropy*, *Journal of Statistical Physics*, *Physica A*, *Physics Letters A*, *Europhysics Letters*, *Nature Nanotechnology*

Publications

23 published original research articles + 2 Peer-reviewed conference proceedings + 2 book chapters
h-index 13, > 600 citations (June 2024, [google scholar](#))

Preprints

1. T. Hempel and [S. A.M. Loos](#)
Reconstruction method to infer nonreciprocal interactions and local driving in complex systems
[ArXiv:2403.09243](#)

Journal Articles

1. [S. A.M. Loos](#), S. Monter, F. Ginot, and C. Bechinger
Universal symmetry of optimal control at the microscale
Physical Review X **14**, 021032 (2024)
(Highlighted in *APS Physics* article “Time-Symmetric Motion Maximizes Energy Efficiency in Fluid”)
2. D. Venturelli*, [S. A.M. Loos*](#), B. Walter*, É. Roldán, and A. Gambassi (*shared first authorship)
Stochastic Thermodynamics of a Probe in a Fluctuating Correlated Field
EPL (Europhysics Letters) **146**, 27001 (2024)
3. A. Seif, [S. A.M. Loos](#), G. Tucci, É. Roldán, and S. Goldt
The impact of memory on learning sequence-to-sequence tasks
Machine Learning- Science and Technology **5**, 015053 (2024)
4. T. Suchanek, K. Kroy, and [S. A.M. Loos](#)
Irreversible mesoscale fluctuations herald the emergence of dynamical phases
Physical Review Letters **131**, 258302 (2023)
5. [S. A.M. Loos](#)
Smooth Control of Active Matter
APS Physics **17**, 20 (2023)
6. T. Suchanek, K. Kroy, and [S. A.M. Loos](#)
Time-reversal and PT symmetry breaking in non-Hermitian field theories
Physical Review E **108**, 064123 (2023)
7. T. Suchanek, K. Kroy, and [S. A.M. Loos](#)
Entropy production in the nonreciprocal Cahn-Hilliard model
Physical Review E **108**, 064610 (2023)
8. J. Sawicki*, R. Berner*, [S. A.M. Loos*](#) et. al. (*shared first authorship)
Perspectives on adaptive dynamical systems
Chaos: An Interdisciplinary Journal of Nonlinear Science (2023)
(Highlighted in *Scilight* article “A look at adaptive systems from biology to machine learning”)
9. [S. A.M. Loos](#), S. H. L. Klapp, and T. Martynec
Long-range Order and Directional Defect Propagation in the Nonreciprocal XY Model with Vision Cone Interactions, Physical Review Letters **130**, 198301 (2023)
10. [S. A.M. Loos](#)
Measurement of scale-dependent time-reversal asymmetry in biological systems
Nature Nanotechnology (2023)
11. [S. A.M. Loos](#), S. Arabha, A. Rajabpour, A. Hassanali, and É. Roldán
Nonreciprocal nanoparticle refrigerators: design principles and constraints
Scientific Reports **13**, 4517 (2023)
12. V. Holubec, A. Ryabov, [S. A.M. Loos](#), and K. Kroy
Equilibrium Stochastic Delay Processes
New Journal of Physics (IOP) **24**, 023021 (2022)

13. V. Holubec, D. Geiss, [S. A.M. Loos](#), K. Kroy, and F. Cichos
Finite-size scaling at the edge of disorder in a time-delay Vicsek model
Physical Review Letters **127**, 258001 (2021)
14. [S. A.M. Loos](#) and S. H.L. Klapp (**Editor's Choice Article**)
Medium Entropy Reduction and Instability in Stochastic Systems with Distributed Delay
Entropy **23**, 696 (2021)
15. T. J. Doerries, [S. A.M. Loos](#), and S. H.L. Klapp
Correlation functions of non-Markovian systems out of equilibrium: Analytical expressions beyond single-exponential memory
Journal of Statistical Mechanics: Theory and Experiment, 033202 (2021)
16. [S. A.M. Loos](#) and S. H.L. Klapp
Irreversibility, heat and information flows induced by non-reciprocal interactions
New Journal of Physics **22**, 123051 (2020)
17. T. Martynec, S. H.L. Klapp, and [S. A.M. Loos](#)
Entropy production at criticality in a non-equilibrium Potts model
New Journal of Physics **22**, 093069 (2020)
18. [S. A.M. Loos](#) and S. H.L. Klapp
Fokker-Planck equations for time-delayed systems via Markovian Embedding
Journal of Statistical Physics **177**, 95-118 (2019)
19. [S. A.M. Loos](#) and S. H.L. Klapp
Heat flow due to time-delayed feedback
Scientific Reports **9**, 2491 (2019)
20. [S. A.M. Loos](#) and S. H.L. Klapp
Force-linearization closure for non-Markovian Langevin systems with time delay
Physical Review E **96**, 012106 (2017)
21. [S. A.M. Loos](#), J. C. Claussen, E. Schöll, and A. Zakharova (*>100 citations, google scholar*)
Chimera patterns under the impact of noise
Physical Review E **93**, 012209 (2016)
22. I. Schneider, M. Kapeller, [S. Loos](#), A. Zakharova, B. Fiedler, and E. Schöll
Stable and transient multicluster oscillation death in nonlocally coupled networks
Physical Review E **92**, 052915 (2015)
23. [S. A.M. Loos](#), R. Gernert, and S. H. L. Klapp
Delay-induced transport in a rocking ratchet under feedback control
Physical Review E **89**, 052136 (2014)

[Peer-Reviewed Conference Proceedings](#)

24. [S. Loos](#), A. Zakharova, J. C. Claussen, and E. Schöll
Robustness of chimera states with respect to noise, in Proceedings of the 7th International Conference on Physics and Control, Istanbul (PhysCon 2015)
25. A. Zakharova, [S. Loos](#), J. Siebert, A. Gjurchinovski, and E. Schöll
Chimera patterns: influence of time delay and noise, *IFAC-PapersOnLine* **48**, 007 (2015)

[Book Chapters](#)

26. R. Gernert, [S. A.M. Loos](#), K. Lichtner, and S. H. L. Klapp
Feedback control of colloidal transport, in *Control of Self-Organizing Nonlinear Systems*, ed. by Schöll, Klapp, Hövel (Springer, 2016)
27. A. Zakharova, [S. A.M. Loos](#), J. Siebert, A. Gjurchinovski, J. C. Claussen, and E. Schöll
Controlling chimera patterns in networks: interplay of structure, noise, and delay
in *Control of Self-Organizing Nonlinear Systems*, ed. by Schöll, Klapp, Hövel (Springer, 2016)