

CV – Sarah A. M. Loos

*Centre for Mathematical Sciences,
Wilberforce Road, Cambridge CB3 0WA, United Kingdom*

*Corpus Christi College, Cambridge,
Trumpington St, Cambridge CB2 1RH United Kingdom*

Date of Birth: 1991 in Saarbrücken, Germany

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Research Experience

Since June 2022: Independent Postdoctoral Fellow at the **University of Cambridge, UK**, in the Soft Matter group at DAMTP, working with Prof **Micheal E Cates**, since 01/06/2022, funded by Marie-Curie Fellowship

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

Postdoctoral researcher at **ICTP, Trieste, IT**
Supervisor: Édgar Roldán, (01/04/2021 – 31/05/2022)

Postdoctoral researcher at **Leipzig University, GER**
Supervisor: Klaus Kroy, (01/09/2020 – 31/03/2021)

Postdoctoral researcher at **Technical University of Berlin (TU Berlin), GER** (14/03/2020 – 30/08/2020)

Doctorate at CRC 910 at **TU Berlin, GER**
Supervisor: Sabine HL Klapp (01/10/2015 – 13/03/2020)

6-month research internship at **Duke University, North Carolina, US**
Supervisor: Joshua Socolar (01/10/2013 – 31/03/2014)

Student Assistant at **CRC 910**: “Control of self-organizing nonlinear systems” at TU Berlin as Undergraduate Researcher, Supervisor: Sabine HL Klapp (01/10/2012 – 31/03/2013)

Student Assistant at the **Universität des Saarlandes, GER**, in the groups of Karsten Kruse (01/04/2010 – 30/09/2010) and Karin Jacobs (01/02/2010 – 31/03/2010)

Education

2020 Doctorate, Dissertation title: *Stochastic systems with time delay: probabilistic and thermodynamic descriptions of non-Markovian processes far from equilibrium* (Viva on 13/03/2020)

Dissertation grade: **Summa cum laude (“with highest honours”)**

Examiners: Sabine Klapp (TU Berlin) and Klaus Kroy (Leipzig University)

published by Springer Nature: <https://www.springer.com/gp/book/9783030807702>

Master in Physics at TU Berlin, **Final grade: 1.0 (Best achievable grade*)**
(01/04/2013 – 30/09/2015)

Master thesis: *Noise effects on chimera states in the Stuart-Landau model*

Supervisors: Eckehard Schöll and Anna Zakharova (**Grade: 1.0**)

Bachelor in Physics at TU Berlin, **Final grade 1.1** (01/10/2010 – 31/03/2013)
Bachelor thesis: *Dynamics of colloidal particles in time-dependent periodic potentials*
Supervisors: Sabine Klapp and Robert Gernert (**Grade: 1.0**)

2009 – 2010: Bachelor in Physics (first year) at Universität des Saarlandes, GER

2009: High school graduation (“Abitur”), in Saarbrücken GER, **Final grade 1.0**

01/10/2007 – 31/03/2008: Junior student in Mechatronics as high school student at Universität des Saarlandes (“Program for outstanding pupils” / “Programm zur 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)

Awards and Scholarships

2023: Selected for “Peter-Debye Lecture” at Leipzig University

2023: Elected as **Research Fellow** at Corpus Christi College, Cambridge, UK

2022: **Marie-Curie Postdoctoral Fellowship (MSCA)**,
for 24 months funding to work at University of Cambridge, UK
endowed with > 220.900 EUR
Originally by the European Commission, undertaken by UKRI, Start Date: 01/09/2023

2022: **Postdoctoral Fellowship by DFG** - German Research Foundation
(Walter Benjamin-Stipendium) for 24 months at University of Cambridge, UK
endowed with > 74.000 EUR, Start date: 01/06/2022

2022: Successful application for **funding from ICTP for Conference** on *Non-Markovian dynamics far from equilibrium* together with Benjamin Walter (SISSA) and Andrea Gambassi (SISSA)

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

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

2020: Dissertation prize: **Carl-Ramsauer Preis** of the DPG in Berlin, endowed with 1500 EUR
<https://www.pgzb.tu-berlin.de/index.php?id=1068>

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, <https://www.pgzb.tu-berlin.de/index.php?id=839>

2023: Scholarship of the **Studienstiftung des Deutschen Volkes** (01/10/2013 – 30/09/2015)

2013: Grants for study abroad by **Studienstiftung des Deutschen Volkes** and by **TASSEP** (TU Berlin) for 6-month research stay at Duke University, North Carolina, US (01/10/2013 – 31/03/2014)

2009: Two awards for highschool graduation: “Best overall grade” and “Best grade in physics”, award by **DPG**

Invited Talks

Invited conference talks

Nov 2023: Invited talk at the **5th Nottingham Workshop on Quantum Non-Equilibrium Dynamics**, Nottingham, UK

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

July 2023: Invited talk at the **SigmaPhi** Europhysics Conference, in Chania-Crete, GRC

June 2023: Invited talk at the **IOP Theory of Condensed Matter Group Meeting 2023** at the University of Warwick, in Coventry, UK

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

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

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

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

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

Sept. 2021: Invited talk at the virtual **84. Annual Meeting of DPG**, SKM Fruehjahrstagung, GER

Invited Seminars and Colloquium talks

Upcoming: January 2024: Seminar talk at **Universität Köln**, GER, invited by Sebastian Diehl

Upcoming: Dec 2023: Seminar talk at **LOMA, Bordeaux**, FRA, invited by Tomas Guerin

Upcoming: Dec 2023: Seminar talk at **Universität des Saarlandes**, GER, invited by Philipp Hövel, Heiko Rieger

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

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

June 2023: Colloquium (Theoretisch Physikalisches Kolloquium) at **University of Kaiserslautern-Landau**, GER, invited by Axel Pelster

Feb. 2023: Seminar talk at **Coventry University**, UK, invited by Sascha Wald

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, invited by Rosemary Harris

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

Jan. 2022: CeNos Colloquium at **Universität Münster**, GER, invited by André Schlichting

Oct. 2021: Seminar at **University of Cambridge** at DAMTP, UK, invited by Michael Cates

Dec. 2020: Seminar at **Freie Universität Berlin**, GER, invited by Felix Höfling

July 2019: Seminar at **ICTP**, Trieste, IT, invited by Édgar Roldán

June 2019: Seminar at **Freie Universität Berlin**, GER, invited by Roland Netz

May 2019: Seminar at **Universität Leipzig**, GER, invited by Klaus Kroy

Nov. 2018: Seminar at **Universität Greifswald**, GER, invited by Thomas Ihle

June 2018: Seminar at **Freie Universität Berlin**, GER, invited by Bernold Fiedler

June 2017: Seminar at **Freie Universität Berlin**, GER, invited by Isabelle Schneider

Organization of Scientific Events

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

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

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

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

May 2019: **CRC 910 Symposium on Embedding strategies for delay problems in different fields**, at TU Berlin

Public Outreach and Engagement

Panellist at the Women in Science EDI session at the Isaac Newton Institute at U Cambridge (Nov. 2023)

Mentor for students in the *Women and non-binary mentorship scheme* at DAMTP, U Cambridge (since Nov. 2022)

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

Speaker at Soapbox Event Berlin (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)

Teaching and Supervision of Students

Teaching

Teaching a course on *Fundamentals of Statistical Mechanics* at ICTP (winter term 2021); including the preparation, supervision and grading of an exam on *Fundamentals of Statistical Mechanics*

Teaching a seminar on *Active Matter* at Leipzig University (winter term 2020 – 2021)

Tutor for “*Mathematical methods for physicists*” as Student Assistant at TU Berlin (01/04/2012 – 30/09/2012)

Supervision

Supervision of Part III Physics project of Noah Grodzinski at University of 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: “Non-Markovian effects in Complex fluids: Embedding and Thermodynamics” at TU Berlin, Examiners: Sabine Klapp and Alexander Carnele (2019 – 2021)

Supervision of Bachelor Thesis by Jan Meyer: “Time-delayed dynamics of a Brownian particle in an asymmetric double-well potential”, Examiners: Sabine Klapp and Gernot Schaller (2017)

Examining

External Examiner for **Doctoral thesis** by Mr Jonathan Utterson (Doctor of Philosophy) at the Mathematical, Physical & Life Sciences Division at **University of Oxford, UK**

Title of Thesis: “An Investigation of Molecular Dynamics for Simple Liquids”

Supervisor: R Erban (University of Oxford), Other examiner: J Carrillo (University of Oxford), (Date of Viva: 8 July 2023)

Examiner for **Diploma thesis** by Kristian Pajanonot on “Fluctuations and Response in Non-reciprocal Biophysical Models” at **ICTP, IT**.

Other Examiner: Édgar Roldán (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**.

Other Examiner: Klaus Kroy (2022)

Refereeing and Editorial Activities

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

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

Publications

21 published papers + 3 preprints + 2 book chapters

Among them: 12 x first author, 6 x last author
3 x Physical Review Letters, 1 Nature Nanotechnology

h-index 12, (Nov 2023, [google scholar](#))

Preprints

1. [S. A.M. Loos](#), S. Monter, F. Ginot, C. Bechinger
Universal symmetry of optimal control at the microscale
[ArXiv:2311.00470](#)
2. D. Venturelli*, [S. A.M. Loos](#)*, B. Walter*, É. Roldán, A. Gambassi
Stochastic Thermodynamics of a Probe in a Fluctuating Correlated Field, [ArXiv:2305.16235](#)
**shared first authorship.*
3. A. Seif, [S. A.M. Loos](#), G. Tucci, É. Roldán, S. Goldt
The impact of memory on learning sequence-to-sequence tasks, [ArXiv:2205.14683](#)

Journal Articles

4. T. Suchanek, K. Kroy, [S. A.M. Loos](#)
Irreversible mesoscale fluctuations herald the emergence of dynamical phases, [ArXiv:2303.16701](#)
Physical Review Letters, *in press* (2023)
5. T. Suchanek, K. Kroy, [S. A.M. Loos](#)
Time-reversal and PT symmetry breaking in non-Hermitian field theories, [ArXiv:2305.05633](#)
Physical Review E, *in press* (2023)
6. T. Suchanek, K. Kroy, [S. A.M. Loos](#)
Entropy production in the nonreciprocal Cahn-Hilliard model, [ArXiv:2305.00744](#)
Physical Review E, *in press* (2023)
7. J. Sawicki*, R. Berner*, [S. A.M. Loos](#)* et. al.
Perspectives on adaptive dynamical systems
Chaos: An Interdisciplinary Journal of Nonlinear Science (2023)
**shared first authorship.*
8. [S. A.M. Loos](#)
Measurement of scale-dependent time-reversal asymmetry in biological systems
Nature Nanotechnology (2023)
9. [S. A.M. Loos](#), S. H. L. Klapp, T. Martynek
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](#), S. Arabha, A. Rajabpour, A. Hassanali, E. Roldan
Nonreciprocal nanoparticle refrigerators: design principles and constraints
Scientific Reports **13**, 4517 (2023)
11. V. Holubec, A. Ryabov, [S. A.M. Loos](#), and K. Kroy
Equilibrium Stochastic Delay Processes
New Journal of Physics **24**, 023021 (2022)
12. 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)

13. S. A.M. Loos and S. H.L. Klapp
Medium Entropy Reduction and Instability in Stochastic Systems with Distributed Delay
Entropy **23**, 696 (2021)
Editor's Choice Article
14. 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)
15. 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)
16. 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)
17. 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)
18. S. A.M. Loos and S. H.L. Klapp
Heat flow due to time-delayed feedback
Scientific Reports **9**, 2491 (2019)
19. 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)
20. S. A.M. Loos, J. C. Claussen, E. Schöll, and A. Zakharova
Chimera patterns under the impact of noise
Physical Review E **93**, 012209 (2016)
21. 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)
22. 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

23. 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**)
24. 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

25. 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)
26. 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)