Laura Filion
Curriculum Vitae

⌂ Soft Condensed Matter & Biophysics Group
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Research Interests in a Nutshell

How do simple, classical interactions give rise to the astoundingly rich and complex structures that form on the nano- to micronscale? To address this question, my research group uses, and *develops*, a combination of state-of-the-art computational and machine learning algorithms to study self-assembly in soft matter systems – both in and out of equilibrium. My research has made significant contributions to our understanding how defects manifest in colloidal crystals (Key Publication (KP) 2,6,7), crystal nucleation (KP 9), the relationship between structure and dynamics in supercooled liquids (KP 1,3,5), and self-assembly behaviour in active colloids (KP 8). Two themes of particular focus in my group at the moment are i) understanding the interplay between defects and phason strain in the self-assembly of soft matter quasicrystals ii) harnessing machine learning algorithms to shed new light on colloidal self-assembly.

Career & Education

2020 – now	**Associate Professor**, Soft Condensed Matter & Biophysics Group, Debye Institute for Nanomaterials Science, Physics Department, Utrecht University (UU), NL
2012 – 2020	**Assistant Prof.**, Utrecht University, NL
2011 – 2012	**Post-doc**, Cambridge University, UK
2007 – 2011	**Ph.D**, Utrecht Univeristy, NL *Thesis:* Self-assembly in colloidal hard-sphere systems
2002-2005	**Masters Degree** in **Physics**, McMaster University, Canada *Thesis:* Spin waves in $NaNiO_2$
1998-2002	Honours Joint **Bachelors** in **Physics** and **Mathematics**, St. Francis Xavier University, Canada

Key Awards & Funding

2020	**Co-applicant** Dutch Research Council **(NWO) Groot**, large consortium grant worth 1,690k€, my part funded 1 PhD student for my group
2019	**Lecturer in the Spotlight**, awarded by the UU physics, math and computational science student association (A-E skwadraat)
2018	NWO Talent Programme **Vidi grant** (800k€), personal grant, Netherlands
2013	NWO Talent Programme **Veni grant** (250k€), personal grant, Netherlands
2015	**Lecturer of the Year** (2nd place), awarded by the UU Physics Students
2011	**PhD Cum Laude**, highest honour awarded in the Netherlands, top ~5% PhDs

Key Leadership Roles

2022-now	**Member** of the **Research Site Visit Committee**, Leiden Institute for Theoretical Physics (In the Netherlands, institutes are reviewed by an external committee every 6 years)
2022-now	**Program Director** of the Experimental Physics **Masters Program**, UU
2021-2022	**Co-author** of the **National Agenda** Computational Science for a Sustainable Future, given to **Ministry of Economic Affairs & Climate Policy**, Netherlands
2021-2022	**Member(2021)/Chair(2022)** of the **Physics Evaluation Group**, for the National Science and Engineering (NSERC) Discovery Grants, Canada
2021 - 2022	**Program Committee Chair** (2022) and **Member** (2021) for the **National Dutch Physics Conference** Physics@Veldhoven, ~1800 participants
2017-2020	**Managing Director** of the Debye Institute for Nanomaterials Science, UU

Teaching Experience

Received both basic and senior teaching qualifications, Utrecht University, Netherlands. Students evaluations of courses taught are always excellent.

- **Lecturer** for bachelors and masters courses in the Department of Physics (Utrecht), including: Modelling and Simulations *(Masters)*, Statistical Physics Theory and Experiment *(2nd year bachelors)*, Advanced Statistical Physics *(3rd year bachelors)*, Hydrodynamics and Transport Phenomena *(2nd year bachelors)*

- **Lecturer** at 3 **PhD schools**, **co-organizer** of 3 **PhD schools** and an international **Masters** school

- **Participation** in many **education committees**: e.g. Exam Assessment Committee, Computational Science in the Bachelors, Computational Science in the Masters

Supervision Highlights

- Masters student **Rinske Alkemade** won the **3rd place** for the **National** Young Talent Shell **Physics Graduation Award** (National Best Masters Thesis Prize in Physics), 2022

- Masters student **Marjolein de Jager** won the **National** Young Talent Shell **Physics Graduation Award**, 2020

- PhD student **Berend van der Meer** was awarded a **Dutch Rubicon Post-Doc** grant to fund his Post Doc position at Oxford, UK, 2019

Supervision

All supervision was at the Department of Physics, UU. All PhD students finished their PhD within the expected 4 years associated with a Dutch PhD.

- **Current PhD students (4 students):** Rinske Alkemade (since Aug. 2022), Alptug Ulugol (since Sept. 2021), Marjolein de Jager (since Sept. 2020), and Alberto Orellana (since Oct. 2019)
- **Graduated PhD students (3 students):** Emanuele Boattini (2017 – 2021), Berend van der Meer (2014 – 2018), Vassilis Prymidis (2013 – 2017). Berend stayed in academia, successfully attracting funding for a post doc in Oxford (NWO Rubicon) and for a post-doc in Wageningen University (NWO Veni). Emanuele and Vassilis quickly found employment in data science.
- **Post Docs (1 post doc):** Berend van der Meer (2018 – 2019)
- (Co-)supervised 13 **masters students** (plus 4 current), 20 **bachelors students** (plus 3 current), and 1 **internship student**.

Outreach

- **Co-organizer** of the Utrecht University Open Days (the main **recruitment event** for bachelors students), since 2015
- **Lecture** on **Brownian Motion** for high school students as part of the *Masterclass: De confrontatie met Einstein*, Utrecht University, annually since 2012
- **Public Lecture** for the **Natuurkundig Gezelschap te Utrecht** (public Utrecht Physics Society) on *Machine Learning in Soft Matter*, April 2018
- **Invited Lecture** for the Utrecht Physics Challenge, 2017
- **Co-author** of an invited article for **Nederlands Tijdschrift voor Natuurkunde (NTvN)** entitled *Wat is er nodig voor een tweede vloeistoffase in stoffen als water?* (*What is necessary for a second liquid phase in water-like systems?*), Feb. 2015. The NTvN is the official magazine for the Dutch organization for physics.

Key Presentations

40 conference talks and seminars (32 invited, 1 keynote)

- **AISSAI Workshop: Machine Learning Glassy Dynamics**, Paris, France, Nov 7-8, 2022
  Invited Tutorial: *Investigating supercooled liquids with machine learning* (watch on YouTube)
- **11th Liquid Matter Conference**, Online, July 18 -23, 2021
  Invited Lecture: *Soft Matter meets Machine Learning: New Machine Learning Algorithms to Unravel Structural & Dynamical Features in Glassy Fluids*
- **Materials Research Society (MRS) Fall Meeting**, Online, Nov 27- Dec 4, USA, 2020
  Invited Lecture: *Hiding in a fluid: Autonomously revealing hidden local structures in colloidal systems*

- **Applied Computational Sciences (ACOS) symposium 2018**, Eindhoven, The Netherlands
  October 10, 2018
  Keynote Lecture: *Machine learning in soft matter science*

Key Publications

Peer-reviewed publications: 52
h-index: 25 (Google Scholar), 10 papers > 100 citations each

1. E. Boattini, F. Smallenburg, **L. Filion**
   Averaging local structure to predict the dynamic propensity in supercooled liquids
   Phys. Rev. Lett. **127**, 088007 (2021). (Cited: 20, **Editor's Suggestion**)

2. R. M. Alkemade, M. de Jager, B. van der Meer, F. Smallenburg, **L. Filion**
   Point defects in crystals of charged colloids
   J. Chem. Phys. **154**, 164905 (2021). (Cited: 1, **JCP Editor's Choice 2021**)

3. E. Boattini, S. Marín-Aguilar, S. Mitra, G. Foffi, F. Smallenburg, and **L. Filion**,
   Autonomously revealing hidden local structures in supercooled liquids,
   Nat. Commun. **11**, 5479 (2020). (Cited: 62)

4. B. van der Meer, V. Prymidis, M. Dijkstra, **L. Filion**
   Predicting the phase behavior of mixtures of active spherical particles
   J. Chem. Phys. **152**, 144901 (2020). (Cited: 13)

5. E. Boattini, M. Dijkstra, **L. Filion**
   Unsupervised learning for local structure detection in colloidal systems
   J. Chem. Phys. **151**, 154901 (2019). (Cited: 51)

6. J. S. van der Burgt, J. J. Geuchies, B. van der Meer, H. Vanrompay, D. Zanaga, Y. Zhang, W. Albrecht, A. V. Petukhov, **L. Filion**, S. Bals, I. Swart, D. Vanmaekelbergh
   Cuboidal Supraparticles Self-Assembled from Cubic $CsPbBr_3$ Perovskite Nanocrystals
   J. Phys. Chem. C **122**, 15706 (2018). (Cited: 53)

7. B. van der Meer, R. van Damme, M. Dijkstra, F. Smallenburg, and **L. Filion**,
   Revealing a vacancy analogue of the crowdion interstitial in simple cubic crystals,
   Phys. Rev. Lett. **121**, 258001 (2018). (Cited: 14)

8. V. Prymidis, H. Sielcken, **L. Filion**
   Self-assembly of active attractive spheres
   Soft Matter **11**, 4158 (2015). (Cited 53)

9. **L. Filion**, M. Hermes, R. Ni, M. Dijkstra,
   Crystal nucleation of hard spheres using molecular dynamics, umbrella sampling, and forward flux sampling: A comparison of simulation techniques,
   J. Chem. Phys. **133**, 244115 (2010). (Cited: 206)

10. **L. Filion**, M. A. T. Marechal, B. van Oorschot, D. Pelt, F. Smallenburg, M. Dijkstra
    Efficient method for predicting crystal structures at finite temperature: variable box shape simulations
    Phys. Rev. Lett. **103**, 188302 (2009). (Cited: 140, **Editor's Suggestion**)