

# Curriculum Vitae

Arthur La Rooij

## **Contact Information:**

Name	: A.L. La Rooij	Rue Raymond Losserand 196B
Date of birth	: 18-12-1987	75014
Place of birth	: Amsterdam, Netherlands	Paris, France
Email	: <a href="mailto:arthur.larooij@lkb.ens.fr">arthur.larooij@lkb.ens.fr</a>	<a href="http://www.arthurlarooij.nl">www.arthurlarooij.nl</a>

## **Research Interests**

My interests mainly concern the nature of complex quantum systems, particularly lattices of quantum mechanical particles. In my PhD research I developed and built a new atomic physics experiment. The goal is to use magnetic potentials shaped by e-beam lithography at the Kavli cleanroom in Delft to trap ultracold neutral atoms in magnetic potential lattices. I find both the quantum simulation as well as the quantum information applications of the experiments that we do fascinating. Technically I have acquired skills in both solid state nanotechnology and atomic physics. Currently I am working in cavity QED where we combine a 1D lattice inside a fiber Fabry-Perot cavity with an optical microscope to study many body entanglement. The cavity enables strong coupling between the atoms which we can manipulate and detect on the single atom level through the microscope. In this way we hope to explore non-locality and entanglement in a controllable environment. In future years I hope to contribute to a large quantum simulation team where I want to studying fermionic lattices with controlled interactions. Only by gaining complete control over the interactions in systems of many quantum particles we can hope to understand them.

## **Education:**

2018-...	Postdoc Experimental Physics University of Strathclyde A versatile 2D bosonic lattice experiment Supervisor: Stefan Kuhr
2016-2018 (11-2016 – 09-2018)	Postdoc Experimental Physics École normale supérieure (Laboratoire Kastler Brossel) Fiber Fabry Perot cavity-QED with a single atom microscope Supervisor: Romain Long and Jakob Reichel
2012-2016	PhD Experimental Physics University of Amsterdam Nanoscale magnetic atom traps for quantum simulation ( <a href="#">thesis</a> ) Supervisor: Robert Spreeuw and Ben van Linden van den Heuvel
2009-2012	Master Theoretical Physics University of Amsterdam Specializations in condensed matter and philosophy of science Masterproject on the Single Electron Transistor ( <a href="#">thesis</a> )
2006-2009	Bachelor Physics and Astrophysics, <i>UvA</i> , Specializations: Philosophy Bachelorproject Standard Model Physics ( <a href="#">thesis</a> )
2000-2006	VWO "Natuur en Techniek", <i>Fons Vitea</i> , Amsterdam With Economics and Philosophy

## **Personal profile:**

Analytical. Creative. Team player. Responsible. Athletic.

# Curriculum Vitae

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## Teaching Experience:

- 2012-2014 University of Amsterdam (Atomic Physics with Prof. Jook Walraven)  
2010-2012 University of Amsterdam (Academic Tutor for 1<sup>st</sup> year students)  
2008-2011 Topscore Amsterdam (Badminton teacher at various high schools)

## Extracurricular Activities:

- 2010-2011 Organizing Committee of the Dutch Physical Societies Conference "Fysica 2011"  
2009-2010 President of the student association NSA

## Cooperation's:

1. Dr. P. Corboz (UvA) Quantum Monte Carlo Simulations
2. Prof. T. Oosterkamp (Leiden) Magnetic Resonance Force Microscopy
3. Prof. A. Vantomme and Prof. K. Temst (Leuven) Magnetic Films

## Publications:

1. Efficient transport of ultracold atoms into a 100  $\mu\text{m}$  cavity with an AOD controlled dipole trap. F. Ferri, M. Baghdad, A. L. La Rooij, J. Reichel, R. Long, **In preparation**
2. Fabrication of magnetic lattices with varying length scales down to 250nm in FePt, A. L. La Rooij, M.C. van der Krogt, A. Vantomme, K. Temst, R. J. C. Spreeuw, **Published**(<http://arxiv.org/abs/1805.00376>)
3. Novel trapping geometries for magnetic film quantum simulation experiments. A. L. La Rooij, H. B. van Linden van den Heuvell and R. J. C. Spreeuw, **In preparation**
4. [Probing the magnetic moment of FePt micromagnets prepared by Focused Ion Beam milling.](#), H. C. Overweg, A. M. J. den Haan, H. J. Eerkens, P. F. A. Alkemade, A. L. La Rooij, R. J. C. Spreeuw, L. Bossoni, T. H. Oosterkamp: Applied Physics Letters 04/2015; 107(7). DOI:10.1063/1.4928929
5. [Magnetic-film atom chip with 10  \$\mu\text{m}\$  period lattices of microtraps for quantum information science with Rydberg atoms.](#) V.Y.F. Leung, D.R.M. Pijn, H. Schlatter, L. Torralbo-Campo, A.L. La Rooij, G.B. Mulder, J. Naber, M.L. Soudijn, A. Tauschinsky, C. Abarbanel, B. Hadad, E. Golan, R. Folman, R.J.C. Spreeuw, *Review of Scientific Instruments*, 85 (5), 053102. doi: 10.1063/1.4874005
6. [Magnetische roosters van koude atomen als quantumsimulatoren](#)(Dutch). *Nederlands Tijdschrift voor Natuurkunde* 2014 (80), 162-164. A. L. La Rooij, R. J. C. Spreeuw

## Academic Awards

- 2014 UvA Physics Symposium Best oral presentation

## Oral Presentations:

- 2016 jan Physics at FOM at Veldhoven  
2015 may Invited Seminar at Atom Institute (Vienna)  
2015 april Invited Seminar at IQOQI (Innsbruck)  
2014 aug Invited Seminar at NIST (Washington D.C.)  
2013 may UvA Physics Symposium  
2012 jan Physics at FOM at Veldhoven

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## Conferences / Schools:

2017 Nov	The International Conference on Quantum Simulation in Paris
2017 Jan	Physics @ FOM at Veldhoven
2016 Nov	Symposium 50 year Nobel prize of Alfred Kastler (2 days) in Paris
2016 feb	Solvay workshop "Quantum simulation with atoms and photons" (Brussels)
2016 jan	Physics @ FOM at Veldhoven
2015 okt	Annual Meeting of the AMO division of the Dutch Physics Society in Lunteren
2015 jan	Physics @ FOM at Veldhoven
2014 okt	Annual Meeting of the AMO division of the Dutch Physics Society in Lunteren
2014 aug	ICAP Conference at University of Maryland (Washington D.C.)
2014 july	Gordon Research Seminar on Quantum Science (Boston)
2014 jan	Physics @ FOM at Veldhoven
2013 okt	Annual Meeting of the AMO division of the Dutch Physics Society in Lunteren
2013 may	CLEO/IQEC, The International Conference on Quantum Electronics at Munchen
2013 april	Les Houches workshop on Artificial Magnetic Fields
2013 jan	Physics @ FOM at Veldhoven
2012 okt	Annual Meeting of the AMO division of the Dutch Physics Society in Lunteren
2012 aug	ICAP Conference at Ecole Polytechnique (Paris)
2012 july	ICAP Summer School at ENS (Paris)
2012 may	COHERENCE School on Rydberg physics at Pisa
2012 jan	Physics @ FOM at Veldhoven
2011 sept	Les Houches Summer School in Atomic Physics
2011 april	Fysica, Conference of the Dutch Physical Society in Amsterdam
2011 march	Trends in Theory, Meeting of the Dutch Physical Society Theory division in Dalfsen
2011 jan	Physics @ FOM at Veldhoven

## Skills:

- Experience with atomic physics and (fiber) optics: Constructing and implementing various dipole traps for ultracold Rubidium. Optical lattices and single atom microscopy. High finesse double wavelength (fiber) cavities.
- Expertise in setting up completely a cold atoms experimental lab. During my PhD I worked with atom chips that combined for Bose-Einstein condensation and Rydberg experiments. Construction and design of UHV systems. Working with AutoCAD to draw the vacuum system and magnetic coils. Laser cooling and atom trapping of <sup>87</sup>Rb.
- Complete cleanroom training. Creation of permanent magnetic FePt films by MBE. E-beam lithography, vapor deposition, FIB milling and plasma etching.
- Data acquisition and analysis: Mathematica, Python, Matlab, Origin.
- Presentation: Latex, Office