# LUKAS RAMMELMÜLLER

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## ACADEMIC & PROFESSIONAL EXPERIENCE

October 2016 - present
**PhD Student**
within the *HGS-HIRe for FAIR* programme
Supervisor: Jens Braun
Institut für Kernphysik, Theoriezentrum
Technische Universität Darmstadt, Germany

March 2019
**Visiting Researcher**
Perimeter Institute for Theoretical Physics, Waterloo, ON, Candada

Summer 2015, Summer 2016 & Fall 2018
**Visiting Researcher**
University of North Carolina, Chapel Hill, NC, USA

August 2014 - December 2014
**Exchange Student**
Transatlantic Scientific Student Exchange Program (TASSEP)
University of North Carolina, Chapel Hill, NC, USA

## EDUCATION

TU Wien
2014 - 2016
**MSc in Physics**
Thesis: *"Energetics and equal-time response of strongly correlated fermions in 1D and 2D"*
Supervisor: Joaquín Drut (UNC Chapel Hill) & Alessandro Toschi (TU Wien)

TU Wien
2010 - 2014
**BSc in Physics**
Thesis: *"Numerical solution of the radial Schrödinger equation with momentum dependent potential"*
Supervisor: Helmut Leeb (TU Wien)

HTBLA Leonding
2004 - 2009
**Matura**
*high school with focus on computer science & business administration*

## TEACHING EXPERIENCE

Summer 2019 — *Theoretical physics V (Advanced Concepts)*, TU Darmstadt, teaching assistant, undergraduate

Summer 2018 — *Theoretical physics II (Quantum Mechanics) for teachers*, TU Darmstadt, teaching assistant, undergraduate

Summer 2017 — *Methods of computation in physics*, TU Darmstadt, teaching assistant, undergraduate

Summer 2016 — *Laboratory Work III (Statistical Evaluation of Experiments)*, TU Wien, teaching assistant, undergraduate

Summer 2015 — *Numerical methods and simulation*, TU Wien, teaching assistant, graduate

Summer 2015 — *Computing for Physicists*, TU Wien, teaching assistant, undergraduate

Winter 2014/2015 — *Laboratory Work II (Classical Mechanics & Statistical Physics)*, TU Wien, teaching assistant, undergraduate

Summer 2014 — *Laboratory Work III (Statistical Evaluation of Experiments)*, TU Wien, teaching assistant, undergraduate

## CO-SUPERVISED STUDENTS

Jul 2018 - present — Florian Ehmann, Master thesis, co-supervisor (supervisor: Jens Braun)

Oct 2018 - Jan 2019 — Felix Hermsen, Bachelor thesis, co-supervisor (supervisor: Jens Braun)

Jun 2018 - Aug 2018 — Fabian Brauneis, Bachelor thesis, co-supervisor (supervisor: Jens Braun)

## HONORS & AWARDS

October 2018 — Giersch-Excellence-Grant 2018 *"in recognition of outstanding achievements in the doctoral thesis project"*, awarded by *Stiftung Giersch*

April 2018 — Poster prize at 669. WE-Heraeus-Seminar on *Quantum gases and quantum coherence* (poster title: *"Imbalanced Fermi gases & the complex Langevin approach"*)

February 2017 — Poster prize at 637. WE-Heraeus-Seminar on *Understanding the LHC* (poster title: *"Equation of state & pair-correlations in 1D mass-imbalanced Fermi systems"*)

June 2016 — Master of Science graduation *with distinction*, Technische Universität Wien

## FUNDRAISING

2018 — *HGS-HIRe abroad* travel grant (3000€), research stay at UNC Chapel Hill, September 2018

2014 — *Transatlantic Scientific Student Exchange Program (TASSEP)* scholarship (2500€), four-month stay at UNC Chapel Hill

## SEMINARS & COLLOQIA

March 2019 — *Condensed Matter Theory Seminar.* Perimeter Institute, Waterloo, Canada.
*"Stochastic quantization and spin-polarized Fermi gases"*

March 2019 — *Special Condensed Matter Theory Seminar.* Ludwigs-Maximilian Universität, Münchem, Germany..
*"Stochastic quantization and spin-polarized Fermi gases"*

October 2018 — *Nuclear Theory Seminar.* National Superconducting Cycloton Laboratory, Michigan State University, USA.
*"Thermodynamics of the polarized unitarty Fermi gas"*

September 2018 — *Theory Talk.* Department of Physics, North Carolina State University, USA.
*"Thermodynamics of the polarized unitarty Fermi gas"*

February 2018 — Physikalisches Insitut, Universität Heidelberg, Germany.
*"Ultracold fermions away from balanced systems"*

## CONFERENCES, WORKSHOPS & SCHOOLS

(4 contributed talks, 5 poster contributions)

April 2018 — *669. WE-Heraeus-Seminar on Quantum Gases and Quantum Coherence.* Physikzentrum Bad Honnef, Germany.
**Contributed poster:** *"Imbalanced Fermi gases & the complex Langevin approach"*

February 2018 — *FOR 1807 Winter School on Numerical Methods for Strongly Correlated Quantum Systems.* Marburg, Germany.
**Contributed talk:** *"The complex Langevin method for ultracold fermions"*

January 2018 — *Multiparticle resonances in hadrons, nuclei, and ultracold gases.* Hirschegg, Austria.
**Contributed talk:** *"Ultracold fermions away from balanced systems"*

November 2017 — *Conference on Frontiers in Two-Dimensional Quantum Systems.* International Center for Theoretical Physics (ICTP), Trieste, Italy.
**Contributed poster:** *"Ground state of the 2D attractive Fermi gas: from few to many body"*

July 2017 — *Introductory Course on Ultracold Quantum Gases / FoQus SFB Meeting.* Uni Innsbruck, Austria.
**Contributed poster:** *"A complex Langevin approach to ultracold fermions"*

June 2017 *19th international conference on recent progress in many-body theories.* Asia Pacific Center for Theoretical Physics (APCTP), Pohang, Korea.
**Contributed poster:** *"A complex Langevin approach to ultracold fermions"*

March 2017 *Arbeitstreffen Kernphysik.* Schleching, Germany.
**Contributed talk:** *"Equation of state & pair-correlations in mass-imbalanced one-dimensional Fermi systems"*

February 2017 *637. WE-Heraeus-Seminar on Understanding the LHC.* Physikzentrum Bad Honnef, Germany.
**Contributed poster & talk:** *"Equation of state & pair-correlations in one-dimensional mass-imbalanced Fermi systems"*

## PEER REVIEWED PUBLICATIONS

5. *Finite-temperature equation of state of polarized fermions at unitarity.*
L. Rammelmüller, A.C. Loheac J.E. Drut, J. Braun.
Phys. Rev. Lett. **121**, 173001, (2018).

4. *Surmounting the sign problem in non-relativistic calculations: a case study with mass-imbalanced fermions.*
L. Rammelmüller, W.J. Porter, J.E. Drut, J. Braun.
Phys. Rev. D **96**, 094506 (2017).

3. *Evolution from few- to many-body physics in one-dimensional Fermi systems: One- and two-body density matrices and particle-partition entanglement.*
L. Rammelmüller, W.J. Porter, J. Braun, J.E. Drut.
Phys. Rev. A **96**, 033635 (2017).

2. *Ground state of the two-dimensional attractive Fermi gas: Essential properties from few to many body.*
L. Rammelmüller, W.J. Porter, J.E. Drut.
Phys. Rev. A **93**, 033639 (2016).

1. *Few-fermion systems in one dimension: Ground- and excited-state energies and contacts.*
L. Rammelmüller, W.J. Porter, A.C. Loheac, J.E. Drut.
Phys. Rev A **92**, 013631 (2015).

## PROCEEDINGS

1. *A complex Langevin approach to ultracold fermions.*
L. Rammelmüller, J.E. Drut, J. Braun.
J. Phys. Conf. **1041**(1), 012006 (2018).