Nicolò Defenu – Curriculum Vitae

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Date of Birth	19^{th} May 1988	**Personal Email**	nicolo.defenu@gmail.com
Nationality	Italian	**ORCID**	0000-0002-3401-3665

Education

11/2010 BSc with honors - Sapienza University of Rome, Roma

110/110 cum laude - 28/30 Average
Third Year Project - Second Quantization with application to phonon propagation.
Advisor: M. Testa

10/2012 MSc with honors - Sapienza University of Rome, Roma

110/110 cum laude - 29/30 Average
Final Year Project -Overhauser method for pair correlation function calculation applied to density functional theory.
Advisor: J. Lorenzana

10/2016 PhD with honors - International School for Advanced Studies (SISSA), Trieste

PhD cum laude (Maximum degree in the Italian System)
PhD Thesis -Application of Functional Renormalization Group Approach to spin systems and long range models.
Advisors: S. Ruffo, A. Trombettoni and A. Codello

Past Positions

Dec 2016 Institute for Theoretical Physics (ITP), Philosophenweg, 19 - 69120 Heidelberg, Germany
Four years Post-Doc position in the group of Dr. Tilman Enss and member of the ISOQUANT collaboration

Present Position

March 2020 Institute for Theoretical Physics, ETH Zürich, Wolfgang-Pauli-Str. 27, 8093, Zürich, Switzerland
Two years Post-Doc position in the group of Prof. Dr. Gian Michele Graf

Awards, Fellowships and Projects

- **Percorsi di eccellenza**

  2010-Awarded of the merit-based fellowship *Percorsi di eccellenza.*
- **Percorso Imprenditoriale Re-Seed**

  2014-Awarded of a project-based fellowship to fund a one year business management course.
- **Fellowship for EU collaborations**

  2015-Awarded of the merit-based *Job Placement* fellowship to fund a two months visit at the Ruprecht-Karls-Universität in Heidelberg.
- **Exploratory project within STRUCTURES cluster**

  2019-Leading investigator of the exploratory project “Universality on network structures” within the cluster ”Structures” at the University of Heidelberg.

Memberships

- **External Member of the cluster "Structures" at the University of Heidelberg.**
- **External Member of the CNR Istituto officina dei materiali (Trieste).**
- **Member of the SwissMAP collaboration.**

Memberships in boards

- **Member of the Young Researchers Board in the Structures Excellence Cluster Feb. 2019**

  The young researchers board proposes and organises scientific activities financed by the special fund for young researchers of the Structures Cluster. The board assigns travel stipends and internships, organises colloquia and invites scientific guests.

Research interests

- **Condensed matter theory**
- **2D Quantum systems**
- **Topological phase transitions**
- **Long range interactions**
- **Functional Renormalization group**
- **Quantum dynamics**
- **Quantum anomaly**
- **Soft Matter Physics**

Teaching experience

During my present employment at Heidelberg University it is part of my duties to participate at teaching activities. As a teaching assistant I have to correct and grade home exercise done by the students and to display the solution of such exercises in a lecture every week. Moreover, I have been a guest Instructor at SISSA (Trieste) where I was responsible for a one week intense course (4 ours per day) on Functional Renormalization Group.

- **Teaching Assistant for Advanced Condensed Matter Theory Feb.-Jul. 2017**
  Heidelberg University, Instructor Prof. Maurits Havenkort
- **Teaching Assistant for Condensed Matter Theory Oct. 2017- Feb. 2019**
  Heidelberg University, Instructor Prof. Maurits Havenkort
- **Teaching Assistant for Seminar on Statistical Physics Feb. - Jul. 2018**
  Heidelberg University, Instructor Prof. Andreas Mielke
- **Teaching Assistant for Theoretical Statistical Physics Oct. 2018 - Feb. 2019**
  Heidelberg University, Instructor Prof. Bjoern Malte Schaefer
- **Teaching Assistant for Seminar on Nonlinear Systems Mar. - Jul. 2019**
  Heidelberg University, Instructor Prof. Andreas Mielke
- **Main Instructor for Functional Renormalization Group Jun. 2019**
  SISSA (Trieste), Co-Instructor Dr. Andrea Trombettoni

- **Head Teaching Assistant (Oberassistent) for Theoretical Statistical Physics** **Oct. 2019- Present**
  Heidelberg University, Instructor Prof. Luca Amendola

- **Main Instructor for Functional Renormalization Group** **Apr. 2020**
  SISSA (Trieste), Co-Instructor Dr. Andrea Trombettoni

Referee experience

- **Referee for *Physical Review Letters*** **Feb. 2019**

- **Referee for *New Journal of Physics*** **Sept. 2019**

- **Referee for *Physical Review A*** **Nov. 2019**

- **Referee for *European Journal of Physics C*** **Feb. 2020**

Activities

- **Selected Conferences**

  Probing and Understanding Exotic Superconductors, ICTP ,
  27th–31st October 2014, Trieste. Oral presentation.
  20th National Conference on Statistical Physics and Complex Systems,
  29 June–1 July 2015, Parma. Oral presentation.
  Hungary-Croatia-Austria-Triangle (ACHT2015) Workshop
  7th–9th October 2015, Leibnitz, Austria. Oral presentation.
  Conference on Long-Range-Interacting Many Body Systems: from Atomic to Astrophysical Scales,
  25th–29th July 2016, Trieste. Invited Speaker.
  8th International conference on the Exact Renormalization Group,
  19th–23th September 2016, Trieste. Oral presentation.
  CQD mini symposium,
  April 19th–20th, 2017, Physikalisches Institut, Heidelberg. Invited Speaker.
  Young researchers' seminar,
  24th–05th April-May 2017, Institut Henri Poincare, Paris. Invited Speaker.
  Quantum Many Body Systems Out of Equilibrium,
  12th–16th March 2018, StellenBosch, South Africa. Invited Speaker.
  ERG2018 : Exact Renormalization Group 2018,
  9th–13th July 2018, Jussieu campus, Paris. Contributed Speaker.
  MACHINE LEARNING FOR QUANTUM DESIGN,
  8th–12th July 2019, Perimeter Institute, Waterloo. Contributed Speaker.
  QUANTUM AND CLASSICAL SYSTEMS WITH LONG-RANGE INTERACTIONS,
  15th–19th July 2019, International Institute of Physics, IIP (Natal). Contributed Speaker.

- **Scientific Visits**

MTA Atomki, Hungarian Academy of science, Debrezen.
Repeated visits staring from December 2014. Seminar Presentation.
International Institute of Physics, Natal (Brasil),
1-7 December 2013, Natal. Seminar Presentation.
Theoretical Quantum Physics Group, Universitaat des Saarlandes,
Repeated visits staring from February 2016.
La Sapienza University, Rome,
Repeated visits staring from March 2016. Seminar Presentation.
International School for Advanced Studies, SISSA, Trieste,
Repeated visits staring from January 2017. Seminar Presentation.
ETH, Zürich,
02nd–04th October 2017, Zürich. Seminar Presentation.
University of Colorado, Boulder, JILA,
09th–12th October 2017, Boulder. Seminar Presentation.
Los Alamos National Laboratory, LANL,
13th–25th October 2017, Los Alamos. Seminar Presentation.
Boston University, BU,
3rd–17th May 2018, Boston.
Weizmann Institute of Science,
Rehovot, Israel. Repeated visits starting from November 2018. Seminar Presentation.
Massachusetts Institute of Technology, MIT,
22th–30th April 2019, Boston, USA.
Simons Center for Geometry and Physics, SCGP,
1st–2nd May 2019, Stony Brook, USA. Seminar Presentation.
Georgetown University, GU,
3rd–6th May 2019, Washington, USA. Seminar Presentation.
Swinburne University of Technology, SUT,
20th–24th January 2020, Melbourne, Australia. Seminar Presentation.

Numerical Skills

- **Operative Systems**

  Windows
  OSX
  Linux-Ubuntu, Lubuntu, Linux Mint, OpenSUSE.

- **Text Editing**

  LaTeX
  Microsoft Office™
  Open Office

- **Programming Languages**

  Python - Numpy, Sympy, Scipy, Pandas
  C, C++
  PHP

- **Scientific Programs**

  Wolfram *Mathematica*®
  Matlab
  Gnuplot
  Origin

- **Web Development**

  Webmaster of Condensed Matter Department at SISSA

Languages

- **Italian - Native**
- **English - Excellent**
- **German - Basic**

Selected Publications

- **N. Defenu, P. Mati, I.G. Marian, I. Nandori, and A. Trombettoni**

  Truncation effects in the functional renormalization group study of spontaneous symmetry breaking,
  JHEP **11 (2015)** 059.
  doi:10.1007/JHEP05(2015)141

- **N. Defenu, A. Trombettoni and S. Ruffo**

  Anisotropic long range spin systems,
  Phys. Rev. **B 94** 224411 (2016).
  doi:10.1103/PhysRevB.94.224411

- **N. Defenu, A. Trombettoni, I. Nandori, T. Enss**

  Nonperturbative RG treatment of amplitude fluctuations for $|\varphi|^4$ topological phase transitions,
  Phys. Rev. **B 96**, 174505 (2017)
  doi:10.1103/PhysRevB.96.174505

- **N. Defenu, A. Trombettoni and S. Ruffo**

  Criticality and Phase Diagram of Quantum Long-Range Systems,
  Phys. Rev. **B 96**, 104432 (2017)
  doi:10.1103/PhysRevB.96.104432

- **N. Defenu, and A. Codello**

  Scaling solutions in the derivative expansion,
  Phys. Rev. **D 98**, 016013 (2018)
  doi:10.1103/PhysRevD.98.016013

- **N. Defenu, T. Enss, M. Kastner, G. Morigi**

  Dynamical critical scaling of long-range interacting quantum magnets,
  Phys. Rev. Lett. **121**, 240403 (2018)
  doi:10.1103/PhysRevLett.121.240403

- **P. M. Preiss, J. H. Becher, R. Klemt, V. Klinkhamer, A. Bergschneider, N. Defenu, and S. Jochim**

  High-Contrast Interference of Ultracold Fermions,
  Phys. Rev. Lett. **122**, 143602 (2019)
  doi:10.1103/PhysRevLett.122.143602

- **P. A. Murthy*, N. Defenu*, L. Bayha, M. Holten, P. M. Preiss, T. Enss, S. Jochim**

  Quantum scale anomaly and spatial coherence in a 2D Fermi superfluid,
  Science **365**, 268-272 (2019)
  doi:10.1126/science.aau4402
  *These authors contributed equally to this work

- **G. Bighin*, N. Defenu*, I. Nándori, L. Salasnich, and A. Trombettoni**

  Berezinskii-Kosterlitz-Thouless Paired Phase in Coupled XY Models,
  Phys. Rev. Lett. **123**, 100601 (2019)
  doi:10.1103/PhysRevLett.123.100601
  *These authors contributed equally to this work

- **Nicolò Defenu, Giovanna Morigi, Luca Dell'Anna, Tilman Enss**

  Universal dynamical scaling of long-range topological superconductors,
  Phys. Rev. **B 100** 184306 (2019).
  doi:10.1103/PhysRevB.100.184306