

## Personal information

Surname(s) / First name(s)

Address(es)

Telephone(s)

Fax(es)

Email(s)

Nationality(-ies)

Date of birth

Gender

## Current position

Group & Institution

Further Affiliations

## Research Interests

## Work experience

Sep. 2007 - Dec 2012

Group & Institution

Other Responsibilities

Jan. 2007- July 2007

Group & Institution

## Education & Training

2004-2007

Thesis

Group & Institution

Other Responsibilities

### J.-Prof. Dr. Rizzi, Matteo

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Researcher-ID: **B-3879-2010**

Italian

June 18, 1980 - Novara, Italy

Male

### Junior Professor (W1) (since 01.01.2013 - positive evaluation 29.10.2015)

KOMET (Condensed Matter) - Prof. P.G.J. van Dongen (C4)

Institut für Physik - Johannes Gutenberg Universität Mainz, [www.iph.uni-mainz.de](http://www.iph.uni-mainz.de)

Staudingerweg 7, 55128 Mainz, Germany

**MAINZ** (MAterial science IN mainZ) Graduate School of Excellence

**CSM** Center for Computational Science Mainz

- *Synthetic Quantum States of Matter with Ultracold Atomic Setups*

- *Interplay of Geometry, Interactions & Gauge fields  
in strongly correlated many-body systems*

- *Quantum-information inspired numerical algorithms (DMRG & Tensor-Networks)*

- *Topological Quantum Memories & Topological Insulators*

### PostDoc Researcher

Theory Group - Prof. J.I. Cirac (<http://www.mpq.mpg.de/Theorygroup/CIRAC/>)

Max-Planck-Institut für Quantenoptik (MPQ), Garching, Germany

\* proposal writing, scientific and management reports of EU-IP SCALA & AQUTE

\* supervision of a Ph.D. student and a Bachelor student (see Teaching ID)

### Research assistant

Quantum Transport & Information Group - Prof. R. Fazio (<http://qti.sns.it/>)

Scuola Normale Superiore (SNS), Pisa, Italy

### Ph.D. in Physics (Diploma di perfezionamento) 70/70 cum laude (merits)

"Quantum Phase Transitions in Hubbard lattices" with Prof. R. Fazio

Quantum Transport & Information Group - Prof. R. Fazio (<http://qti.sns.it/>)

Scuola Normale Superiore (SNS), Pisa, Italy

- Representative of Ph.D. students in the Science Class Council



<p><b>1999-2003</b> Institution Other Responsibilities</p>	<p><b>Degree in Sciences (Diploma di Licenza)</b> <span style="float: right;"><i>70/70 cum laude (merits)</i></span> Scuola Normale Superiore (SNS), Pisa, Italy (<a href="http://www.sns.it">http://www.sns.it</a>) - Responsible of students' Funds for Sport activities</p>
<p><b>2002-03</b> Thesis Institution</p>	<p><b>Master Degree in Physics (Laurea Specialistica)</b> <span style="float: right;"><i>110/110 cum laude (merits)</i></span> "Phase Transitions in Josephson Junctions <math>T_3</math> (dice) Arrays" with Prof. R. Fazio Università degli Studi di Pisa - Dipartimento di Fisica (<a href="http://www.df.unipi.it">http://www.df.unipi.it</a>)</p>
<p><b>1999-2002</b> Thesis Institution</p>	<p><b>Bachelor Degree in Physics (Laurea)</b> <span style="float: right;"><i>110/110 cum laude (merits)</i></span> "Bose Einstein Condensation" with Prof. M.P. Tosi Università degli Studi di Pisa - Dipartimento di Fisica (<a href="http://www.df.unipi.it">http://www.df.unipi.it</a>)</p>
<b>Long Term Visits</b>	
<p><b>October 2016</b> Group &amp; Institution</p>	<p><b>Visiting Researcher (affiliated)</b> Program "Synthetic Quantum Matter" [<a href="#">link</a>] Kavli Institute for Theoretical Physics (KITP), Santa Barbara, CA, USA</p>
<p><b>April 2015</b> Group &amp; Institution</p>	<p><b>Visiting Researcher</b> Program "Frontiers in Quantum Simulation with Cold Atoms" [<a href="#">link</a>] University of Washington, Seattle, WA, USA</p>
<p><b>October 2010</b> Group &amp; Institution</p>	<p><b>Visiting Researcher (affiliated)</b> Program "Beyond Standard Optical Lattices" [<a href="#">link</a>] Kavli Institute for Theoretical Physics (KITP), Santa Barbara, CA, USA</p>
<p><b>April 2006 &amp; May 2007</b> Group &amp; Institution</p>	<p><b>Research stay</b> (collaboration with A. Imambekov) Prof. E. Demler's group, Harvard University, Cambridge MA, USA</p>
<b>Personal skills</b>	
<p>Languages Computer skills</p>	<p><i>Italian</i>: Mother-Tongue    <i>English</i>: C1 Proficient    <i>German</i>: C1 Proficient Programming in Fortran (f77-f90/5) (with basic MPI) &amp; Mathematica &amp; MatLab Co-Director of a Symmetric Tensor-Network Library project (open-source soon)</p>
<b>Honors &amp; Awards</b>	
<p>2016 2016 1999-2003  1999</p>	<p>2nd Place (1st Theorist overall) in the Italian CNR Recruitment Process (87.8/100) Outstanding Referee of the American Physical Society Admission to Scuola Normale Superiore - Pisa, (30 places/year 5% top nationwide): Fellowship covering life and study expenses for the whole University period (99-03) with additional courses &amp; exams, strong requisites on grades, early own seminars Alfiere del Lavoro della Repubblica Italiana, National Award for High School students appointed by the Republic Presidency</p>
<b>Dissemination</b>	
<p>Contributions  Referee  Editorial work</p>	<p>Around 30 peer-reviewed papers (ca. 700 citations, h-index 15), ca. 20 invited talks in International Conferences, 35 as guest in other institutes and 30 contributed talks, plus 20 poster presentations  Since 2007 active referee for several international journals. Since 2013 also referee for the DFG funding agency, since 2015 for the Polish Academy of Sciences, and since 2016 for the Carl-Zeiss-Stiftung.  Since July 2016 Editorial Board Member of Scientific Reports (Nat. Pub. Group)</p>

## Organized Events

- \* International Workshop “Perspectives on Quantum Many-Body Entanglement” [[link](#)] Mainz, 25th-27th Sep. 2013 (with J.Prof. R. Orus, JGU) – 40 participants (12 invited)
- \* WE-Heraeus Klausurtagung “Vier Quanten” (JGU young groups’ meeting), Oberwesel, 13th-17th April 2015 (with Profs. Windpassinger, van Loock and Orus)
- \* MPQ Theory Workshop, around 30 people, (with A. Pflanze) Friedrichshafen, 12th-15th September 2012

## Funding ID

- 2017 Two *pending* proposals (first cutoff passed) within EU initiative QuantERA: QUTECURVED – “QUantum TEchnologies in artificial CURVED spaces” QUMIX – “QUantum MIXtures for emerging quantum phenomena and technologies”
- 2016 Stufe-I Wiss. Förderung by the JGU-Mainz (circa **30K€**) about “Fractional topological phases in cold atomic ribbons”,
- 2015 DFG-Sachbeihilfe “OSCAR- Orbital and Spin Currents in Atomic Ring traps”, **188K€**
- 2015 Center for Comp. Sciences Mainz - “Numerical optimization of tensor networks” circa **30K€** jointly with the JGU groups of Prof. Orus and Prof. Raasch (Math);
- 2014 WE Heraus Foundation - Klausurtagung - “Vier Quanten” (ref. BV 33606) circa **5K€** jointly with the JGU groups of Profs. Orus, Windpassinger, van Loock;
- 2013 Stufe-I Wiss. Förderung by the JGU-Mainz (circa **30K€**) about “Interplay of geometry, interactions and gauge fields”,
- 2004-06 Member of IBM Linux on Power Innovation Grant “Powder with Power” **20k€** Support to develop open-source well-adapting DMRG code ([www.dmrg.it](http://www.dmrg.it))

## Teaching ID

- SS2017 **6hours/week course for Bachelor (9 credits)** at JGU - Mainz  
“Theory 4: Thermodynamics and Statistical Mechanics” (in German)
- WS 2016-7 **4hours/week course for Master (6 credits)** at JGU - Mainz
- WS 2015-6 “Introduction to Quantum Computation” (in English)
- SS 2016 **4hours/week course for Master (6 credits)** at JGU - Mainz
- SS 2015 “Selected Chapters of condensed matter physics” (in English)
- WS 2014-15 **2hours/week course for Master (3 credits)** at JGU - Mainz  
“Numerical Methods for strongly correlated electron systems” (in English)
- SS 2014 **4hours/week course for Master (6 credits)** at JGU - Mainz  
“Introduction to the theory of condensed matter” (in German)
- WS 2014-5 **2+1hours/week course for Bachelor (3 credits)** at JGU - Mainz
- WS 2013-4 “Mathematical Methods 2” (in German)
- SS 2013 **4hours/week course for Master (6 credits)** at JGU - Mainz  
“Entanglement in many-body systems: from concepts to algorithms” (in English)
- 2017 **Supervising the PhD thesis** of Andreas Haller at JGU - Mainz
- 2016 **Supervising the Master thesis** of Andreas Haller at JGU - Mainz
- 2015 – **Supervising the PhD thesis** of Manon Bischoff at JGU - Mainz
- 2013 – **Supervising the PhD thesis** of Johannes Jünemann at JGU - Mainz & MAINZ
- 2014 **Supervising the Bachelor thesis** of Andreas Haller at JGU - Mainz
- 2014 – **Second Referee of Bachelor / Master / Diploma theses** at JGU - Mainz
- 2012 **Co-supervising the Bachelor thesis** of Dominik Schubert at TUM München
- 2008-2012 **Co-supervising the Ph.D. thesis** of Dr. Leonardo Mazza at TUM & MPQ-Garching

## Selected Publications

Updated full list at [www.rizzi-matteo.com](http://www.rizzi-matteo.com) and with **Researcher-ID B-3879-2010**

**Total peer-reviewed articles: 32 — Total citations  $\approx$  700 — h-index: 15**

- 10) D.Aghamalyan, M.Cominotti, **MR**, D.Rossini, F.Hekking, A.Minguzzi, L.C.Kwek, L.Amico  
*Coherent superposition of current flows in Atomtronic Quantum Interference Device*,  
New J. Phys. **17**, 045023 (2015) chosen as highlight of 2015 on NJP
- 9) M. Cominotti, D. Rossini, **MR**, F. Hekking, and A. Minguzzi  
*Optimal Persistent Currents for Interacting Bosons on a Ring with a Gauge Field*,  
Phys. Rev. Lett. **113**, 025301 (2014)
- 8) L. Mazza, **MR**, M.A. Lukin, J.I. Cirac,  
*Robustness of quantum memories based on Majorana zero modes*,  
Phys. Rev. B **88**, 205142 (2013)
- 7) L. Mazza, A. Bermudez, N. Goldman, **MR**, M.A. Martin-Delgado, M. Lewenstein,  
*An Optical-Lattice-Based Quantum Simulator for Relativistic Field Theories and Topological Insulators*,  
New J. Phys. **14**, 015007 (2012) chosen as highlight of 2012 on NJP
- 6) M. Roncaglia, **MR**, J. Dalibard,  
*From Rotating Atomic Rings to Quantum Hall States*,  
Sci. Rep. **1**, 43 (2011)
- 5) A. Bermudez, L. Mazza, **MR**, N. Goldman, M. Lewenstein, M.A. Martin-Delgado,  
*Wilson Fermions and Axion Electrodynamics in Optical Lattices*,  
Phys. Rev. Lett. **105**, 190404 (2010) chosen as highlight of EU-IP AQUTE in Y1
- 4) M. Roncaglia, **MR**, J.I. Cirac,  
*Pfaffian State Generation by Strong 3-Body Dissipation*,  
Phys. Rev. Lett. **104**, 096803 (2010)
- 3) **MR**, M. Polini, M.A. Cazalilla, M.R. Bakhtiari, M.P. Tosi, R. Fazio,  
*Fulde-Ferrell-Larkin-Ovchinnikov superfluidity in 1D optical lattices*,  
Phys. Rev. B **77**, 245105 (2008)
- 2) G. Xianlong, **MR**, M. Polini, R. Fazio, M.P. Tosi, V.L. Campo Jr., K. Capelle,  
*Luther-Emery Phase and Atomic-Density Waves in a Trapped Fermion Gas*,  
Phys. Rev. Lett. **98**, 030404 (2007)
- 1) **MR**, D. Rossini, G. De Chiara, S. Montangero, R. Fazio,  
*Phase diagram of spin-1 bosons on one-dimensional lattices*,  
Phys. Rev. Lett. **95**, 240404 (2005)

## Selected invited talks

Updated full list available at <http://www.rizzi-matteo.com>

**ca. 20 invited talks at Int. Conf., 30 contributed and 30 as guest in Institutes**

- |   |   |
|---|---|
| 30.May -16. Jun. 2017<br>GGI Florence, Italy    | <i>"Exploring topological phases with cold atoms &amp; tensor networks"</i><br>Intern. Workshop "From Static to Dynamical Gauge Fields with Ultracold Atoms"                        |
| 14.-16. Nov. 2016<br>Oxford, UK                 | <i>"Strongly-correlated SU(N)-fermionic mixtures in one-dimensional harmonic traps"</i><br>Atomic & Laser Seminar Series  |
| 12.-15. Dec. 2014<br>TU Kaiserslautern, Germany | <i>"Majorana fermions, Pfaffian states and Ising anyons"</i><br>International School & Workshop "Anyon Physics of Ultracold Atomic Gases"   |
| 21.-22. Sep. 2013<br>Harvard University, USA    | <i>"On the robustness of quantum memories based on Majorana zero modes"</i><br>Workshop "Quantum Dynamics of Low-Dimensional Systems"   |
| 02.-06. Sep. 2013<br>ECT*, Trento, Italy        | <i>"Optical lattice based q.-simul. for relativistic fermions and topological insulators"</i><br>Colloquium at the Workshop QCD-TNT-III "From quarks to gluons - a bridge too far?" |
| 01.-05. Jun. 2010<br>Nizza, France              | <i>"Pfaffian State Generation by Strong 3-Body Dissipation"</i><br>CNRS Conference "Theory of Quantum Gases and Quantum Coherence"  |