

# Curriculum Vitae

Mag. Dr. Manfred Johann Mark

**Date of birth:** 13.09.1977 in Innsbruck, Austria  
**Nationality:** Austria  
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## Academic positions / Professional experience

2014-now Senior scientist at the University of Innsbruck, Austria in the group of Prof. Francesca Ferlaino.  
2012-2014 PostDoc at the University of Innsbruck, Austria in the group of Prof. Hanns-Christoph Nägerl.

## Scientific education

2008-2012 Doctoral student at the University of Innsbruck, Austria, in the group of Prof. Hanns-Christoph Nägerl. Doctoral thesis topic: "Experiments with tunable quantum gases in optical lattices".  
2002-2007 Study of physics at the University of Innsbruck, Austria. Diploma thesis topic: "Wechselwirkungseffekte eines Cäsium-BECs in eindimensionalen Gittern".

## Education and working experience outside science

1998-2002 Lead Consultant at the Telecommunication Consultancy "TiKOM Tirol Kommunikation" in Innsbruck and Vienna.  
1992-1997 "Höhere Technische Bundeslehranstalt für Elektronik/Nachrichtentechnik" in Innsbruck, Matura/A-levels with distinction.

## Awards and Prizes

- 2006: "Undergraduate Research Experience & Knowledge Award from the Science Foundation Ireland"
- 2012: "Anerkennungspreis der Jury des Award of Excellence des Bundesministers für Wissenschaft und Forschung"

## Other activities

- 2016 Participant of the "Pint of Science" Festival
- 2015 Organizer of the "Tag der Physik"
- 2013 Local Co-organizer of the "International Conference on Quantum Optics 2014" conference in Obergurgl.
- 2012 Organizer of the "Ultracold quantum gases"-group contribution to the "Aktionstag Junge Uni".
- 2012 Build-up of a new practical course for students: " Laborpraktikum der Experimentalphysik: Elektronik"
- 2011 Local Co-organizer of the "Frontiers of Matter Wave Optics 2011" conference in Obergurgl as part of the EuroQUASAR program of the European Science Foundation.

## Supervising courses

- Laborpraktikum der Experimentalphysik: Elektronik (SS12,WS12,WS13,SS15,SS16)
- Proseminar Elektromagnetismus und Optik (SS09)
- Proseminar Mechanik und Wärme (SS10, SS11, WS11,WS14,SS16)
- Proseminar Atom- und Molekülphysik (WS15, WS16)
- Grundpraktikum 1 (WS10)
- F-Praktikum 1 (SS15)
- F-Praktikum 2 (WS09, WS11,WS14, WS15, WS16)

## Invited lectures

- CUI Graduate days, Hamburg, 10.-12.03.2014, three lectures on "Ultracold physics in low dimensions"
- Summer school "Low-Dimensional Quantum Many-Body Systems", Trier, 17.-18.08.2012, two lectures on "Tunable quantum gases in one-dimensional confinement"

## Invited scientific talks

- CUI young researchers workshop "From few- to many body physics in cold atomic quantum matter", 28.06.2016, Talk "Quantum simulation 2.0: Quench dynamics and long-range extensions in the Bose-Hubbard model"
- Seminar "Few-body physics: Advances and prospects in Theory and Experiment", Bad Honnef, 19.04.2016, Talk "Emergence of chaotic scattering in ultracold lanthanide atoms"
- Joint Annual Meeting of the Austrian Physical Society and the Swiss Physical Society, Linz, 05.09.2013, Talk "Doublon stability and decay mechanisms"
- FINES conference "Finite-Temperature Non-Equilibrium Superfluid Systems", Queenstown, 18.02.2013, Talk "Quench dynamics in strongly interacting Bose-Hubbard chains"
- Seminar "Quo vadis BEC", Bad Honnef, 22.08.2012, Talk "Ultracold atoms with tunable interactions in optical lattice potentials"
- Summer school "Low-Dimensional Quantum Many-Body Systems", Trier, 17.08.2012, Lecture "Tunable quantum gases in one-dimensional confinement: Introduction" and

"Tunable quantum gases in one-dimensional confinement: Tonks- and Super-Tonks-Girardeau Gases"

- Workshop "Effective Gravity in Fluids and Superfluids", Trieste, 13.07.2012, Talk "A metastable Mott insulator state with strong attractive interactions"
- Maria-Waldrast-Meeting, Maria Waldrast, 02.03.2012, Talk "Experiments with tunable bosonic quantum gases in optical lattices"
- SFB-Meeting, Innsbruck, 13.10.2011, Talk "Multi-body interactions in a Mott-insulator state"
- Workshop "Quantum transport in dilute gases", Benasque, 14.07.2011, Talk "Inducing transport with super Bloch oscillations. Beyond the standard Bose Hubbard model"
- 19th International Laser Physics Workshop, Foz do Iguacu, 06.07.2010, Talk "Phases, transport, and scattering in low-dimensional quantum systems"
- ESF Conference "Frontiers of Matter wave optics", Crete, 09.04.2010, Talk "Rovibronic ground state molecules in an optical lattice"

### Scientific publications

*Quantum-fluctuation-driven crossover from a dilute Bose-Einstein condensate to a macrodroplet in a dipolar quantum fluid*

L. Chomaz, S. Baier, D. Petter, M. J. Mark, F. Wächtler, L. Santos, F. Ferlaino,  
Phys. Rev. X **6**, 041039 (2016)

*Floquet engineering of correlated tunneling in the Bose-Hubbard model with ultracold atoms*

F. Meinert, M. J. Mark, K. Lauber, A. J. Daley, and H.-C. Nägerl  
Phys. Rev. Lett. **116**, 205301 (2016)

*Extended Bose-Hubbard Models with Ultracold Magnetic Atoms*

S. Baier, M. J. Mark, D. Petter, K. Aikawa, L. Chomaz, Z. Cai, M. Baranov, P. Zoller, F. Ferlaino  
Science **352**, 201 (2016)

*Emergence of chaotic scattering in ultracold Er and Dy*

T. Maier, H. Kadau, M. Schmitt, M. Wenzel, I. Ferrier-Barbut, T. Pfau, A. Frisch, S. Baier, K. Aikawa, L. Chomaz, M. J. Mark, F. Ferlaino, C. Makrides, E. Tiesinga, A. Petrov, S. Kotochigova  
Phys. Rev. X **5**, 041029 (2015)

*Probing the Excitations of a Lieb-Liniger Gas from Weak to Strong Coupling*

F. Meinert, M. Panfil, M. J. Mark, K. Lauber, J.-S. Caux, H.-C. Nägerl  
Phys. Rev. Lett. **115**, 085301 (2015)

*Compact, robust, and spectrally pure diode-laser system with a filtered output and a tunable copy for absolute referencing*

E. Kirilov, M. J. Mark, M. Segl, H.-C. Nägerl  
Appl. Phys. B **0946-2171** (2015)

*Observation of Density-Induced Tunneling*

O. Jürgensen, F. Meinert, M. J. Mark, H.-C. Nägerl, D.-S. Lühmann  
Phys. Rev. Lett. **113**, 193003 (2014)

*Observation of many-body dynamics in long-range tunneling after a quantum quench*  
F. Meinert, M. J. Mark, E. Kirilov, K. Lauber, P. Weinmann, M. Gröbner, A. J. Daley, and H.-C. Nägerl  
Science **344**, 1259-1262 (2014)

*Interaction-Induced Quantum Phase Revivals and Evidence for the Transition to the Quantum Chaotic Regime in 1D Atomic Bloch Oscillations*  
F. Meinert, M. J. Mark, E. Kirilov, K. Lauber, P. Weinmann, M. Gröbner, and H.-C. Nägerl  
Phys. Rev. Lett. **112**, 193003 (2014)

*Quantum Quench in an Atomic One-Dimensional Ising Chain*  
F. Meinert, M. J. Mark, E. Kirilov, K. Lauber, P. Weinmann, A. J. Daley, and H.-C. Nägerl  
Phys. Rev. Lett. **111**, 053003 (2013)

*Preparation and spectroscopy of a metastable Mott insulator state with attractive interactions*  
M. J. Mark, E. Haller, K. Lauber, J. G. Danzl, A. Janisch, H. P. Büchler, A. J. Daley, and H.-C. Nägerl,  
Phys. Rev. Lett. **108**, 215302 (2012)

*Three-body correlation functions and recombination rates for bosons in three and one dimensions.*  
E. Haller, M. Rabie, M. J. Mark, J. G. Danzl, R. Hart, K. Lauber, G. Pupillo, H.-C. Nägerl  
Phys. Rev. Lett. **107**, 230404 (2011)

*Precision Measurements on a Tunable Mott Insulator of Ultracold Atoms*  
M. J. Mark, E. Haller, K. Lauber, J. G. Danzl, A. J. Daley, H.-C. Nägerl,  
Phys. Rev. Lett. **107**, 175301 (2011)

*Demonstration of the temporal matter-wave Talbot effect for trapped matter waves*  
M. J. Mark, E. Haller, J. G. Danzl, K. Lauber, M. Gustavsson, H.-C. Nägerl  
New J. Phys. **13**, 085008 (2011)

*Optimal trapping wavelengths of Cs<sub>2</sub> molecules in an optical lattice.*  
R. Vexiau, N. Bouloufa, M. Aymar, J. G. Danzl, M. J. Mark, H.-C. Nägerl, O. Dulieu  
Eur. Phys. J. D **65**, 243 (2011)

*Ultracold and dense samples of ground-state molecules in lattice potentials.*  
H.-C. Nägerl, M. J. Mark, E. Haller, M. Gustavsson, R. Hart, J. G. Danzl  
J. Phys.: Conf. Ser. **264**, 012015 (2011)

*Production of a quantum gas of rovibronic ground-state molecules in an optical lattice.*  
J. G. Danzl, M. J. Mark, E. Haller, G. Gustavsson, R. Hart, H.-C. Nägerl,  
Laser Spectroscopy **256** (2010)

*Pinning quantum phase transition for a Luttinger liquid of strongly interacting bosons*  
E. Haller, R. Hart, M. J. Mark, J.G. Danzl, L. Reichsöllner, M. Gustavsson, M. Dalmonte, G. Pupillo, H.-C. Nägerl,  
Nature **66**, 597 (2010)

*Interference of interacting matter waves*  
M. Gustavsson, E. Haller, M. J. Mark, J. G. Danzl, R. Hart, A. J. Daley, H.-C. Nägerl,  
New J. Phys. **12**, 065029 (2010)

*Inducing Transport in a Dissipation-Free Lattice with Super Bloch Oscillations*  
E. Haller, R. Hart, M. J. Mark, J. G. Danzl, L. Reichsöllner, H. -C. Nägerl,  
Phys. Rev. Lett. **104**, 200403 (2010)

*Confinement-Induced Resonances in Low-Dimensional Quantum Systems*  
E. Haller, M. J. Mark, R. Hart, J. G. Danzl, L. Reichsöllner, V. Melezhik, P. Schmelcher, H. -C. Nägerl,  
Phys. Rev. Lett. **104**, 153203 (2010)

*An ultracold high-density sample of rovibronic ground-state molecules in an optical lattice*  
J. G. Danzl, M. J. Mark, E. Haller, M. Gustavsson, R. Hart, J. Aldegunde, J. M. Hutson, H. -C. Nägerl,  
Nature Physics **6**, 265 (2010)

*Realization of an Excited, Strongly Correlated Quantum Gas Phase*  
E. Haller, M. Gustavsson, M. J. Mark, J. G. Danzl, R. Hart, G. Pupillo, H. -C. Nägerl,  
Science **325**, 1224 (2009)

*Deeply bound ultracold molecules in an optical lattice*  
J. G. Danzl, M. J. Mark, E. Haller, M. Gustavsson, R. Hart, A. Liem, H. Zellmer, H.-C. Nägerl,  
New J. Phys. **11**, 055036 (2009)

*Precision molecular spectroscopy for ground state transfer of molecular quantum gases*  
J. G. Danzl, M. J. Mark, E. Haller, M. Gustavsson, N. Bouloufa, O. Dulieu, H. Ritsch, R. Hart, H.-C. Nägerl,  
Faraday Discuss. (2009) DOI: 10.1039/B820542F

*Dark resonances for ground state transfer of molecular quantum gases*  
M. J. Mark, J. G. Danzl, E. Haller, M. Gustavsson, N. Bouloufa, O. Dulieu, H. Salami, T. Bergeman, H. Ritsch, R. Hart and H.-C. Nägerl,  
Appl. Phys. B **95**, 219-225 (2009)

*Quantum Gas of Deeply Bound Ground State Molecules*  
J. G. Danzl, E. Haller, M. Gustavsson, M. J. Mark, R. Hart, N. Bouloufa, O. Dulieu, H. Ritsch, H.-C. Nägerl,  
Science **321**, 1062 (2008)

*Control of Interaction-Induced Dephasing of Bloch Oscillations*  
M. Gustavsson, E. Haller, M. J. Mark, J. G. Danzl, G. Rojas-Kopeinig, H.-C. Nägerl,  
Phys. Rev. Lett. **100**, 080404 (2008)