Univ. Prof. Dr. Markus Arndt

Personal Information

Birth	14.09.1965, Unkel/Rh. (Germany)
Nationality	Germany
Marital status	Married, 2 children
WWW	www.quantumnano.at
EMAIL	markus.arndt@univie.ac.at

Career development

since 2008	Full Professor of Quantum Nanophysics at University of Vienna,
2004 - 2008	Professor of Quantum Nanophysics at University of Vienna,
2002	Docent / Ao. Univ. Prof. at University of Vienna (Habilitation)
1999 - 2002	Universitätsassistent at University of Vienna, with Anton Zeilinger.
1997 - 1998	Postdoc at University of Innsbruck, with Anton Zeilinger.
1995 - 1997	Postdoc at Ecole Normale Supérieure, Paris with Jean Dalibard
1994 - 1995	Postdoc at MPQ, Garching, with A. R. Weis and T. W. Hänsch
1991 - 1994	PhD (LMU, Munich) at MPQ, Garching: with A. R. Weis and T. W. Hänsch
1990 - 1991	Diploma Work at LMU Munich, with Herbert Walther

Professional activities

7/2020 – 9/2022	Scientific Director, Vienna Doctoral School in Physics
10/2018 – 9/2022	Vice Dean, Faculty of Physics, University of Vienna
1/2020-12/2022	Coordinator, EU FET Open *SuperMaMa*
Since 9/2016	Speaker, Erwin Schrödinger Center for Quantum Science & Technology ESQ Austria
3/2016 – 6/2020	Speaker, Vienna Doctoral School in Physics
3/2013-2/2016	Coordinator, EU FET Open *NANOQUESTFIT*
2013 - 2015	PI & Founding member, Research Platform *QuNaBioS*
10/2012-9/2014	Dean, Faculty of Physics, University of Vienna
1/2007-9/2012	Speaker, Quantum optics, Q-nanophysics and Q-information
2006 - 2013	Speaker, Vienna FWF Graduate Program Complex Quantum Systems
2007 - 2011	Coordinator, ESF network: Molecule Interferometry & Metrology *MIME*
2008 - 2013	Member, Steering Committee to the ESF Network *Casimir*

Awards, Distinctions & Research Prizes

2020	Schrödinger Prize of the Austrian Academy of Sciences, ÖAW, with L. Erdös
2019	Robert-Wichard-Pohl Prize, German Physical Society, DPG
2018	Fetzer Pioneer Award, Fetzer Foundation
2014	Outstanding Referee for the journals of the American Physical Society (APS)
2013	Prize for Natural and Technical Sciences, City of Vienna
2012	ERC Advanced Grant, European Research Council
2008	Wittgenstein Prize, Ministry for Science and Research, BMWF & FWF
2006	Science Communication Award (3rd), Austrian Science Fund, FWF
2001	START Prize, Ministry of Education, Science & Culture & FWF
2000	Fritz-Kohlrausch Prize, Austrian Physical Society, ÖPG
2000	Erich-Schmid-Prize, Austrian Acad. of Sciences, ÖAW, with G. Springholz

5 Distinguished fellowships and memberships

Since 2014	Corresponding Member, Austrian Academy of Sciences (ÖAW)
2008-2013	Member Junge Kurie, Austrian Academy of Sciences (ÖAW)
1996-1997	DFG research fellowship
1995-1996	Feodor-Lynen fellowship, Alexander von Humboldt foundation
1986-1991	Fellowship, Studienstiftung des deutschen Volkes

Research Interests

- **Universal matter-wave interferometry**
  with atoms, clusters, tailored molecules, biomolecules and nanoparticles.
- **Quantum physics at the interface to the classical world:**
  decoherence and interferometric tests of wave function collapse.
- **Quantum physics at the interface to chemistry:**
  Quantum nanorulers to measure electric, magnetic, optical and structural properties of molecules.
- **Quantum physics at the interface to biology:**
  Matter-wave experiments with vitamins, antibiotics and polypeptides.
- **Quantum physics at the interface to mass spectrometry technologies**
  Quantum nanowire detectors for biomolecular beams
- **Quantum physics at the interface to optomechanics:**
  Optical cooling of dielectric nanospheres in high-finesse microcavities as well as rotational cooling

A) Publications listed in the Science Citation Index

1. High finesse microcavities in the optical telecom O-band
J. Fait, S. Putz, G. Wachter, J. Schalko, U. Schmid, M. Arndt, and M. Trupke
Appl. Phys. Lett. 119, 221112 (2021), DOI: 10.1063/5.0066620

2. *Single-, double-, and triple-slit diffraction of molecular matter-waves*
C. Brand, S. Troyer, C. Knobloch, O. Cheshnovsky, and M. Arndt
Am. J. Phys. 89, 1132 (2021), DOI: 10.1119/5.0058805
Am. J. Phys. Cover Page & Editor´s Pick

3. W. C.-W. Huang, H. Batelaan, M. Arndt
Kapitza-Dirac Blockade: A Universal Tool for the Deterministic Preparation of Non-Gaussian Oscillator States
Phys. Rev. Lett. 126 (2021), DOI: 10.1103/PhysRevLett.126.253601
Phys. Rev. Lett. Cover Page

4. C. Brand, M. R. A. Monazam, C. Mangler, Y. Lilach, O. Cheshnovsky, M. Arndt, J. Kotakoski
The morphology of doubly-clamped graphene nanoribbons
2D Materials 8, 025035 (2021), DOI: 10.1088/2053-1583/abe952

5. C. Brand, F. Kialka, S. Troyer, C. Knobloch, K. Simonovic, B.A. Stickler, K. Hornberger, M. Arndt,
Bragg diffraction of large organic molecules
Phys. Rev. Lett. (2020), DOI: 10.1103/PhysRevLett.125.033604
Editor's Suggestion

6. Y.Y. Fein, A. Shayeghi, F. Kialka, P. Geyer, S. Gerlich, M. Arndt,
Quantum-assisted diamagnetic deflection of molecules
Phys. Chem. Chem. Phys. (2020), DOI: 10.1039/d0cp02211j
PCCP Hot Paper

7. J. Schätti, V. Köhler, M. Mayor, Y.Y. Fein, P. Geyer, L. Mairhofer, S. Gerlich, M. Arndt,
Matter-wave interference and deflection of tripeptides decorated wth fluorinated alkyl chains
J Mass Spectrom. (2020), DOI:10.1002/jms.4514

8. A. Shayeghi, P. Rieser, G. Richter, U. Sezer, J.H. Rodewald, P. Geyer, T.J. Martinez, M. Arndt,
Matter-wave interference of a native polypeptide
Nature Comm., 11, 144 (2020), DOI: 10.1038/s41467-020-15280-2

9. C. Brand, K. Simonovic, F. Kialka, S. Troyer, P., Geyer, M. Arndt,
A fiber-based beam profiler for high-power laser beams in confined spaces and ultra-high vacuum
Optics Express (2020), DOI: 10.1364/OE.387650

10. Y. Y. Fein, F. Kialka, P. Geyer, S. Gerlich, M. Arndt,
Coriolis compensation via gravity in a matter-wave interferometer
New Journal of Physics (2020), DOI:10.1088/1367-2630/ab73c5

11. Y. Y. Fein, A. Shayeghi, L. Mairhofer, F. Kialka, P. Rieser, P. Geyer, S. Gerlich, M. Arndt,
Quantum-Assisted Measurement of Atomic Diamagnetism

Phys. Review X 10, 011014(2020), DOI: 10.1103/PhysRevX.10.011014

12. Y. Y. Fein, P. Geyer, F. Kiałka, S. Gerlich, M. Arndt,
Improved accuracy fullerene polarizability measurements in a long-baseline matter-wave interferometer
Phys. Rev. Res. 1, 033158 (2019), DOI: 10.1103/PhysRevResearch.1.033158

13. Y. Y. Fein, P. Greyer, P. Zwick, F. Kiałka, S. Pedalino, M. Mayor, S. Gerlich and M. Arndt,
Quantum Superposition of Molecules Beyond 25kDa,
Nature Physics (2019), DOI:10.1038/s41567-019-0663-9
Highlighted by more than 40 News Outlets, such as Spiegel, NZZ, FAZ, Spektrum, APA, etc..

14. J. Schätti, M. Kriegleder, M. Debiossac, M. Kerschbaum, P. Geyer, M. Mayor, M. Arndt, V. Köhler,
Neutralization of insulin by photocleavage under high vacuum,
Chem. Commun. (2019), DOI: 10.1039/c9cc05712a

15. G. Wachter, S. Kuhn, S. Minniberger, C. Salter, P. Asenbaum, J. Millen, M. Schneider, J. Schalko, U. Schmid, A. Felgner, D. Hüser, M. Arndt, M. Trupke,
Silicon microcavity arrays with open access and a finesse of half a million,
Light: Science & Applications 8:37, 1-7 (2019), DOI: 10.1038/s41377-019-0145-y

16. C. Brand, M. Debiossac, T. Susi, F. Aguillon, J. Kotakoski, P. Roncin, M. Arndt
Coherent diffraction of hydrogen through the 246 pm lattice of graphene
New J. Phys. (2019), DOI: 10.1088/1367-2630/ab05ed

17. F. Kiałka, B. Stickler, K. Hornberger, Y.Y. Fein, P. Geyer, L. Mairhofer, S. Gerlich, M. Arndt,
Concepts for long-baseline high-mass matter-wave interferometry
Phys. Scr. 94 (2019), DOI: 10.1088/1402-4896/aaf243

18. J. Schätti, P. Rieser, U. Sezer, G. Richter, P. Geyer, G. G. Rondina, D. Häussinger, M. Mayor, A. Shayeghi, V. Köhler, M. Arndt
Pushing the mass limit for intact launch and photoionization of large neutral biopolymers
Commun. Chem. 1, 93 (2018), DOI: 10.1038/s42004-018-0095-y

19. B. A. Stickler, B. Papendell, S. Kuhn, B. Schrinski, J. Millen, M. Arndt, K. Hornberger
Probing macroscopic quantum superpositions with nanorotors
New J. Phys. 20, 122001 (2018), DOI: 10.1088/1367-2630/aaece4

20. C. Brand, B.A. Stickler, C. Knobloch, A. Shayeghi, K. Hornberger and M. Arndt
Conformer-selection by matter-wave interference
Phys. Rev. Lett. 121, 173002 (2018), DOI: 10.1103/PhysRevLett.121.173002

21. L. Mairhofer, S. Eibenberger, A. Shayeghi and M. Arndt
A quantum ruler for magnetic deflectometry
Entropy 20, 516 (2018), DOI: 10.3390/e20070516

22. M. Debiossac, J. Schätti, M. Kriegleder, P. Geyer, A. Shayeghi, M. Mayor, M. Arndt. andV. Köhler
Tailored photocleavable peptides: Fragmentation and neutralization pathways in high vacuum

Phys. Chem. Chem. Phys. 20, 11412--11417 (2018), DOI: 10.1039/c8cp01058g

23. J. Rodewald, N. Dörre, A. Grimaldi, P. Geyer, L. Felix, M. Mayor, A. Shayeghi and M. Arndt
Isotope-selective high-order interferometry with large organic molecules in free fall
New J. Phys. 20, 033016 (2018), DOI: 10.1088/1367-2630/aaade2

24. S. Kuhn, G. Wachter, F. Wieser, J. Millen, M. Schneider, J. Schalko, U. Schmid, M. Trupke and M. Arndt
Nanoparticle detection in an open-access silicon microcavity
Appl. Phys. Lett. 111, 253107 (2017), DOI: 10.1063/1.5008492
Editor's Pick

25. S. Kuhn, B. A. Stickler, A. Kosloff, F. Patolsky, K. Hornberger, M. Arndt and J. Millen
Optically driven ultra-stable nanomechanical rotor
Nature Comm. 8 (1) (2017), DOI: 10.1038/s41467-017-01902-9
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26. J. P. Cotter, C. Brand, C. Knobloch, Y. Lilach, O. Cheshnovsky and M. Arndt
In search of multipath interference using large molecules
Science Adv. 3, e1602478 (2017), DOI: 10.1126/sciadv.1602478
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27. L. Mairhofer, S. Eibenberger, J. P. Cotter, M. Romirer, A. Shayeghi and M. Arndt
Quantum-assisted metrology of neutral vitamins in the gas-phase
Angew. Chem. Int. Ed. 56, 6 (2017), DOI: 10.1002/ange.201704916
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28. L. Gallego, U. Sezer, M. Arndt and M. Mayor
Long-pulse laser launch and ionization of tailored large neutral silver nanoparticles with atomic mass assignment
Nanoscale 9, 9175-9180 (2017); DOI: 10.1039/c7nr03297n

29. J. Schätti, U. Sezer, S. Pedalino, J. P. Cotter, M. Arndt*, M. Mayor and V. Köhler*
Tailoring the volatility and stability of oligopeptides
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30. J. Rodewald, P. Haslinger, N. Dörre, B.A. Stickler, A. Shayeghi, K. Hornberger and M. Arndt
New avenues for matter-wave-enhanced spectroscopy,
Appl. Phys. B 123,3 (2017), DOI 10.1007/s00340-016-6573-y

31. U. Sezer, P. Geyer, M. Kriegleder, M. Debiossac, A. Shayeghi, M. Arndt, F. Lukas and M. Mayor
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32. S. Kuhn, A. Kosloff, B. A. Stickler, F. Patolsky, K. Hornberger, M. Arndt, and J. Millen
Full Rotational Control of Levitated Silicon Nanorods
Optica 4, 356-360 (2017), DOI: doi.org/10.1364/OPTICA.4.000356

33. C. Knobloch, B. A. Stickler, C. Brand, M. Sclafani, Y. Lilach, T. Juffmann, O. Cheshnovsky, K. Hornberger and M. Arndt
On the role of the electric dipole moment in the diffraction of biomolecules at nanomechanical gratings
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34. B. A. Stickler, S. Nimmrichter, L. Martinetz, S. Kuhn, M. Arndt and K. Hornberger
Ro-Translational Cavity Cooling of Dielectric Rods and Disks
Phys. Rev. A 94, 033818, (2016), DOI: 10.1103/PhysRevA.94.033818

35. P. Geyer, U. Sezer, J. Rodewald, L. Mairhofer, N. Dörre, P. Haslinger, S. Eibenberger, C. Brand and M. Arndt
Perspectives for Quantum Interference with Biomolecules and Biomolecular Clusters
Phys. Scr. 91, 063007-063019 (2016), DOI: 10.1088/0031-8949/91/6/063007

36. W.P. Schleich, et al.
Quantum technology: from research to application
Appl. Phys. B 122, 1-31 (2016), DOI: 10.1007/s00340-016-6353-8

37. C. Brand, M. Sclafani, C. Knobloch, Y. Lilach, T. Juffmann, J. Kotakoski, C. Mangler, A. Winter, A. Turchanin, J. Meyer, O. Cheshnovsky and M. Arndt
An atomically thin matter-wave beam splitter
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38. Markus Arndt and Christian Brand,
Interference of atomic clocks,
Science 349, 1168-1169 (2015), DOI: 10.1126/science.aad0683

39. C. Brand, J. Fiedler, T. Juffmann, M. Sclafani, C. Knobloch, S. Scheel, Y. Lilach, O. Cheshnovsky and M. Arndt,
A Green's function approach to modeling molecular diffraction in the limit of ultra-thin gratings
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40. M. Tomandl, T. Mieling, C. Losert-Valiente Kroon, M. Hopf and M. Arndt
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41. S. Kuhn, P. Asenbaum, A. Kosloff, M. Sclafani, B. A. Stickler, S. Nimmrichter, K. Hornberger, O. Cheshnovsky, F. Patolsky and M. Arndt
Cavity-assisted manipulation of freely rotating silicon nanorods in high vacuum
Nano Letters 15, 5604–5608 (2015), DOI: 10.1021/acs.nanolett.5b02302

42. J. Kotakoski, C. Brand, Y. Lilach, O. Cheshnovsky, C. Mangler, M. Arndt and J. C. Meyer
Towards two-dimensional all-carbon heterostructures via ion beam patterning of single-layer graphene

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43. J. P. Cotter, S. Eibenberger, L. Mairhofer, X. Cheng, P. Asenbaum, M. Arndt; K. Walter, S. Nimmrichter and K. Hornberger
Coherence in the presence of absorption and heating in a molecule interferometer
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44. U. Sezer, L. Wörner, J. Horak, L. Felix, J. Tüxen, C. Götz, A. Vaziri, M. Mayor and M. Arndt
Laser-induced acoustic desorption of natural and functionalized biochromophores
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45. U. Sezer, P. Schmid, L. Felix, M. Mayor and M. Arndt
Stability of high-mass molecular libraries: the role of the oligoporphyrin core
J. Mass Spectrom. 50, 235-239 (2015), DOI: 10.1002/jms.3526

46. J. Espigulé-Pons, C. Götz, A. Vaziri and M. Arndt
Physical Constraints for the Stoneham Model for Light-Dependent Magnetoreception
arXiv*:1412.7369* (2014)

47. N. Dörre, P. Haslinger, J. Rodewald, P. Geyer and M. Arndt,
A refined model for Talbot-Lau matter-wave optics with pulsed photo-depletion gratings
JOSA B 32, 114–120 (2015), DOI: 10.1364/JOSAB.32.000114

48. N. Dörre, J. Rodewald, P. Geyer, B. von Issendorff, P. Haslinger and M. Arndt
Photofragmentation beam splitters for matter-wave interferometry
Phys. Rev. Lett. 113, 233001 (2014), DOI: 10.1103/PhysRevLett.113.233001
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49. C. Emary, J. P. Cotter and M. Arndt
Testing macroscopic realism through high-mass interferometry.
Phys. Rev. A 90,042114-1 (2014), DOI: 10.1103/PhysRevA.90.042114

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Synthesis of Highly Fluoroalkyl-Functionalized Oligoporphyrin Systems,
Eur. J. Org. Chem.6884–6895 (2014),DOI: 10.1002/ejoc.201402816
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51. S. Eibenberger, X. Cheng, J. P. Cotter and M. Arndt
Absolute absorption cross sections from photon recoil in a matter-wave interferometer
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De Broglie's meter stick: Making measurements with matter waves.
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Insight review: Testing the limits of quantum mechanical superpositions
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54. M. Tomandl, C. M. Losert-Valiente Kroon, M. Hopf and M. Arndt
Interaktive Forschungssimulationen
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55. P. Asenbaum, S. Kuhn, S. Nimmrichter, U. Sezer and M. Arndt
Cavity cooling of free silicon nanoparticles in high vacuum
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57. S. Eibenberger, S. Gerlich, M. Arndt, M. Mayor and J. Tüxen,
Matter-wave interference with particles selected from a molecular library with masses exceeding 10 000 amu
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Quantum coherent propagation of complex molecules through the frustule of the alga Amphipleura pellucida,
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A universal matter-wave interferometer with optical ionization gratings in the time domain
Nature Physics 9, 144–148 (2013), DOI: 10.1038/nphys2542
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Real-time single-molecule imaging of quantum interference
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Characterization of a superconducting nanowire detector for low energy ions
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New prospects for de Broglie interferometry: Grating diffraction in the far-field and Poisson´s spot in the near-field
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Highly Fluorous Porphyrins as Model Compounds for Molecule Interferometry
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Concept of an ionizing time-domain matter-wave interferometer
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Quantum interference of large organic molecules
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Master equation for the motion of a polarizable particle in a multimode cavity
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81. M. Arndt, T. Juffmann and V. Vedral
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HFSP Journal 3, 386-400 (2009), DOI: 10.2976/1.3244985
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