

Selected Publications by Univ.-Prof. Dr. Markus Arndt

Quantum Nanophysics Group, Faculty of Physics, University of Vienna

- 1) Y. Y. Fein, S. Pedalino, A. Shayeghi, F. Kialka, S. Gerlich and M. Arndt
Nanoscale Magnetism Probed in a Matter-Wave Interferometer
Phys. Rev. Lett **129**, 123001 (2022), DOI: 10.1103/PhysRevLett.129.123001
Editor's pick & Featured in "Physics": <https://physics.aps.org/articles/v15/137>
- 2) 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
- 3) Y.Y. Fein, P. Geyer, P. Zwick, F. Kialka, S. Pedalino, M. Mayor, S. Gerlich, M. Arndt,
Quantum superposition of molecules beyond 25 kDa,
Nature Physics **15**, 1242 (2019). DOI 10.1038/s41567-019-0663-9
- 4) 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).
- 5) 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)
- 6) C. Brand, B.A. Stickler, C. Knobloch, A. Shayeghi, K. Hornberger, M. Arndt,
Conformer Selection by Matter-Wave Interference,
Phys. Rev. Lett. **121**, 173002 (2018).
- 7) M. Debiossac, J. Schätti, M. Kriegleder, P. Geyer, A. Shayeghi, M. Mayor, M. Arndt, V. Köhler,
Tailored photocleavable peptides: Fragmentation and neutralization pathways in high vacuum,
Phys Chem Chem Phys **20**, 11412-11417 (2018).
- 8) S. Kuhn, B. A. Stickler, A. Kosloff, F. Patolsky, K. Hornberger, M. Arndt, J. Millen,
Optically driven ultra-stable nanomechanical rotor,
Nature Communications **8**, 1670 (2017)
- 9) J. P. Cotter, C. Brand, C. Knobloch, Y. Lilach, O. Cheshnovsky, M. Arndt,
In search of multipath interference using large molecules,
Science Advances **3**, e1602478 (2017), DOI: 10.1126/sciadv.1602478
- 10) L. Mairhofer, S. Eibenberger, J. P. Cotter, M. Romirer, A. Shayeghi, M. Arndt,
Quantum-assisted metrology of neutral vitamins in the gas-phase,

Angew. Chem. Int. Ed. **56**, **10947** (2017), DOI: 10.1002/anie.201704916
Angew. Chem. Deutsch **56**, **11088**(2017), DOI: 10.1002/ange.201704916
High-lighted in Chemistry Views

- 11) C. Brand, M. Sclafani, C. Knobloch, Y. Lilach, T. Juffmann, J. Kotakoski, C. Mangler, A. Winter, A. Turchanin, J. Meyer, O. Cheshnovsky, M. Arndt,
An atomically thin matter-wave beam splitter,
Nature Nanotechnology **10**, **845 - 848** (2015), DOI: 10.1038/nnano.2015.179
Nature Nano: News & Views by P. Treutlein, Highlighted by Physics World
- 12) M. Arndt, C. Brand,
Interference of atomic clocks,
Science **349**, **1168-1169** (2015); DOI: 10.1126/science.aad0683
- 13) M. Tomandl, T. Mieling, C. Losert-Valiente Kroon, M. Hopf, M. Arndt,
Simulated Interactive Research Experiments as Educational Tools for Advanced Science,
Scientific Reports **5**, **14108** (2015), DOI: 10.1038/srep14108
Highlighted by Phys.org, PhysicsNews, Le Scienze
- 14) S. Kuhn, P. Asenbaum, A. Kosloff, M. Sclafani, B. A. Stickler, S. Nimmrichter, K. Hornberger, O. Cheshnovsky, F. Patolsky, 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
- 15) J. Kotakoski, C. Brand, Y. Lilach, O. Cheshnovsky, C. Mangler, M. Arndt, J. C. Meyer,
Towards two-dimensional all-carbon heterostructures via ion beam patterning of single-layer graphene,
Nano Letters **15**, **5944–5949** (2015), DOI: 10.1021/acs.nanolett.5b02063
- 16) J. P. Cotter, S. Eibenberger, L. Mairhofer, X. Cheng, P. Asenbaum, M. Arndt; K. Walter, S. Nimmrichter, K. Hornberger,
Coherence in the presence of absorption and heating in a molecule interferometer,
Nature Communications **6**, **7336** (2015), DOI: 10.1038/ncomms8336
- 17) N. Dörre, J. Rodewald, P. Geyer, B. von Issendorff, P. Haslinger, M. Arndt,
Photofragmentation beam splitters for matter-wave interferometry
Phys. Rev. Lett. **113**, **233001** (2014). DOI: 10.1103/PhysRevLett.113.233001
Editor's Choice & Viewpoint in Physics 7,122 (2014)
- 18) S. Eibenberger, X. Cheng, J. P. Cotter, M. Arndt,
Absolute absorption cross sections from photon recoil in a matter-wave interferometer,
Phys. Rev. Lett. **112**, **250402** (2014), DOI: 10.1103/PhysRevLett.112.250402
- 19) M. Arndt, K. Hornberger,
Insight review: Testing the limits of quantum mechanical superpositions,
Nature Physics **10**, **271-277** (2014), DOI: 10.1038/nphys2863
- 20) P. Asenbaum, S. Kuhn, S. Nimmrichter, U. Sezer, M. Arndt,
Cavity cooling of free silicon nanoparticles in high vacuum,
Nature Communications **4**, **2743** (2013), DOI: 10.1038/ncomms3743

- 21) S. Eibenberger, S. Gerlich, M. Arndt, M. Mayor, J. Tüxen,
Matter-wave interference with particles selected from a molecular library with masses exceeding 10 000 amu
Phys. Chem. Chem. Phys. **15**, 14696 (2013), DOI: 10.1039/C3CP51500A
- 22) P. Haslinger, N. Dörre, P. Geyer, J. Rodewald, S. Nimmrichter, M. Arndt,
A universal matter-wave interferometer with optical ionization gratings in the time domain,
Nature Physics **9**, 144–148 (2013), DOI: 10.1038/nphys2542
News & Views, Nature Physics by A. Cronin & W. Holmgren
- 23) T. Juffmann, A. Milic, M. Müllneritsch, P. Asenbaum, A. Tsukernik, J. Tüxen, M. Mayor, O. Cheshnovsky, M. Arndt,
Real-time single-molecule imaging of quantum interference
Nature Nanotechnology **7**, 297 - 300 (2012). DOI:10.1038/nnano.2012.34
News & Views of Nature Nanotechnology, by B. Z. Zhao & W. Schöllkopf
Cover page of Nature Nanotechnology May 2012
Chosen as one of the best science pictures in 10 years of Nature Nanotechnology
- 24) K. Hornberger, S. Gerlich, S. Nimmrichter, P. Haslinger, M. Arndt,
Colloquium: Quantum interference with clusters and molecules
Rev. Mod. Phys. **84**, 157-173 (2012), DOI: 10.1103/RevModPhys.84.157
Highlighted in *Nature Physics* by M. Buchanan, Feb. 2012
- 25) M. Arndt
Coherence from spontaneity,
Nature Physics **7**, 375–376 (2011). DOI: 10.1038/nphys1987
- 26) S. Gerlich, S. Eibenberger, M. Tomandl, S. Nimmrichter, K. Hornberger, P. J. Fagan, J. Tüxen, M. Mayor, M. Arndt,
Quantum interference of large organic molecules,
Nature Communications **2**, 263 (2011), DOI 10.1038/ncomms1263
Featured by Nature Communications April 5th 2011, Highlight by Nature April 5th 2011
TOP100 Science Stories in Discover Magazine 2/2012
- 27) T. Juffmann, S. Truppe, P. Geyer, S. Deachapunya, H. Ulbricht, M. Arndt,
Wave and Particle in Molecular Interference Lithography,
Phys. Rev. Lett. **103**, 263601 (2009). DOI: 10.1103/PhysRevLett.103.263601
PRL: Editor's Suggestions
APS: Selected for the Virtual Journal of Nanoscale Science & Technology, Vol.11 (2010)
APS: Selected for the Virtual Journal of Atomic Quantum Fluids Vol. 2 (1) (2010)
- 28) M. Arndt, T. Juffmann, V. Vedral,
Quantum Physics Meets Biology,
HFSP Journal **3**, 386-400 (2009). DOI: 10.2976/1.3244985
APS: Selected for the Virtual Journal of Quantum Information January 10 (2010)
APS: Selected for the Virtual Journal of Biological Physics Research January 15, (2010)

- 29) S. Gerlich, M. Gring, H. Ulbricht, K. Hornberger, J. Tüxen, M. Mayor, M. Arndt,
Matter-Wave Metrology as a Complementary Tool for Mass Spectrometry,
Angew. Chem. Int. Ed. **47**, 6195–6198, (2008)
Angew. Chem. 120, 6290–6293 (2008). DOI: 10.1002/anie.200801942
VIP paper and Cover Page at Angew. Chemie
- 30) S. Gerlich, L. Hackermüller, K. Hornberger, A. Stibor, H. Ulbricht, F. Goldfarb, T. Savas, M. Müri, M. Mayor, M. Arndt,
A Kapitza-Dirac-Talbot-Lau interferometer for highly polarizable molecules,
Nature Physics **3**, 711 (2007). DOI: 10.1038/nphys701
Research highlights by NATURE & NATURE PHYSICS (8/2007)
- 31) M. Arndt
Quantum physics - Coherence in molecular nitrogen,
Nature Physics **1**, 19-20 (2005). DOI: 10.1038/nphys118
- 32) L. Hackermüller, K. Hornberger, B. Brezger, A. Zeilinger, M. Arndt,
Decoherence of matter waves by thermal emission of radiation
Nature **427**, 711–714 (2004). DOI: 10.1038/nature02276
IOP physics highlight & APS physics news of 2004
- 33) L. Hackermüller, S. Uttenthaler, K. Hornberger, E. Reiger, B. Brezger, A. Zeilinger, M. Arndt,
The wave nature of biomolecules and fluorofullerenes,
Phys. Rev. Lett. **91**, 90408 (2003). DOI: 10.1103/PhysRevLett.91.090408
• *NATURE News*, 5th September 2003
• *IOP Physics News*, 5th September 2003
• *Virtual Journal of Nanoscale Science & Technology*, 8 (10), September 8 (2003)
- 34) K. Hornberger, S. Uttenthaler, B. Brezger, L. Hackermüller, M. Arndt, A. Zeilinger,
Collisional Decoherence Observed in MatterWave Interferometry,
Phys. Rev. Lett. **90**, 160401 (2003). DOI: 10.1103/PhysRevLett.90.160401
APS: Virtual Journal of Nanoscale Science & Technology, 7 (18), May 5, (2003)
- 35) Brezger, L. Hackermüller, S. Uttenthaler, J. Petschinka, M. Arndt, A. Zeilinger,
Matter-Wave Interferometer for Large Molecules,
Phys. Rev. Lett. **88**, pp. 100404, (2002). DOI: 10.1103/PhysRevLett.88.100404
APS News update 2002
- 36) O. Nairz, B. Brezger, M. Arndt, A. Zeilinger,
Diffraction of complex molecules by structures made of light,
Phys. Rev. Lett. **87**, 160401(2001). DOI: 10.1103/PhysRevLett.87.160401
Research highlights by NATURE
- 37) M. Arndt, O. Nairz, J. Voss-Andreae, C. Keller, G. van der Zouw, A. Zeilinger,
Wave-particle duality of C60 molecules
Nature **401**, 680-682, (1999). DOI: 10.1038/44348
APS physics highlight of 1999

- 38) M. Arndt, M. Ben Dahan, D. Guéry-Odelin, M. Reynolds, J. Dalibard,
Observation of a zero-energy resonance in Cs-Cs collisions
Phys. Rev. Lett. **79**, 625-628 (1997). DOI: 10.1103/PhysRevLett.79.625
- 39) P. Szriftgiser, D. Guéry-Odelin, M. Arndt, J. Dalibard,
Atomic wave diffraction and interference using temporal slits,
Phys. Rev. Lett. **77**, 4-7, (1996). DOI: 10.1103/PhysRevLett.77.4
- 40) M. Arndt, S. I. Kanorsky, A. Weis, T. W. Hänsch,
Long Electronic Spin Relaxation Times of Cs Atoms in Solid 4He,
Phys. Rev. Lett. **74**, 1359-1362 (1995). DOI: 10.1103/PhysRevLett.74.1359
- 41) Buchleitner, D. Delande, J. Zakrzewski, R. N. Mantegna, M. Arndt, H. Walther,
Multiple Time Scales in the Microwave Ionization of Rydberg Atoms,
Phys. Rev. Lett. **75**, 3818-3821 (1995). DOI: 10.1103/PhysRevLett.75.3818
- 42) M. Arndt, A. Buchleitner, R. N. Mantegna, H. Walther,
Experimental Study of Quantum and Classical Limits in Microwave Ionization of Rubidium Rydberg Atoms,
Phys. Rev. Lett. **67**, S. 2435 - 2438 (1991). DOI: 10.1103/PhysRevLett.67.2435