

PD Dr Tatiana Latychevskaia

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EDUCATION

2019	Promotionsrecht (right to award doctorates) at the University of Zurich.	Zurich Switzerland
2014 – 2016	Habilitation (PD) at the Department of Physics, University of Zurich; Habilitation thesis "Phase retrieval methods applied to coherent imaging".	Zurich Switzerland
1997 – 2001	PhD in the group of Prof Urs P Wild , Department of Chemistry, ETH Zurich. Experimental PhD thesis " Single molecules in electric fields " - detection of single molecule fluorescence at cryogenic (1.4 K) temperature, measuring the Stark effect on individual polycyclic aromatic hydrocarbons (PAH) molecules.	Zurich Switzerland
1990 – 1996	Master's degree at the Department of Physics, Technical University of St.-Petersburg . Theoretical and optical experimental Diploma thesis "Synthesis of rainbow holograms".	St. Petersburg Russia

EMPLOYMENT

2018 –	Scientist at Paul Scherrer Institute, developing electron diffraction imaging methods of nano-objects and individual biomolecules.	Villigen PSI Switzerland
2017 – 2018	Senior researcher at LUMES Laboratory, EPFL Lausanne, Group of Prof. Carbone, providing support in data analysis for experiments in electron diffraction of nano-object systems (nano-diffraction, small angle diffraction, time-resolved).	Lausanne Switzerland
2004 – 2017	Postdoctoral researcher at Physics Department, University of Zurich, Group of Prof Hans-Werner Fink , leading the project on developing physics theories and mathematical methods for reconstruction of single molecule electron diffraction images and holograms.	Zurich Switzerland
2003 – 2004	Postdoctoral researcher at the Department of Physics, University of Basel; built time-resolved setup for room-temperature scanning confocal optical microscopy single-molecule detection.	Basel Switzerland
2002 – 2003	Postdoctoral researcher at the Department of Physics, University of Zurich; developed physics theories and mathematical methods for reconstruction of low-energy electron coherent diffraction images and holograms.	Zurich Switzerland
2002 – 2002	Guest researcher at Academia Sinica, Taipei, Taiwan. Together with Prof Urs P Wild we built room-temperature single-molecule detection setup.	Taipei Taiwan
1996 – 1997	Teaching assistant at the Department of Theoretical Physics, Technical University of St. Petersburg.	St. Petersburg Russia

TEACHING ACTIVITIES

2020 –	Teaching lecture course PHY 425 "Modern Optics and Microscopy", University of Zurich.	Zurich Switzerland
2019 –	Teaching lecture course PHY 427 "Electron Microscopy Lectures", University of Zurich.	Villigen Switzerland
2012 – 2015	Teaching assistant to physics students in advanced practical courses. Experiments on X-ray diffraction, single photon interference, and electron diffraction. Teaching graduate students self-made course "Introduction to coherent optics", University of Zurich.	Zurich Switzerland
2004 – 2012	Teaching assistant to medicine, biology and chemistry students in physics lab-courses and lectures, University of Zurich.	Zurich Switzerland
2003 – 2003	Teaching lectures in quantum optics as a guest lecturer in the course "Single-molecule detection and spectroscopy", University of Basel.	Basel Switzerland
2003 – 2003	Teaching assistant to general physics lectures, University of Basel.	Basel Switzerland
2002 – 2002	Teaching assistant to medical, biology and chemistry students in physics lab-courses and lectures. University of Zurich, Switzerland. Guest lecturer in the course "Modern Microscopy Techniques; Principles and Applications in Physics, Chemistry and Biology", Physics Institute, University of Zurich.	Zurich Switzerland
1998 – 2001	Teaching assistant to students in the lab-courses and lectures "Chemistry for Physicists". ETH Zurich, Switzerland. The results of the practicum experiment "Surface Tension" were published in " Axisymmetric liquid hanging drops " by E. Meister and T. Latychevskaia, J. Chem. Educ. 83, 117-126 (2006). The results of the practicum experiment "Viscosity" were published in the book "Grundpraktikum Physikalische Chemie. Theorie und Experimente" by E. Meister (2000).	Zurich Switzerland
1996 – 1997	Teaching assistant at the Department of Theoretical Physics (teaching classical mechanics, quantum mechanics and electrodynamics), Technical University of St.-Petersburg.	St.Petersburg Russia

SUPERVISION OF UNDER- and GRADUATE STUDENTS

Physics Department, University of Zurich, Switzerland

- 2021– PhD thesis of Sara Mustafi "Convergent Beam Electron Diffraction".
- 2022 Bachelor thesis of Sarah Bernardinis "Study of electrical transport and field emission of CVD graphene" (co-supervision with Dr Soichiro Tsujino).
- 2021 Master thesis of Alice Kohli "A quantum mechanical scheme to reduce radiation damage in electron microscopy".
- 2018 PhD thesis of Jonas Heidler in wavefront modulation for phase retrieval (unofficial supervision and project support).
- 2014–2018 PhD thesis of Pavlo Kliuiev "Phase retrieval of photoemission data" (unofficial supervision and project support).
- 2014–2018 PhD thesis of Marianna Lorenzo "Intercalation of alkali metals in graphene".
- 2015 Bachelor thesis of Daniel Schachtler "Creation of Airy beams with spatial light modulator and study of their optical properties" (published in Applied Optics 55(22), 6095 – 6101 (2016)).
- 2012–2016 PhD thesis of Giulia Mancini "Femtosecond diffractive imaging of structures, charge and spin textures" (unofficial supervision and project support).
- 2012 Bachelor thesis of Jessica Britschgi "4D Particle tracking by optical holography" (published in Opt. Express 22, 20994 (2014)).
- 2012 Master thesis of Simon Schwegler "Sub-pixel registration methods for enhancement of coherent diffraction images".
- 2012 Bachelor thesis of Beat Lauber "Optical Fourier transform holography".
- 2010 Bachelor thesis of Roland Stania "Optical holography of graphite/graphene flakes".
- 2011–2013 PhD thesis of Mirna Saliba "Fourier-Transform holography with low-energy electrons" (I proposed Fourier-transform holography as subject for PhD thesis and I was unofficially supervising the project).
- 2009 Bachelor thesis of Fabian Gehri "Three-dimensional deconvolution methods applied to holographic reconstructions" (published in Opt. Express 18, 22527 (2010)).
- 2008 Bachelor thesis of Florian Schwarz "Experimental study of optical holography of a charged tungsten tip".
- 2008 Master thesis of Matthias Germann "Pulsed low-energy electron holography (unofficial supervision and project support)".
- 2007 Master thesis of Igor Beati "Image enhancement of electron holograms with nonlinear filtering" (collaboration with Prof Buhmann, Computer Science Department at ETH Zurich).

HIGHLIGHTS

In 2007 I solved long-standing problem in holography which existed since the invention of holography by Dennis Gabor. The related publication (T. Latychevskaia and H.-W. Fink, Solution to the twin image problem in holography, Phys. Rev. Lett. 98(23), pp. 233901 (2007)) was featured in popular scientific journals world-wide:

PhysOrg: <http://www.physorg.com/news101465939.html>
NewScientist: <http://www.newscientist.com/article/dn12032>
UniZurich: <http://www.uzh.ch/news/articles/2007/2633.html>

AWARDS

- 2022 [OSA 2022 Outstanding Reviewer Award](#)
- 2021 [Photonics 2021 Outstanding Reviewer Award](#)
- 2010 – 2010 Individual grant "Structure of Individual Bio-Molecules by Numerical Reconstruction of Coherent Diffraction Images" from the Forschungskredit of the University of Zurich
- 2010 Poster awarded an oral presentation at Gordon Research Conference Three-Dimensional Electron Microscopy, Barga, Italy
- 2003 "Single Molecule Spectroscopy" by Latychevskaia et al., J. Chin. Chem. Soc. 50, 477 (2003), awarded "Best Article of the Chinese Chemical Society 2003"

ORGANIZATION OF SCIENTIFIC MEETINGS

- 2007 – 2008 At the European Researcher Night in Zurich in 2007 and 2008, I organized and led a team of scientists in illustrating the potential of holographic techniques to the general public, both on a stand and on stage <http://www.uzh.ch/news/articles/2007/2673.html>
- 2004 – 2015 Engaging speakers for the "Solid State Physics Seminar" at the Physics Institute, University of Zurich.

MEMBERSHIPS OF SCIENTIFIC SOCIETIES

- 2022 – present Member of the Swiss Physical Society (SPS).
- 2022 – present Member of the Physical Society of Zurich (Physikalische Gesellschaft Zürich).
- 2011 – present Member of Optica (former Optical Society of America - OSA).
- 2012 – 2013 Member of the Material Research Society (MRS).

EDITORIAL ACTIVITIES

- 2024 – present Associated editor for Optics and Lasers in Engineering.
- 2022 – present Associated editor for Scientific Reports.
- 2023 – 2024 Guest editor for Micron special issue "Low-dimensional materials and electron microscopy".

PEER REVIEW FOR

Science Advances, PNAS, Nature Physics, Nature Nanotechnology, Scientific Reports, PlosOne, Nano Letters, Optics Express, Optics Letters, Journal of the Optical Society of America A, Applied Optics, Optics Communications, Optics and Lasers in Engineering, Macromolecular Rapid Communications, Microscopy and Microanalysis, Applied Physics Letters, Journal of Infrared, Millimeter, and Terahertz Waves, Chinese Optics Letters and others. In total: more than 450 reviews.

SCIENTIFIC GRANTS

2021–2025	<i>"Novel high-resolution and 3D diffraction imaging methods"</i> (SNF grant 197107).	500'000 CHF
2013 – 2015	<i>"Exploring the Resolution Limit of Coherent Low-Energy Electron Diffraction Microscopy"</i> (SNF 150049). I was co-author of the proposal. The project is dedicated to developing related experimental setups for obtaining atomically resolved structural information.	258'925.00 CHF
2012 – 2014	<i>"Novel phase retrieval methods in coherent diffraction from non-crystalline objects of nanometer dimensions"</i> (SNF 140764). The project was dedicated to developing related numerical methods for obtaining atomically resolved structural information.	223'646.00 CHF
2010 – 2010	<i>"Structure of individual bio-molecules by numerical reconstruction of coherent diffraction images"</i> . Individual grant from Forschungskredit University of Zurich to support promising young academics engaged in outstanding research projects. The project was dedicated to developing phase retrieval numerical methods.	52'096.00 CHF
2006 – 2010	<i>"Obtaining Atomically Resolved Structural Information on Individual Bio-molecules Using Electron Holography"</i> (EUFP6). I was co-author of the proposal. During the project I was leading sub-project on numerical reconstruction. The project was dedicated to developing related experimental setups and reconstruction methods for obtaining atomically resolved structural information.	1'542'000.00 EUR
2009 – 2013	<i>"Coherent Low-Energy Electron Diffraction Microscopy of Single Bio-molecules"</i> (SNF 126848, 138118). I was co-author of the proposal.	333'140.00 CHF
2006 – 2009	<i>"Coherent Low-Energy Electron Diffraction Microscopy of Single Biomolecules"</i> (SNF 113814). I was co-author of the proposal. I developed theory for the design of the first coherent diffraction imaging low-energy electron microscope which was built during the project and which allows imaging of individual macromolecules.	342'291.00 CHF

PUBLICATIONS LIST

- 91 **T. Latychevskaia**, "Controlling topological states in bilayer graphene", *Nature Nanotechnology News and Views* (2023), doi: 10.1038/s41565-023-01454-8.
- 90 **T. Latychevskaia**, "Coherent imaging with low-energy electrons, quantitative analysis", *Ultramicroscopy* 253, 113807 (2023), doi: 10.1016/j.ultramic.2023.113807.
- 89 S. Mustafi and **T. Latychevskaia**, "Fourier Transform Holography: A Lensless Imaging Technique, Its Principles and Applications", *Photonics (mdpi)* 10(2), 153 (2023), doi: 10.3390/photonics10020153.
- 88 **T. Latychevskaia**, C. R. Woods, Y. B. Wang, M. Holwill, E. Prestat, S. Mustafi, S. J. Haigh, K. S. Novoselov, "Potentials of individual atoms by convergent beam electron diffraction", *Carbon* 201, 244-250 (2023), doi: 10.1016/j.carbon.2022.09.003.
- 87 **T. Latychevskaia** and A. Kohli, "Low-dose shift- and rotation-invariant diffraction recognition imaging", *Scientific Reports* 12, 11202 (2022), doi: 10.1038/s41598-022-15486-y.
- 86 **T. Latychevskaia**, P. Huang and K. Novoselov, "Imaging defects in two-dimensional crystals by convergent-beam electron diffraction", *Phys. Rev. B* 105, 184113 (2022), doi: 10.1103/PhysRevB.105.184113.
- 85 **T. Latychevskaia**, C. Cassidy and T. Shintake, "Bragg holography of nano-crystals", *Ultramicroscopy* 230, 113376 (2021), doi: 10.1016/j.ultramic.2021.113376.
- 84 **T. Latychevskaia**, "Three-dimensional structure from single two-dimensional diffraction intensity measurement", *Phys. Rev. Lett.* 127, 063601 (2021), doi: 10.1103/PhysRevLett.127.063601.
- 83 **T. Latychevskaia**, "Phase retrieval methods applied to coherent imaging", *Advances in Imaging and Electron Physics* 218, 1-62 (2021).
- 82 **T. Latychevskaia**, "Wavefront modulation and beam shaping into arbitrary three-dimensional intensity distributions", *Photonics* 8(6), 179 (2021), doi: 10.3390/photonics8060179.
- 81 **T. Latychevskaia**, "Three-dimensional volumetric deconvolution in coherent optics and holography", *Applied Optics* 60(5), 1304-1314 (2021), doi: 10.1142/10.1364/AO.412736.
- 80 **T. Latychevskaia**, S. J. Haigh and K. S. Novoselov, "Holographic convergent electron beam diffraction (CBED) imaging of two-dimensional crystals", *Surface Review and Letters* 28(8), 2140001 (2021), doi: 10.1142/S0218625X21400011.
- 79 **T. Latychevskaia**, Y. Zou, C. R. Woods, Y. B. Wang, M. Holwill, E. Prestat, S. J. Haigh and K. S. Novoselov, "Holographic reconstruction of interlayer distance of bilayer two-dimensional crystal samples from their convergent beam electron diffraction patterns", *Ultramicroscopy* 219, 113020 (2020), doi: 10.1016/j.ultramic.2020.113020.
- 78 **T. Latychevskaia**, "Holography and coherent diffraction imaging with low-(30-250 eV) and high-(80-300 keV) energy electrons: History, principles, and recent trends", *Materials* 13 (14), 3089 (2020), doi: 10.3390/ma13143089.
- 77 **T. Latychevskaia**, C. R. Woods, Y. B. Wang, M. Holwill, E. Prestat, S. J. Haigh and K. S. Novoselov, "Convergent beam electron diffraction of multilayer van der Waals structures", *Ultramicroscopy* 212, 112976 (2020), doi: 10.1016/j.ultramic.2020.112976.
- 76 **T. Latychevskaia**, "Iterative phase retrieval for digital holography (invited)", *J. Opt. Soc. Am A* 36(12), D31-D40 (2019), doi: 10.1364/JOSAA.36.000D31.
- 75 **T. Latychevskaia**, "Reconstruction of missing information in diffraction patterns and holograms by iterative phase retrieval", *Optics Communications* 452, 56-67 (2019), doi: 10.1016/j.optcom.2019.07.021.
- 74 **T. Latychevskaia** and J. P. Abrahams, "Inelastic scattering and solvent scattering reduce dynamical diffraction in biological crystals", *Acta Cryst. B* 75(4), 52 - 531 (2019), doi: 10.1107/S2052520619009661.
- 73 **T. Latychevskaia**, C. Escher, W. Andregg, M. Andregg and H.-W. Fink, "Direct visualization of charge transport in suspended (or free-standing) DNA strands by low-energy electron microscopy", *Scientific Reports* 9, 8889 (2019), doi: 10.1038/s41598-019-45351-4. Featured by: Physics Buzz: <http://physicsbuzz.physicscentral.com/2019/08/researchers-image-current-flowing.html>
- 72 I. Madan, G. M. Vanacore, E. Pomarico, G. Berruto, R. J. Lamb, D. McGrouther, T. T. A. Lummen, **T. Latychevskaia**, F. J. Garca de Abajo and F. Carbone, "Holographic imaging of electromagnetic fields via electron-light quantum interference", *Science Advances* 5(5), eaav8358 (2019), doi: 10.1126/sciadv.aav8358.
- 71 **T. Latychevskaia**, "Lateral and axial resolution criteria in incoherent and coherent optics and holography, near- and far-field regimes", *Applied Optics* 58(13), 3597 – 3603 (2019), doi: 10.1364/AO.58.003597.

- 70 G. F. Mancini, F. Pennacchio, **T. Latychevskaia**, J. Reguera, F. Stellacci and F. Carbone, "Local photo-mechanical stiffness revealed in gold nanoparticles supracrystals by ultrafast small-angle electron diffraction", *Structural Dynamics* 6, 024304 (2019), doi: 10.1063/1.5091858.
- 69 **T. Latychevskaia**, C. Escher and H.-W. Fink, "Moiré structures in few layer twisted graphene studied by transmission electron microscopy", *Ultramicroscopy* 197, 46 – 52 (2019), doi: 10.1016/j.ultramic.2018.11.009.
- 68 **T. Latychevskaia**, S.-K. Son, Y. Yang, D. Chancellor, M. Brown, S. Ozdemir, I. Madan, G. Berruto, F. Carbone, A. Mishchenko and K. Novoselov, "Stacking transition in rhombohedral graphite", *Frontiers of Physics* 14, 13608 (2019), doi: 10.1007/s11467-018-0851-6.
- 67 **T. Latychevskaia**, C. R. Woods, Y. B. Wang, M. Holwill, E. Prestat, S. J. Haigh and K. S. Novoselov, "Convergent and divergent beam electron holography and reconstruction of adsorbates on free-standing two-dimensional crystals", *Frontiers in Physics* 14, 13606 (2019), doi: 10.1007/s11467-018-0851-6.
- 66 P. Huang, R. Jayaraman, GF Mancini, A. Kruchkov, M. Cantoni, Y. Murooka, **T. Latychevskaia**, D. McGrouther, E. Baldini, J. S. White, A. Magrez, T. Giamarchi, F. Carbone, H. M. Ronnow, "Investigating Skyrmions Using Lorentz Transmission Electron Microscopy", *Microscopy and Microanalysis* 24, 932 (2018), doi: 10.1017/S1431927618005159
- 65 **T. Latychevskaia** and H.-W. Fink, "Three-dimensional double helical DNA structure directly revealed from its X-ray fiber diffraction pattern by phase retrieval", *Optics Express* 26(23), 30991 – 31017 (2018), doi: 10.1364/OE.26.030991.
- 64 **T. Latychevskaia**, "Iterative phase retrieval in coherent diffractive imaging: practical issues", *Appl. Optics* 57(25), 7187 – 7197 (2018), doi: 10.1364/AO.57.007187.
- 63 P. Kliuiev, **T. Latychevskaia**, G. Zamborlini, M. Jugovac, J. Osterwalder, M. Hengsberger and L. Castiglioni, "Algorithms and image formation in orbital tomography", *Phys. Rev. B* 98, 085426 (2018), doi: 10.1103/PhysRevB.98.085426.
- 62 **T. Latychevskaia**, C. R. Woods, Y. B. Wang, M. Holwill, E. Prestat, S. J. Haigh and K. S. Novoselov, "Convergent beam electron holography for analysis of van der Waals heterostructures", *PNAS* 115(29), 7473 – 7478 (2018), doi: 10.1073/pnas.1722523115.
- 61 M. Lorenzo, C. Escher, **T. Latychevskaia** and H.-W. Fink, "Metal adsorption and nucleation on free-standing graphene by low-energy electron point source microscopy", *Nano Letters* 18(6), 3421 – 3427 (2018), doi: 10.1021/acs.nanolett.8b00359.
- 60 **T. Latychevskaia**, F. Wicki, C. Escher, and H.-W. Fink, "Imaging the potential distribution of charged adsorbates on graphene by low-energy electron holography", *Ultramicroscopy* 182, 276 – 282 (2017), doi: 10.1016/j.ultramic.2017.07.019.
- 59 **T. Latychevskaia** and H.-W. Fink, "Resolution enhancement in in-line holography by numerical compensation of vibrations", *Optics Express* 25(17), 20109 – 20124 (2017), doi: 10.1364/OE.25.020109.
- 58 **T. Latychevskaia**, "Spatial coherence of electron beams from field emitters and its effect on the resolution of imaged objects", *Ultramicroscopy* 175, 121 – 129 (2017), doi: 10.1016/j.ultramic.2016.11.008.
- 57 **T. Latychevskaia**, W.-H. Hsu, W.-T. Chang, C.-Y. Lin and I.-S. Hwang, "Three-dimensional surface topography of graphene by divergent beam electron diffraction", *Nature Communications* 8, 14440 (2017), doi: 10.1038/ncomms14440.
- 56 J.-N. Longchamp, S. Rauschenbach, S. Abb, C. Escher, **T. Latychevskaia**, K. Kern and H.-W. Fink, "Imaging proteins at the single molecule level", *PNAS* 114(7), 1474 – 1479 (2017), doi: 10.1073/pnas.1614519114. Featured by:
 - PhysOrg: <https://phys.org/news/2017-01-electron-holography-individual-proteins.html>
 - NewScientist: <https://www.newscientist.com/article/dn28744-first-ever-pictures-of-single-proteins-thanks-to-graphene-sheet/>
 - Graphenea: <https://www.graphenea.com/blogs/graphene-news/131148167-graphene-sheets-enable-single-protein-snapshots>
 - Futurism: <https://futurism.com/first-ever-photos-of-single-proteins-have-been-taken>
- 55 **T. Latychevskaia**, Y. Chushkin and H.-W. Fink, "Resolution enhancement by extrapolation of coherent diffraction images: a quantitative study about the limits and a numerical study of non-binary and phase objects", *Journal of Microscopy* 264 (1), 3 – 13 (2016), doi: 10.1111/jmi.12408.
- 54 P. Kliuiev, **T. Latychevskaia**, J. Osterwalder, M. Hengsberger and L. Castiglioni, "Application of iterative phase-retrieval algorithms to ARPES orbital tomography", *New Journal of Physics* 18, 093041 (2016), doi: 10.1088/1367-2630/18/9/093041.

- 53 **T. Latychevskaia**, F. Wicki, J.-N. Longchamp, C. Escher and H.-W. Fink, "Direct observation of individual charges and their dynamics on graphene by low-energy electron holography", *Nano Letters* 16 (9), 5469 – 5474 (2016), doi: 10.1021/acs.nanolett.6b01881.
- 52 F. Wicki, J.-N. Longchamp, **T. Latychevskaia**, C. Escher, H.-W. Fink, "Mapping unoccupied electronic states of freestanding graphene by angle-resolved low-energy electron transmission", *Phys. Rev. B* 94 (7), 075424 (2016), doi: 10.1103/PhysRevB.94.075424.
- 51 **T. Latychevskaia**, D. Schachtler and H.-W. Fink, "Creating Airy beams employing a transmissive spatial light modulator", *Applied Optics* 55(22), 6095 – 6101 (2016), doi: 10.1364/AO.55.006095.
- 50 **T. Latychevskaia** and H.-W. Fink, "Inverted Gabor holography principle for tailoring arbitrary shaped three-dimensional beams", *Scientific Reports* 6, 26312 (2016), doi: 10.1038/srep26312.
- 49 G. F. Mancini, **T. Latychevskaia**, F. Pennaccio, J. Reguera, F. Stellacci, and F. Carbone, "Order/disorder dynamics in a dodecanethiol-capped gold nanoparticles supracrystal by small-angle ultrafast electron diffraction", *Nano Letters* 16(4), 2705 – 2713 (2016), doi: 10.1021/acs.nanolett.6b00355.
- 48 E. V. Orlenko, **T. Latychevskaia**, A. V. Evstafev and F. E. Orlenko, "Invariant time-dependent exchange perturbation theory and its application to the particles collision problem", in *9th Congress on Electronic Structure: Principles and Applications*, volume 11, pages 41 – 56 (Springer-Verlag Berlin, Berlin, 2016), doi: 10.1007/s00214-015-1646-2.
- 47 **T. Latychevskaia**, J.-N. Longchamp, C. Escher, and H.-W. Fink, "Holography and coherent diffraction with low-energy electrons: A route towards structural biology at the single molecule level", *Ultramicroscopy* 159, 395 – 402 (2015), doi: 10.1016/j.ultramic.2014.11.024.
- 46 **T. Latychevskaia**, G. F. Mancini and F. Carbone, "The role of the coherence in the cross-correlation analysis of diffraction patterns from two-dimensional dense mono-disperse systems", *Scientific Reports* 5, 16573 (2015), doi: 10.1038/srep16573; 10.1038/srep16573.
- 45 J. Rajeswari, H. Ping, G. F. Mancini, Y. Murooka, **T. Latychevskaia**, D. McGrouther, M. Cantoni, E. Baldini, J. S. White, A. Magrez, T. Giamarchi, H. M. Rønnow and F. Carbone, "Filming the formation and fluctuation of skyrmion domains by cryo-Lorentz transmission electron microscopy", *PNAS* 112 (46), 14212 – 14217 (2015), doi: 10.1073/pnas.1513343112.
- 44 **T. Latychevskaia**, Y. Chushkin, F. Zontone, and H.-W. Fink, "Imaging outside the box: Resolution enhancement in X-ray coherent diffraction imaging by extrapolation of diffraction patterns", *Appl. Phys. Lett.* 107 (18), 183102 (2015), doi: 10.1063/1.4934879.
- 43 J.-N. Longchamp, **T. Latychevskaia**, C. Escher, and H.-W. Fink, "Low-energy electron holographic imaging of individual tobacco mosaic virions", *Appl. Phys. Lett.* 107 (13), 133101 (2015), doi: 10.1063/1.4931607.
- 42 **T. Latychevskaia** and H.-W. Fink, "Reconstruction of purely absorbing, absorbing and phase-shifting, and strong phase-shifting objects from their single-shot in-line holograms", *Appl. Optics* 54(13), pp. 3925 – 3932 (2015), doi: 10.1364/AO.54.003925.
- 41 E. V. Orlenko, **T. Latychevskaia**, A. V. Evstafev, F. E. Orlenko, "Invariant time-dependent exchange perturbation theory and its application to the particles collision problem", *Theor. Chem. Acc.* 134(5), pp. 1 – 16 (2015), doi: 10.1007/s00214-015-1646-2.
- 40 **T. Latychevskaia** and H.-W. Fink, "Practical algorithms for simulation and reconstruction of digital in-line holograms", *Appl. Optics* 54(9), pp. 2424 – 2434 (2015), doi: 10.1364/AO.54.002424.
- 39 L. Rong, **T. Latychevskaia**, D. Wang, Z. Yu, X. Zhou, C. Chen, H. Huang, Y. Wang, Z. Li, and Z. Zhou, "Terahertz in-line digital holography of human hepatocellular carcinoma tissue", *Scientific Reports* 5, 8445 (2015), doi: 10.1038/srep08445.
- 38 **T. Latychevskaia** and H.-W. Fink, "Atomically resolved structural determination of graphene and its point defects via extrapolation assisted phase retrieval", *Appl. Phys. Lett.* 106, 021908 (2015), doi: 10.1063/1.4906089.
- 37 J.-N. Longchamp, C. Escher, **T. Latychevskaia**, and H.-W. Fink, "Low-energy electron holographic imaging of gold nanorods supported by ultraclean graphene", *Ultramicroscopy* 145, pp. 80 – 84 (2014), doi: 10.1016/j.ultramic.2013.10.018.
- 36 **T. Latychevskaia**, J.-N. Longchamp, C. Escher, and H.-W. Fink, "On artefact-free reconstruction of low-energy (30-250 eV) electron holograms", *Ultramicroscopy* 145, pp. 22 – 27 (2014), doi: 10.1016/j.ultramic.2013.11.012.
- 35 **T. Latychevskaia**, and H.-W. Fink, "Holographic time-resolved particle tracking by means of three-dimensional volumetric deconvolution", *Opt. Express* 22(17), pp. 20994 – 21003 (2014), doi: 10.1364/OE.22.020994.

- 34 L. Rong, **T. Latychevskaia**, D. Wang, X. Zhou, H. Huang, Z. Li, and Y. Wang, "Terahertz in-line digital holography of dragonfly hindwing: amplitude and phase reconstruction at enhanced resolution by extrapolation", *Opt. Express* 22(14), pp. 17236 – 17245 (2014), doi: 10.1364/OE.22.017236.
- 33 **T. Latychevskaia**, J.-N. Longchamp, C. Escher, and H.-W. Fink, "Coherent diffraction and holographic imaging of individual biomolecules using low-energy electrons", in *Present and Future Methods for Biomolecular Crystallography* (Springer, 2013), pp. 331 – 342, doi: 10.1007/978-94-007-6232-9_29.
- 32 **T. Latychevskaia** and H.-W. Fink, "Coherent microscopy at resolution beyond diffraction limit using post-experimental data extrapolation", *Appl. Phys. Lett.* 103(20), 204105 (2013), doi: 10.1063/1.4831985.
- 31 J.-N. Longchamp, **T. Latychevskaia**, C. Escher, and H.-W. Fink, "Graphene unit cell imaging by holographic coherent diffraction", *Phys. Rev. Lett.* 110(25), 255501 (2013), doi: 10.1103/PhysRevLett.110.255501.
- 30 M. Germann, **T. Latychevskaia**, C. Escher, and H.-W. Fink, "Pulsed electron holography", *Appl. Phys. Lett.* 102(20), pp. 203115 (2013), doi: 10.1063/1.4807661.
- 29 **T. Latychevskaia** and H.-W. Fink, "Resolution enhancement in digital holography by self-extrapolation of holograms", *Opt. Express* 21(6), pp. 7726 – 7733 (2013), doi: 10.1364/OE.21.007726.
 • Featured in *Advances in Engineering*: <http://advanceseng.com/applied-physics/resolution-enhancement-digital-holography-self-extrapolation-holograms/>
- 28 **T. Latychevskaia**, J.-N. Longchamp, and H.-W. Fink, "When holography meets coherent diffraction imaging", *Opt. Express* 20(27), pp. 28871 – 28892 (2012), doi: 10.1364/OE.20.028871.
- 27 J.-N. Longchamp, **T. Latychevskaia**, C. Escher, and H.-W. Fink, "Low-energy electron transmission imaging of clusters on free-standing graphene", *Appl. Phys. Lett.* 101(11), 113117 (2012), doi: 10.1063/1.4752717.
- 26 J.-N. Longchamp, **T. Latychevskaia**, C. Escher, and H.-W. Fink, "Non-destructive imaging of an individual protein", *Appl. Phys. Lett.* 101(9), 093701 (2012), doi: 10.1063/1.4748113.
- 25 G. B. Stevens, M. Krüger, **T. Latychevskaia**, P. Lindner, A. Plückthun, and H.-W. Fink, "Individual filamentous phage imaged by electron holography", *Eur. Biophys. J.* 40, pp. 1197 – 1201 (2011), doi: 10.1007/s00249-011-0743-y.
- 24 **T. Latychevskaia**, J.-N. Longchamp, and H.-W. Fink, "Novel Fourier-domain constraint for fast phase retrieval in coherent diffraction imaging", *Opt. Express* 19(20), pp. 19330 – 19339 (2011), doi: 10.1364/OE.19.019330.
- 23 **T. Latychevskaia**, F. Gehri, and H.-W. Fink, "Depth-resolved holographic reconstructions by three-dimensional deconvolution", *Opt. Express* 18(21), pp. 22527 – 22544 (2010), doi: 10.1364/OE.18.022527.
- 22 R. R. Nair, P. Blake, J. R. Blake, R. Zan, S. Anissimova, U. Bangert, A. P. Golovanov, S. V. Morozov, A. K. Geim, K. S. Novoselov, and **T. Latychevskaia**, "Graphene as a transparent conductive support for studying biological molecules by transmission electron microscopy", *Appl. Phys. Lett.* 97(15), 153102 (2010), doi: 10.1063/1.3492845.
- 21 **T. Latychevskaia**, P. Formanek, C. T. Koch, and A. Lubk, "Off-axis and inline electron holography: Experimental comparison", *Ultramicroscopy* 110(5), pp. 472 – 482 (2010), doi: 10.1016/j.ultramic.2009.12.007.
- 20 M. Germann, **T. Latychevskaia**, C. Escher, and H.-W. Fink, "Nondestructive imaging of individual biomolecules", *Phys. Rev. Lett.* 104(9), 095501 (2010), doi: 10.1103/PhysRevLett.104.095501.
- 19 **T. Latychevskaia** and H.-W. Fink, "Simultaneous reconstruction of phase and amplitude contrast from a single holographic record," *Opt. Express* 17(13), pp. 10697 – 10705 (2009), doi: 10.1364/OE.17.010697.
- 18 **T. Latychevskaia** and H.-W. Fink, "Solution to the twin image problem in holography", *Phys. Rev. Lett.* 98(23), pp. 233901 (2007), doi: 10.1103/PhysRevLett.98.233901. Featured by:
 • PhysOrg: <http://www.physorg.com/news101465939.html>
 • NewScientist: <http://www.newscientist.com/article/dn12032>
 • UniZurich: <http://www.uzh.ch/news/articles/2007/2633.html>
- 17 V. A. Azov, A. Beeby, M. Cacciarini, A. G. Cheetham, F. Diederich, M. Frei, J. K. Gimzewski, V. Gramlich, B. Hecht, B. Jaun, **T. Latychevskaia**, A. Lieb, Y. Lill, F. Marotti, A. Schlegel, R. R. Schlittler, P. J. Skinner, P. Seiler, and Y. Yamakoshi, "Resorcin[4]arene cavitand-based molecular switches", *Adv. Funct. Mater.* 16(2), pp. 147 – 156 (2006), doi: 10.1002/adfm.200500181.
- 16 C. Escher, **T. Latychevskaia**, H.-W. Fink, and D. W. Pohl, "Direct evidence for conduction pathways in a solid electrolyte", *Phys. Rev. Lett.* 97(13), 136601 (2006), doi: 10.1103/PhysRevLett.97.136601.
- 15 **T. Latychevskaia**, A. Renn, and U. P. Wild, "A single-molecule study of polycrystalline microstructure by fluorescence polarization spectroscopy", *J. Lumines.* 118(1), pp. 111 – 122 (2006), doi: 10.1016/j.jlumin.2005.08.008.

- 14 H. Okamoto, **T. Latychevskaia**, and H.-W. Fink, "A quantum mechanical scheme to reduce radiation damage in electron microscopy", *Appl. Phys. Lett.* 88(16), 164103 (2006), doi: 10.1063/1.2191096.
- 13 E. C. Meister, and **T. Latychevskaia**, "Axisymmetric liquid hanging drops", *J. Chem. Educ.* 83(1), pp. 117 – 126 (2006), doi: 10.1021/ed083p117.
- 12 **T. Latychevskaia**, K. K. Liang, M. Hayashi, C.-H. Chang, A. Renn, U. P. Wild, J.-H. Hsu, T.-C. Chang, and S. H. Lin, "Single molecule spectroscopy", *J. Chin. Chem. Soc.* 50(3B), pp. 477 – 516 (2003), doi: 10.1002/jccs.200300075.
- 11 M. Hayashi, C. H. Chiang, K. K. Liang, Y. J. Shiu, C.-H. Chang, D. Y. Wu, F. Y. Li, T.-C. Chang, U. P. Wild, **T. Latychevskaia**, and S. H. Lin, "Theory of the Stark effect on single molecular spectroscopy", *J. Chin. Chem. Soc.* 49(5), pp. 797 – 804 (2002), doi: 10.1002/jccs.200200114.
- 10 **T. Latychevskaia**, A. Renn, and U. P. Wild, "Higher-order Stark effect on single-molecules", *Chem. Phys.* 282(1), pp. 109 – 119 (2002), doi: 10.1016/S0301-0104(02)00621-3.
- 9 L. Kador, **T. Latychevskaia**, A. Renn, and U. P. Wild, "Radio-frequency Stark effect modulation of single-molecule lines", *J. Lumines.* 86(3-4), pp. 189 – 194 (2000), doi: 10.1016/S0022-2313(00)00162-9.
- 8 J. Sepiol, A. Starukhin, R. Kolos, **T. Latychevskaia**, J. Jasny, A. Renn, and U. P. Wild, "Detection and spectroscopy of single molecules in rare gas matrices: dibenzanthanthrene in krypton and xenon", *Chem. Phys. Lett.* 311(1 – 2), pp. 29-35 (1999), doi: 10.1016/S0009-2614(99)00753-8.
- 7 J. Sepiol, A. Starukhin, **T. Y. Latychevskaia**, J. Jasny, A. Renn, and U. P. Wild, "Imaging and spectroscopy of terrylene molecules isolated in vapor-deposited n-alkane matrices", *Chem. Phys.* 247(1), pp. 35 – 40 (1999), doi: 10.1016/S0301-0104(99)00099-3.
- 6 L. Kador, **T. Latychevskaia**, A. Renn, and U. P. Wild, "Absorption spectroscopy on single molecules in solids", *J. Chem. Phys.* 111(19), pp. 8755 – 8758 (1999), doi: 10.1063/1.480222.
- 5 A. Kniazkov, Y. I. Onischenko, G. E. Dovgalenko, G. J. Salamo, and **T. Y. Latychevskaia**, "Advanced holographic nondestructive testing system for residual stress analysis", *SPIE Proceedings* 3678, pp. 73 – 81 (1999), doi: 10.1117/12.347399.
- 4 V. N. Krylov, V. N. Mikhailov, K. T. Weitzel, **T. Latychevskaia**, V. N. Sizov, A. Renn, and U. P. Wild, "Recording and reconstruction of reflection and transmission holograms with a cw laser diode", *SPIE Proceedings* 3293, pp. 131 – 138 (1998), doi: 10.1117/12.303646.
- 3 V. N. Mikhailov, T. K. Weitzel, **T. Latychevskaia**, V. N. Krylov, and U. P. Wild, "Pulse recording of slanted fringe holograms in DuPont photopolymer", *SPIE Proceedings* 3294, pp. 132 – 135 (1998), doi: 10.1117/12.304533.
- 2 E. V. Orlenko, and **T. Y. Latychevskaia**, "The method of exchange perturbation theory as applied to magnetic ordering in high-T-c materials", *J. Exp. Theor. Phys.* 86(6), pp. 1167 – 1176 (1998), doi: 10.1134/1.558587.
- 1 A. Kniazkov, G. E. Dovgalenko, G. J. Salamo, and **T. Latychevskaia**, "Measuring residual stress using a small blind-hole and phase-shift interferometry" in *Critical link: Diagnosis to prognosis Proceedings of a Joint Conference The 51st Meeting of the Society for Machinery Failure Prevention Technology and the 12th Biennial Conference on Reliability, Stress Analysis and Failure Prevention* H. C. Pusey, and S. C. Pusey, eds. (1997), pp. 641 – 648.

PRESENTATIONS LIST

2023 Sep	"Quantitative Low-Energy Electron Coherent Imaging and Convergent Beam Electron Diffraction of 2D Materials", invited presentation at 2D23 SALVE symposium	Ulm Germany
2023 Sep	"Convergent beam electron diffraction (CBED) of two-dimensional (2D) crystals", invited presentation at the 20th International Microscopy Congress (IMC20)	Busan Korea
2023 Sep	"In-line holography with low-energy electrons, quantitative analysis", presentation at the 20th International Microscopy Congress (IMC20)	Busan Korea
2023 Aug	Chairman of mini-symposium "Coherent scattering methods using X-rays or electrons" at the 26th Congress of the International Union of Crystallography (IUCr)	Melbourne Australia
2023 May	"Potentials of individual atoms by convergent beam electron diffraction", invited presentation at the International Workshop on Models and Data for Plasma-Material Interaction in Fusion Devices (MoD-PMI)	Aachen Germany
2022 Aug	"Low-energy electron holography and coherent diffraction imaging", invited presentation at Native Mass Spectrometry and Single Molecule Imaging MS M22 conference	Oxford UK
2022 Jul	"Holography and coherent diffraction imaging with low-energy electrons", invited seminar at the Max Planck Institute	Stuttgart Germany
2022 Apr	"Convergent beam electron diffraction of two-dimensional materials", invited presentation at the SALVE symposium	Ulm Germany
2022 Mar	"Ptychography - scanning coherent diffraction imaging technique, principles and applications", seminar at the Physikalische Gesellschaft Zürich	Zürich Switzerland
2022 Feb	"Phase retrieval for coherent imaging", invited webinar at the IIT Dehli student chapter of OPTICA (formerly OSA) / SPIE	online
2022 Jan	"Holography and coherent diffraction imaging with electrons, light and X-rays", invited presentation at the Institute of Optics, Information and Photonics, Friedrich-Alexander University of Erlangen-Nuernberg (FAU)	Erlangen Germany
2021 Sep	"Recent results in 3D wavefront modulation and quantum mechanical detection", invited presentation at the Q-SORT International Conference on Quantum Imaging and Electron Beam Shaping	online
2020 Jul	"Iterative Phase Retrieval in Holography and Coherent Diffraction Imaging (CDI)", invited seminar at the Society for Industrial and Applied Mathematics congress (online)	Toronto Canada
2019 Dec	"Iterative Phase Retrieval in Holography", invited seminar at CEMES-CNRS, Université de Toulouse	Toulouse France
2019 Sep	"Holographic and convergent beam electron diffraction imaging", invited presentation at the Nano- and Ultrafast Surface Science Workshop	Garching Germany
2019 Sep	"Iterative phase retrieval methods", invited lecture at the Lecture Week organized by the Helmholtz-Institute Jena	Jena Germany
2019 Sep	"Iterative phase retrieval for digital holography", keynote presentation at the International Forum on Microscopy 2019	Beijing China
2019 Aug	"Prospects and progress towards collecting and phasing of single molecule electron diffraction data", presentation at the 32nd European Crystallographic Meeting	Vienna Austria
2019 Jul	"Convergent beam electron diffraction on 2D van der Waals structures", invited seminar	Ulm Germany
2019 Jul	"Wavefront modulation by inverted Gabor holography", presentation at the Q-SORT International Conference on Quantum Imaging and Electron Beam Shaping	Erlangen Germany
2019 Jun	"In line holography and coherent diffraction imaging in electron microscopy", invited presentation at the NannolInnovation 2019	Rome Italy

2019 May	"Phase retrieval for digital holography", invited presentation at the Digital Holography and 3-D Imaging OSA topical meeting	Bordeaux France
2019 Apr	"Iterative phase retrieval in coherent diffractive imaging and holography", invited seminar at the Institut für Optik und Quantenelektronik (IOQ), Friedrich-Schiller Universität	Jena Germany
2018 Oct	"Modern imaging without lenses: portraits of individual molecules", Antrittsvorlesung at the University of Zurich	Zurich Switzerland
2018 Feb	"Coherent lensless low-energy electron imaging", invited presentation at the 5th Ringberg Meeting on Structural Biology with FELs	Ringberg Germany
2017 Dec	"Coherent imaging with low-energy electrons (30 – 250 eV)", invited presentation at the 3rd SALVE Symposium	Ulm Germany
2017 Apr	"Coherent imaging with low-energy electrons", invited seminar at the Okinawa Institute of Science and Technology (OIST)	Okinawa Japan
2017 Apr	"Coherent imaging with low-energy electrons", invited seminar at the Fritz Haber Institute	Berlin Germany
2017 Feb	"Coherent imaging with low-energy electrons (30 - 250 eV): Imaging charged impurities and three-dimensional topography of graphene" (invited), Electron Holography Workshop organized by Hitachi and sponsored by Japanese government	Tokyo Japan
2015 Jun	"Resolution enhancement in coherent imaging via extrapolation beyond detector area" (invited), Optical Society of America Optics and Photonics Congress	Washington USA
2015 Feb	"Coherent imaging with ultra-low energy electrons" Sub-Angstrom Low-Voltage Electron Microscopy (SALVE) Symposium	Ulm Germany
2015 Feb	"Phase retrieval methods applied to coherent imaging" (invited) International School and Workshop "Matter in Extreme Conditions: from Material Science to Planetary Physics (MECMATPLA)"	Montgenvre France
2014 Sep	"Coherent imaging beyond detector area and Abbe limit, towards atomic resolution", International Microscopy Congress	Prague Czech Republic
2013 Aug	"On the reconstruction of ultra low-energy electron holograms and diffraction patterns", International Microscopy Conference	Regensburg Germany
2013 Apr	"Imaging outside the box: resolution enhancement by hologram self-extrapolation", The Optical Society of America, Digital Holography Meeting	Hawaii USA
2013 Apr	"Holographic time-resolved particle tracking using 3d-deconvolution" The Optical Society of America, Digital Holography Meeting	Hawaii USA
2012 Nov	"Low-energy electron holograms and diffraction patterns of individual biomolecules", Material Research Society Fall Meeting	Boston USA
2012 May	"Coherent low-energy electron imaging - a new tool for structural biology" (invited), 45th Erice Crystallographic Course	Erice Italy
2012 Apr	"When holography meets coherent diffraction imaging" The Optical Society of America, Digital Holography Meeting	Miami USA
2011 Oct	"Coherent diffraction imaging of individual biological molecules using coherent low-energy electrons" (invited, keynote speaker) Centre of Excellence for Coherent X-Ray Science (CXS) Workshop	Melbourne Australia
2011 Sep	"Imaging individual biological molecules with coherent low-energy electrons" 25th Rhine-Knee Regional Meeting on X-ray Crystallography of Biomacromolecules	Sursee Switzerland
2011 Aug	"Numerical reconstruction of holograms and diffraction patterns of individual biomolecules", Microscopy Conference	Kiel Germany
2010 Dec	"Coherent imaging of individual molecules with low-energy electrons" Invited seminar at the IGBMC	Strasbourg France

2010 Jul	"Imaging of individual molecules with coherent low-energy electrons" The Gordon Research Conference "Diffraction Methods in Structural Biology"	Lewiston USA
2010 Jun	"Numerical reconstruction of low-energy electron holograms" Selected talk from the poster session at the Gordon Research Conference "Three Dimensional Electron Microscopy"	Barga Italy
2010 Apr	"Coherent imaging of individual molecules with low-energy electrons" Invited seminar at the Physics Department of the EPFL	Lausanne Switzerland
2009 Jan	"Reconstruction of low-energy electron holograms" International conference "Current Trends in Structural Biology on the Single Molecule Level"	Luzern Switzerland
2008 Mar	"Holography with low-energy electrons, a new tool for structural biology" American Physics Society March meeting	New Orleans USA
2007 Dec	"Theory of hologram alignment method" International meeting of the European FP-7 SIBMAR project	Jena Germany
2007 and 2008	"Holography" Public show presentations on stage at the European Researcher Night	Zurich Switzerland
2007 Feb	"Conformational and structural studies on single bio-molecules" Swiss Physical Society Meeting	Zurich Switzerland
2006 Sep	"Electron holography of an individual virus" International Conference on Nanoscience and Technology (ICN+T)	Basel Switzerland
2002 Sep	"Towards online reconstruction of electron holograms" NCCR workshop	Pontresina Switzerland
2001	"Spectral diffusion of single DPNP molecules in n-hexadecane matrix" International NCCR winter workshop	Andermatt Switzerland
2000	"Higher order Stark effect on single molecules" (invited) Seminar at the Physics Department, University of Leiden	Leiden Netherlands