

## PD Dr Tatiana Latychevskaia

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Researcher unique identifiers      Web of Science Researcher ID: D-3099-2013  
ORCID: 0000-0001-6693-8681

### EDUCATION

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

### EMPLOYMENT

|                |                                                                                                                                                                                                                                                         |                                        |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| 2018 – present | Scientist and PI at the Paul Scherrer Institute, developing coherent diffraction methods for imaging nano-objects and individual biomolecules.                                                                                                          | PSI                                    |
| 2024 August    | Invited visiting Professor in the Computational Imaging group, University of Tampere, Finland.                                                                                                                                                          | University of Tampere                  |
| 2017 – 2018    | Senior researcher in the group of Prof. Carbone at LUMES Laboratory, provided support in data analysis for experiments in electron diffraction of nano-object systems (nano-diffraction, small angle diffraction, time-resolved).                       | EPFL                                   |
| 2004 – 2016    | Researcher in the group of Prof Hans-Werner Fink, Department of Physics, led the project of developing theory and numerical methods for simulation and reconstruction of diffraction patterns and holograms of single molecules and nano-sized objects. | UZH                                    |
| 2003 – 2004    | Postdoctoral researcher at the Department of Physics, implemented a time-resolved component for room-temperature scanning confocal optical microscopy single-molecule detection setup.                                                                  | University of Basel                    |
| 2002 – 2003    | Postdoctoral researcher in the group of Prof Hans-Werner Fink, Department of Physics, developed theory and numerical methods for simulation and reconstruction of diffraction patterns and holograms of single molecules and nano-sized objects.        | UZH                                    |
| 2002 – 2002    | Invited guest researcher at Academia Sinica, Taipei, Taiwan. Together with Prof Urs P Wild, built a room-temperature single-molecule detection setup.                                                                                                   | Academia Sinica, Taipei                |
| 1996 – 1997    | Teaching assistant at the Department of Theoretical Physics, Technical University of St. Petersburg, Russia.                                                                                                                                            | Technical University of St. Petersburg |

## TEACHING ACTIVITIES

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                       |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 2020 – present | Lecturer in the course PHY 425 "Modern Optics and Microscopy" (every spring semester) together with Prof Christof Aegerter.                                                                                                                                                                                                                                                                                                               | UZH                                   |
| 2019 – present | Lecturer in the course PHY 427 "Electron Microscopy Lectures" (every fall semester) together with Prof Takashi Ishikawa (ETH).                                                                                                                                                                                                                                                                                                            | UZH                                   |
| 2012 – 2015    | Teaching assistant in the Advanced Physics Practicum course: Experiments on X-ray diffraction, single photon interference, and electron diffraction. Teaching graduate students self-made course "Introduction to coherent optics".                                                                                                                                                                                                       | UZH                                   |
| 2004 – 2012    | Teaching assistant in physics lab-courses and lectures for medical, biology and chemistry students.                                                                                                                                                                                                                                                                                                                                       | UZH                                   |
| 2003 – 2003    | Guest lecturer in the course "Single-molecule detection and spectroscopy" by Prof Bert Hecht.                                                                                                                                                                                                                                                                                                                                             | Uni Basel                             |
| 2003 – 2003    | Teaching assistant in Physics lecture course for physics students.                                                                                                                                                                                                                                                                                                                                                                        | Uni Basel                             |
| 2002 – 2002    | Teaching assistant in physics lab-courses and lectures for medical, biology and chemistry students. Guest lecturer in the course "Modern Microscopy Techniques; Principles and Applications in Physics, Chemistry and Biology".                                                                                                                                                                                                           | UZH                                   |
| 1998 – 2001    | Teaching assistant in the lectures and lab-courses "Chemistry for Physicists". 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). | ETH                                   |
| 1996 – 1997    | Teaching assistant at the Department of Theoretical Physics (teaching practical exercises in classical mechanics, quantum mechanics and electrodynamics); Technical University of St. Petersburg, Russia.                                                                                                                                                                                                                                 | Technical University of St.Petersburg |

## SUPERVISION OF UNDER- and GRADUATE STUDENTS

Physics Department, MNF, UZH

|                |                   |          |                                                                                                                                                   |
|----------------|-------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 2024 – present | Soheil Hajibaba   | PhD      | Investigation of the spatial coherence of Dirac materials field emitters (co-supervision with Dr Soichiro Tsujino, PSI)                           |
| 2021 – present | Sara Mustafi      | PhD      | Convergent beam electron diffraction                                                                                                              |
| 2023           | Heba Hussein      | semester | Parseval's theorem in optical simulations                                                                                                         |
| 2022           | Sarah Bernardinis | Bachelor | Study of electrical transport and field emission of CVD graphene (co-supervision with Dr Soichiro Tsujino, PSI)                                   |
| 2021           | Alice Kohli       | Master   | A quantum mechanical scheme to reduce radiation damage in electron microscopy                                                                     |
| 2018           | Jonas Heidler     | PhD      | Wavefront modulation for phase retrieval (Uni Basel, unofficial co-supervision and project support)                                               |
| 2014 – 2018    | Pavlo Kliuiev     | PhD      | Phase retrieval of photoemission data (unofficial co-supervision and project support)                                                             |
| 2014 – 2018    | Marianna Lorenzo  | PhD      | Intercalation of alkali metals in graphene                                                                                                        |
| 2015           | Daniel Schachtler | Bachelor | 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    | Giulia Mancini    | PhD      | Femtosecond diffractive imaging of structures, charge and spin textures (EPFL, unofficial co-supervision and project support)                     |
| 2012           | Jessica Britschgi | Bachelor | 4D Particle tracking by optical holography                                                                                                        |
| 2012           | Simon Schwegler   | Master   | Sub-pixel registration methods for enhancement of coherent diffraction images                                                                     |
| 2012           | Beat Lauber       | Bachelor | Optical Fourier transform holography                                                                                                              |
| 2010           | Roland Stania     | Bachelor | Optical holography of graphite/graphene flakes                                                                                                    |
| 2011 – 2013    | Mirna Saliba      | PhD      | Fourier transform holography with low-energy electrons (unofficial supervision and project support)                                               |
| 2009           | Fabian Gehri      | Bachelor | Three-dimensional deconvolution methods applied to holographic reconstructions, published in Opt. Express 18, 22527 (2010)                        |
| 2008           | Florian Schwarz   | Bachelor | Experimental study of optical holography of a charged tungsten tip                                                                                |
| 2008           | Matthias Germann  | Master   | Pulsed low-energy electron holography (unofficial supervision and project support)                                                                |
| 2007           | Igor Beati        | Master   | Image enhancement of electron holograms with nonlinear filtering (unofficial supervision, in collaboration with Prof Joachim Buhmann, ETH)        |

## HIGHLIGHTS

In 2007 Latychevskaia solved long-standing problem in holography which existed since the invention of holography by Dennis Gabor; the solution initiated a new field of applying iterative reconstruction methods in holography. 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>  
UZH: <https://www.news.uzh.ch/de/articles/2007/2673.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

2024 – 2025 Member of the Scientific Program Committee of the Optica (former Optical Society of America) topical meeting Digital Holography 2025, Seattle, USA.  
2023 Chair of Symposium A089 "Coherent scattering methods using X-rays or electrons" at the IUCr 2023 Congress in Melbourne, Australia.  
2007 – 2008 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 at the European Researcher Night in Zürich in 2007 and 2008.  
2004 – 2015 Engaged speakers for the "Solid State Physics Seminar" at the Physics Institute, University of Zürich.

## MEMBERSHIPS OF SCIENTIFIC SOCIETIES

2022 – present Member of the Swiss Physical Society (SPS).  
2022 – present Member of the Physical Society of Zürich (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 (Elsevier).  
2022 – present Associated editor for Scientific Reports (Nature).  
2023 – 2024 Guest editor for Micron (Elsevier) special issue "Low-dimensional materials and electron microscopy".

## PEER REVIEW FOR

**Journals:** Nature, Science Advances, PNAS, Nature Physics, Nature Nanotechnology, Nature Communications, 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 500 reviews.

## SCIENTIFIC GRANTS

|             |                                                                                                                                                                                                                                                                                                                                                     |                     |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 2025 – 2029 | <i>"Coherent imaging with low-energy electrons"</i> (SNF grant 10003659).                                                                                                                                                                                                                                                                           | 990'000.00<br>CHF   |
| 2021 – 2025 | <i>"Novel high-resolution and 3D diffraction imaging methods"</i> (SNF grant 197107).                                                                                                                                                                                                                                                               | 500'000.00<br>CHF   |
| 2013 – 2015 | <i>"Exploring the resolution limit of coherent low-energy electron diffraction microscopy"</i> (SNF 150049); co-author of the proposal. The project was dedicated to developing of experimental setup for obtaining atomic-resolution structural information.                                                                                       | 258'925.00<br>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 of the numerical methods for obtaining atomic-resolution structural information from coherent diffraction patterns and holograms.                                         | 223'646.00<br>CHF   |
| 2010 – 2010 | <i>"Structure of individual bio-molecules by numerical reconstruction of coherent diffraction images"</i> . Individual grant from Forschungskredit University of Zürich to support promising young academics engaged in outstanding research projects. The project was dedicated to developing of the numerical phase retrieval methods.            | 52'096.00<br>CHF    |
| 2006 – 2010 | <i>"Obtaining Atomically Resolved Structural Information on Individual Bio-molecules Using Electron Holography"</i> (EUFP6); cco-author of the proposal, lead the sub-project of numerical methods. The project was dedicated to developing of the experimental setup and numerical methods for obtaining atomic-resolution structural information. | 1'542'000.00<br>EUR |
| 2009 – 2013 | <i>"Coherent low-energy electron diffraction microscopy of single bio-molecules"</i> (SNF 126848, 138118); co-author of the proposal.                                                                                                                                                                                                               | 333'140.00<br>CHF   |
| 2006 – 2009 | <i>"Coherent low-energy electron diffraction microscopy of single biomolecules"</i> (SNF 113814); co-author of the proposal, developed the 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<br>CHF   |

## PUBLICATIONS LIST

- 96 S. Mustafi, R. Cai, S. Sullivan-Allsop, M. Smith, N. J. Clark, M. Lindley, D. Peng, K. S. Novoselov, S. J. Haigh, and **T. Latychevskaia**, "Dynamics of single gold nanoparticles on graphene simultaneously in real- and diffraction space by time-series convergent beam electron diffraction", *Micron* 194, 103814 (2025), doi:10.1016/j.micron.2025.103814.
- 95 D. Brault, C. Fournier, and **T. Latychevskaia**, "Iterative phase retrieval algorithm for space-variant PSFs in optical systems with aberrations", *Optics Letters* 50(6), 1767 – 1770 (2025), doi:10.1364/OL.550272.
- 94 **T. Latychevskaia** "Criteria for objects suitable for reconstruction from holograms and diffraction patterns", *J. Opt. Soc. Am. A* 41(11), 2219 – 2230 (2024), doi:10.1364/JOSAA.534332.
- 93 **T. Latychevskaia**, D. A. Bandurin and K. S. Novoselov "A new family of septuple-layer 2D materials of  $\text{MoSi}_2\text{N}_4$ -like crystals", *Nature Reviews Physics* (2024), doi:10.1038/s42254-024-00728-x.
- 92 F. Wicki and **T. Latychevskaia**, "Double-slit holography – a single-shot lensless imaging technique", *Scientific Reports* 14, 12528 (2024), doi:10.1038/s41598-024-62785-7.
- 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), doi:10.1016/bs.aiep.2021.04.001.
- 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.
- 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/s11467-018-0867-y.
- 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: Electron holography of individual proteins
  - NewScientist: First ever pictures of single proteins thanks to graphene sheet
  - Graphenea: Graphene sheets enable single protein snapshots
  - Futurism.com: These are the first-ever photos of a single protein
- 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.
- 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.
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| 2025 Sep | "Iterative phase retrieval methods in electron crystallography", oral presentation at the Microscopy Conference MC2025                                                                                                 | Karlsruhe<br>Germany   |
| 2025 Aug | Programm committee member of Phase2Face Symposium at the European Optical Society (EOS) Annual Meeting                                                                                                                 | Delft<br>Netherlands   |
| 2025 Aug | Organizer and programm committee member of Digital Holography Topical Meeting at OPTICA (former OSA) Imaging Congress                                                                                                  | Seattle<br>USA         |
| 2024 Jun | "Iterative Methods in Digital Holography", invited tutorial presentation at Digital Holography OPTICA (former OSA) Topical Meeting                                                                                     | Paestum<br>Italy       |
| 2023 Sep | "Quantitative Low-Energy Electron Coherent Imaging and Convergent Beam Electron Diffraction of 2D Materials", invited presentation at 2D23 SALVE symposium                                                             | Ulm<br>Germany         |
| 2023 Sep | "Convergent beam electron diffraction (CBED) of two-dimensional (2D) crystals", invited presentation at the 20th International Microscopy Congress (IMC20)                                                             | Busan<br>Korea         |
| 2023 Sep | "In-line holography with low-energy electrons, quantitative analysis", oral presentation at the 20th International Microscopy Congress (IMC20)                                                                         | Busan<br>Korea         |
| 2023 Aug | Organizer and chairman of mini-symposium "Coherent scattering methods using X-rays or electrons" at the 26th Congress of the International Union of Crystallography (IUCr)                                             | Melbourne<br>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<br>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<br>UK           |
| 2022 Jul | "Holography and coherent diffraction imaging with low-energy electrons", invited seminar at the Max Planck Institute                                                                                                   | Stuttgart<br>Germany   |
| 2022 Apr | "Convergent beam electron diffraction of two-dimensional materials", invited presentation at the SALVE symposium                                                                                                       | Ulm<br>Germany         |
| 2022 Mar | "Ptychography - scanning coherent diffraction imaging technique, principles and applications", seminar at the Physikalische Gesellschaft Zürich                                                                        | Zürich<br>Switzerland  |
| 2022 Feb | "Phase retrieval for coherent imaging", invited tutorial webinar at the IIT Delhi 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<br>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<br>Canada      |
| 2019 Dec | "Iterative Phase Retrieval in Holography", invited seminar at CEMES-CNRS, Université de Toulouse                                                                                                                       | Toulouse<br>France     |
| 2019 Sep | "Holographic and convergent beam electron diffraction imaging", invited presentation at the Nano- and Ultrafast Surface Science Workshop                                                                               | Garching<br>Germany    |
| 2019 Sep | "Iterative phase retrieval methods", invited lecture at the Lecture Week organized by the Helmholtz-Institute Jena                                                                                                     | Jena<br>Germany        |
| 2019 Sep | "Iterative phase retrieval for digital holography", keynote presentation at the International Forum on Microscopy 2019                                                                                                 | Beijing<br>China       |

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| 2019 Aug | "Prospects and progress towards collecting and phasing of single molecule electron diffraction data", oral presentation at the 32nd European Crystallographic Meeting                                                                                   | Vienna<br>Austria        |
| 2019 Jul | "Convergent beam electron diffraction on 2D van der Waals structures", invited seminar at the group of Prof Ute Kaiser                                                                                                                                  | Ulm<br>Germany           |
| 2019 Jul | "Wavefront modulation by inverted Gabor holography", oral presentation at the Q-SORT International Conference on Quantum Imaging and Electron Beam Shaping                                                                                              | Erlangen<br>Germany      |
| 2019 Jun | "In line holography and coherent diffraction imaging in electron microscopy", invited presentation at the NannolInnovation 2019                                                                                                                         | Rome<br>Italy            |
| 2019 May | "Phase retrieval for digital holography", invited presentation at the Digital Holography and 3-D Imaging OSA topical meeting                                                                                                                            | Bordeaux<br>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<br>Germany          |
| 2018 Oct | "Modern imaging without lenses: portraits of individual molecules", public lecture (Antrittsvorlesung) at the University of Zurich                                                                                                                      | Zurich<br>Switzerland    |
| 2018 Feb | "Coherent lensless low-energy electron imaging", invited presentation at the 5th Ringberg Meeting on Structural Biology with FELs                                                                                                                       | Ringberg<br>Germany      |
| 2017 Dec | "Coherent imaging with low-energy electrons (30 – 250 eV)", invited presentation at the 3rd SALVE Symposium                                                                                                                                             | Ulm<br>Germany           |
| 2017 Apr | "Coherent imaging with low-energy electrons", invited seminar at the Okinawa Institute of Science and Technology (OIST)                                                                                                                                 | Okinawa<br>Japan         |
| 2017 Apr | "Coherent imaging with low-energy electrons", invited seminar at the Fritz Haber Institute                                                                                                                                                              | Berlin<br>Germany        |
| 2017 Feb | "Coherent imaging with low-energy electrons (30 - 250 eV): Imaging charged impurities and three-dimensional topography of graphene", invited presentation at the Electron Holography Workshop organized by Hitachi and sponsored by Japanese government | Tokyo<br>Japan           |
| 2015 Jun | "Resolution enhancement in coherent imaging via extrapolation beyond detector area", invited presentation at the Optical Society of America Optics and Photonics Congress                                                                               | Washington<br>USA        |
| 2015 Feb | "Coherent imaging with ultra-low energy electrons", invited presentation at Sub-Angstrom Low-Voltage Electron Microscopy (SALVE) Symposium                                                                                                              | Ulm<br>Germany           |
| 2015 Feb | "Phase retrieval methods applied to coherent imaging", invited presentation at International School and Workshop "Matter in Extreme Conditions: from Material Science to Planetary Physics (MECMATPLA)"                                                 | Montgenvre<br>France     |
| 2014 Sep | "Coherent imaging beyond detector area and Abbe limit, towards atomic resolution", oral presentation at the International Microscopy Congress                                                                                                           | Prague<br>Czech Republic |
| 2013 Aug | "On the reconstruction of ultra low-energy electron holograms and diffraction patterns", oral presentation at the International Microscopy Conference                                                                                                   | Regensburg<br>Germany    |
| 2013 Apr | "Imaging outside the box: resolution enhancement by hologram self-extrapolation", oral presentation at the Optical Society of America, Digital Holography Meeting                                                                                       | Hawaii<br>USA            |
| 2013 Apr | "Holographic time-resolved particle tracking using 3d-deconvolution", oral presentation at the Optical Society of America, Digital Holography Meeting                                                                                                   | Hawaii<br>USA            |
| 2012 Nov | "Low-energy electron holograms and diffraction patterns of individual biomolecules", oral presentation at the Material Research Society Fall Meeting                                                                                                    | Boston<br>USA            |
| 2012 May | "Coherent low-energy electron imaging - a new tool for structural biology", invited presentation at the 45th Erice Crystallographic Course                                                                                                              | Erice<br>Italy           |

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| 2012 Apr | "When holography meets coherent diffraction imaging", oral presentation at the Optical Society of America, Digital Holography Meeting                                                                     | Miami<br>USA              |
| 2011 Oct | "Coherent diffraction imaging of individual biological molecules using coherent low-energy electrons", keynote invited presentation at the Centre of Excellence for Coherent X-Ray Science (CXS) Workshop | Melbourne<br>Australia    |
| 2011 Sep | "Imaging individual biological molecules with coherent low-energy electrons", oral presentation at the 25th Rhine-Knee Regional Meeting on X-ray Crystallography of Biomacromolecules                     | Sursee<br>Switzerland     |
| 2011 Aug | "Numerical reconstruction of holograms and diffraction patterns of individual biomolecules", oral presentation at the Microscopy Conference                                                               | Kiel<br>Germany           |
| 2010 Dec | "Coherent imaging of individual molecules with low-energy electrons", invited seminar at the IGBMC                                                                                                        | Strasbourg<br>France      |
| 2010 Jul | "Imaging of individual molecules with coherent low-energy electrons", poster presentation at the Gordon Research Conference "Diffraction Methods in Structural Biology"                                   | Lewiston<br>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<br>Italy            |
| 2010 Apr | "Coherent imaging of individual molecules with low-energy electrons", invited seminar at the Physics Department of the EPFL                                                                               | Lausanne<br>Switzerland   |
| 2009 Jan | "Reconstruction of low-energy electron holograms", oral presentation at the international conference "Current Trends in Structural Biology on the Single Molecule Level"                                  | Luzern<br>Switzerland     |
| 2008 Sep | "Holography" – a public show presentation on stage at the European Researcher Night                                                                                                                       | Zurich<br>Switzerland     |
| 2008 Mar | "Holography with low-energy electrons, a new tool for structural biology", oral presentation at the American Physics Society March meeting                                                                | New Orleans<br>USA        |
| 2007 Dec | "Theory of hologram alignment method", oral presentation at the International meeting of the European FP-7 SIBMAR project                                                                                 | Jena<br>Germany           |
| 2007 Sep | "Holography" – a public show presentation on stage at the European Researcher Night                                                                                                                       | Zurich<br>Switzerland     |
| 2007 Feb | "Conformational and structural studies on single bio-molecules", oral presentation at the Swiss Physical Society Meeting                                                                                  | Zurich<br>Switzerland     |
| 2006 Sep | "Electron holography of an individual virus", oral presentation at the International Conference on Nanoscience and Technology (ICN+T)                                                                     | Basel<br>Switzerland      |
| 2002 Sep | "Towards online reconstruction of electron holograms", poster presentation at the NCCR workshop                                                                                                           | Pontresina<br>Switzerland |
| 2001 Mar | "Spectral diffusion of single DPNP molecules in n-hexadecane matrix", oral presentation at the International NCCR winter workshop                                                                         | Andermatt<br>Switzerland  |
| 2000 Nov | "Higher order Stark effect on single molecules", invited seminar at the Physics Department, University of Leiden                                                                                          | Leiden<br>Netherlands     |
| 2000 Feb | "Modulation of absorption lines of single molecules via the RF Stark effect", poster presentation at the international EPA Graduate Student Symposium in Photochemistry                                   | Fribourg<br>Switzerland   |
| 1999 Oct | "Single molecule absorption spectra detected by RF Stark modulation", poster presentation at the Deutsche Physikalische Gesellschaft (DPG) conference                                                     | Münster<br>Germany        |