CURRICULUM VITAE

Ing. Tomáš Neuman Ph.D.

Light and matter theory group

Institute of Physics of the Czech Academy of Sciences (FZU-CAS)

Cukrovarnická 112/10

162 00 Praha 6

Email: neumat@seznam.cz (private), neuman@fzu.cz (institutional)

ORCID ID: https://orcid.org/0000-0003-3089-5805

Web of Science ResearcherID: AAG-6945-2021

EDUCATION

Physics, chemistry, and materials (Doctoral degree, PhD), 16.09.2014-14.12.2018

Theory of Plasmon-Enhanced Spectroscopy of Molecular Excitations: Infrared Absorption, Fluorescence, and Raman Scattering,

University of the Basque Country (UPV/EHU), Materials Physics Center (**Defended on 14.12.2018**; graduated with honours)

Physical Engineering and Nanotechnology (Master's degree, Ing.) 1.9.2012-24.06.2014

Study of Optical Properties of Metallic Structures and Their Applications in Nano-Optics,

Brno University of Technology, Faculty of Mechanical Engineering (**Defended on 24.06.2014**; graduated with honours; **awarded by Prize of Josef Hlávka**)

Physical Engineering and Nanotechnology (Bachelor's degree, Bc.) 1.9.2009-20.06.2012

Study of Properties of Surface Plasmon Polariton by Using Scanning Near-Field Optical Microscopy,

Brno University of Technology, Faculty of Mechanical Engineering (**Defended on 20.6.2012**; graduated with honours)

INTERNATIONAL WORK EXPERIENCE

Institut des Sciences Moléculaires d'Orsay, ISMO – Post-doctoral researcher at CNRS, Orsay, **France**, 1.12.2021-31.12.2022.

University of Strasbourg, IPCMS - Post-doctoral researcher at Institut de Physique et Chimie des Matériaux de Strasbourg (IPCMS), Strasbourg, **France**, 8.12.2020-30.11.2021.

Harvard University – Post-doctoral researcher at Harvard University, Cambridge, MA, **USA**, 15.6.2019-26.9.2020

MPC – MPC post-doctoral grant, granted by MPC (Material's physics center) 15.12.2018-14.06.2019

CSIC – FPI pre-doctoral grant by Spanish Ministerio de Ciencia, Innovación y Universidades (project FIS2013-41184-P), 01.05.2015-14.12.2018

ISIS – Two-month internship under the supervision of Thomas Ebbesen in Nanostructures Laboratory, Institut de Science et d'Ingénierie Supramoléculaires (Unistra/CNRS), Strasbourg, **France**, 01.10.2017 – 30.11.2017. (Asymmetric light emission from organic exciton-polaritons)

NIST – Three-month internship under supervision of Garnett Bryant in National Institute of Standards and Technology - Quantum Measurements Division, Gaithersburg, Maryland, **USA**, 19.04.2016 – 17.07.2016. (Ab-initio description of many-body excitations in linear atomic chains)

DIPC – Granted by Donostia International Physics Center, San Sebastián, **Spain**, 01.09.2014-30.04.2015. (Theory of scattering-type near-field microscopy and infrared spectroscopy)

DIPC – Six-month-internship at Donostia International Physics Center, San Sebastián, **Spain**, 1.2.2013-1.8.2013. (Interaction of s-SNOM probe with sample)

PUBLICATIONS

[1] Dvořák, P.; Neuman, T.; Břínek, L.; Samoril, T.; Kalousek, R.; Dub, P.; Varga, P.; Šikola, T. Control and Near-Field Detection of Surface Plasmon Interference Patterns, Nano Lett. 13, 2558-2563 (2013).

[2] Neuman, T.; Alonso-González, P.; García-Etxarri, A.; Schnell, M.; Hillenbrand, R.; Aizpurua, J.; Mapping the nearfields of plasmonic nanoantennas by scattering-type scanning near-field optical microscopy, Laser Photon. Rev. 9, 637-649 (2015).

[3] Neuman, T.; Huck, C.; Vogt, J.; Neubrech, F.; Hillenbrand, R.; Aizpurua, J.; Pucci, A.; Importance of Plasmonic Scattering for an Optimal Enhancement of Vibrational Absorption in SEIRA with Linear Metallic Antennas, J. Phys. Chem. C 119, 26652-26662 (2015).

[4] Schnell, M.; Sarriugarte, P.; Neuman, T.; Khanikaev, A. B.; Shvets, G.; Aizpurua, J.; Hillenbrand, R.; Real-Space Mapping of the Chiral Near-Field Distributions in Spiral Antennas and Planar Metasurfaces, Nano Lett. 16, 663-670 (2016).

[5] Huck, C.; Vogt, J.; Neuman, T.; Nagao, T.; Hillenbrand, R.; Aizpurua, J.; Pucci, A.; Neubrech, F.; Strong coupling between phonon-polaritons and plasmonic nanorods, Optics Express 24, 25528-25539 (2016).

[6] Schmidt, M; González-Tudela, A.; Giedge, G.;Neuman, T.; Zhang, Y.; Esteban, R.; Aizpurua, J.; 2017 IEEE Photonics Conference (IPC), 75-75 (2017).

[7] Neuman, T.; Esteban, R; Casanova, D.; García-Vidal, F. J.; Aizpurua, J.; Coupling of molecular emitters and plasmonic cavities beyond the point-dipole approximation, Nano Lett., 18, 2358-2367 (2018).

[8] Konečná, A.; Neuman, T.; Aizpurua, J.; Hillenbrand, R.; Surface-enhanced molecular electron energy loss spectroscopy, ACS Nano, 12, 4775-4786 (2018).

[9] Neuman, T.; Aizpurua, J.; Asymmetric light emission from organic exciton-polaritons, Optica, 5(10), 1247-1255 (2018).

[10] Neuman, T.; Esteban, R; Giedke, G.; Schmidt, M.; Aizpurua, J.; Hybrid optomechanical model of resonant SERS for parametric all-optical control of molecular vibrations, Phys. Rev. A, 100(4), 043422 (2019) (**Editor's choice**).

[11] Juraschek, D.; Neuman, T.; Flick, J.; Narang, P.; Cavity control of nonlinear phononics; Phys. Rev. Research 3(3), L032046 (2021).

[12] Neuman, T.; Aizpurua, J.; Esteban, R; Theory of resonant SERS in strongly coupled plasmon-exciton systems, Nanophotonics, 9(2), 295-308 (2020).

[13] Doppagne, B.; Neuman, T.; Soria Martinez, R.; Parra Lopez, L.E.; Bulou, H.; Romeo, M.; Berciaud, S.; Scheurer, F.; Aizpurua, J.; Schull, G.; Single-molecule tautomerization tracking through space-, time-, and spectrally resolved fluorescence, Nature Nanotechnology, 15(3), 207-211 (2020).
[14] Neuman, T.; Eichenfield, M.; Trusheim, M.; Hackett, L.; Narang, P.; Englund, D.; A Photonic Bus for Coherent Interfaces Between a Superconducting Qubit Processor, Spin Memory, and Photonic Quantum Networks; npj Quantum Information 7 (1), 1-8 (2021).
[15] Wang, D. S.; Neuman, T.; Narang, P; Dipole-Coupled Defect Pairs as Deterministic Entangled Photon Pair Sources; Phys. Rev. Research, 2(4), 043328 (2020).
[16] Neuman, T.; Trusheim, M.; Narang, P.; Selective acoustic control of photon-mediated qubit-qubit interactions; Phys. Rev. A, 101(5), 052342 (2020).
[17] Neuman, T.; Wang, D. S.; Narang, P.; Nanomagnonic cavities for strong spin-magnon coupling; Phys. Rev. Lett., 125(24), 247702 (2020).
[18] Townsend, E.; Neuman, T.; Debrecht, A.; Aizpurua, J.; Bryant, G. W.; Many-Body Physics in Small Systems: Observing the Onset and Saturation of Correlation in Linear Atomic Chains; Phys. Rev. B, 103 (19), 195429 (2021).
[19] Wang, D. S.; Neuman, T.; Narang, P.; Spin Emitters beyond the point dipole approximation in nanomagnonic cavities; J. Phys. Chem. C, 125 (11) 6222-6228 (2021).
[20] Wang, D. S.; Neuman, T.; Flick, J.; Narang, P.; Light-Matter interaction of a molecule in a dissipative cavity from first principles; J. Chem. Phys., 154, 104109 (2021).
[21] Gupta, S. N.; Bitton, O.; Neuman, T.; Esteban, R.; Chuntonov, L.; Aizpurua, J.; Haran, G.; Plasmon-exciton polaritonics shed light on quantum dot dark-state dynamics, Nat. Commun., 12, 1310 (2021).
[22] Juraschek, D.; Neuman, T.; Narang, P.; Giant phonon-induced effective magnetic fields in 4f paramagnets; Phys. Rev. Research, 4(1), 013129 (2022).
[23] Roslawska, A.; Neuman, T.; Doppagne, B.; Borisov, A. G.; Romeo, M.; Scheurer, F.; Aizpurua, J.; Schull, G.; Mapping Lamb, Stark and Purcell effects at a chromophore-picocavity junction with hyper-resolved fluorescence microscopy; Phys. Rev. X, 12(1), 011012 (2022).
[24] Vasilev, K.; Doppagne, B.; Neuman, T.; Rosławska, A.; Bulou, H.; Boeglin, A.; Scheurer, F.; Schull, G.; Internal Stark effect of single-molecule fluorescence; Nat. Commun., 13(1), 1-8 (2022).
[25] Wang, D. S.; Neuman, T.; Yelin, S. F.; Flick, J., Cavity-modified unimolecular dissociation reactions via intramolecular vibrational energy redistribution; J. Phys. Chem. Lett., 13(15), 3317-3324 (2022).
[26] Jiang, S.; Neuman, T.; Boeglin, A; Scheurer, F.; Schull, G.; Topologically localized excitons in single graphene nanoribbons, arXiv preprint arXiv:2209.01471 (2022).
[27] Jiang, S.; Neuman, T.; Bretel, R.; Boeglin, A.; Scheurer, F.; Le Moal, E.; Schull, G.; Many-body description of STM-induced fluorescence of charged molecules; arXiv preprint arXiv:2210.00126 (2022).

CONFERENCE CONTRIBUTIONS:

[1] Neuman, T.; Pucci, A.; Kalousek, R.; Šikola, T.; Aizpurua, J.; Role of scattering and absorption in surface-enhanced infrared spectroscopy, International Conference on Surface Plasmon Photonics SPP7 (Jerusalem, Israel), May 31 - June 5, 2015 (**Oral presentation**).
[2] Neuman, T.; Alonso-González, P.; García Etxarri, A.; Albella, P.; Hillenbrand, R.; Aizpurua, J.; Mapping and interpreting the nearfields of plasmonic antennas, International Conference on Surface Plasmon Photonics SPP7 (Jerusalem, Israel), May 31 - June 5, 2015 (Poster presentation).

[3] Neuman, T.; Huck, C.; Vogt, J.; Hillenbrand, R.; Pucci, A.; Aizpurua, J.; Role of scattering and absorption in surface enhanced infrared spectroscopy, International conference on enhanced spectroscopies 2015 (Messina, Italy), October 12-15, 2015 (Poster presentation).

[4] Neuman, T.; Esteban, R; Giedke, G.; Schmidt, M.; Aizpurua, J.; Quantum optical description of plasmon-assisted resonant Raman scattering, Gordon's conference: Nanophotonics & Plasmonics (Sunday River, Newry, ME, USA), July 10-15, 2016 (Poster presentation).

[5] Neuman, T.; Esteban, R.; Giedke, G.; Schmidt, M.; Aizpurua, J.; Controlling the quantum state of molecular vibrations in resonant Surface-Enhanced Raman Scattering, SCOM16 (San Sebastian, Spain), October 19 - 21, 2016 (Poster presentation).

[6] Neuman, T.; Esteban, R.; Giedke, G.; Schmidt, M.; Aizpurua, J.; Controlling the quantum state of molecular vibrations in resonant Surface-Enhanced Raman Scattering, Quantum Nanophotonics (Benasque, Spain), February 26th-March 3rd, 2017 (Poster presentation).

[7] Neuman, T.; Esteban, R.; Giedke, G.; Schmidt, M.; Aizpurua, J.; Controlling Molecular Vibrations in Resonant Surface-Enhanced Raman Scattering, CLEO Europe (Munich, Germany), June 24-29, 2017 (Poster presentation).

[8] Neuman, T.; Esteban, R.; Giedke, G.; Schmidt, M.; Aizpurua, J.; Coherent pumping of molecular vibrations in resonant Surface-Enhanced Raman Scattering, Conference on Quantum Nanophotonics (Ascona, Switzerland), August 20-25, 2017 (Poster presentation).

[9] Neuman, T.; Esteban, R.; Casanova, D.; García-Vidal, F. J.; Aizpurua, J.; Coupling of molecular emitters and plasmonic cavities beyond the point-dipole approximation, Nanolight (Benasque, Spain), March 11-16, 2018 (Poster presentation).

[10] Neuman, T.; Esteban, R.; Casanova, D.; García-Vidal, F. J.; Aizpurua, J.; Coupling of molecular emitters and plasmonic cavities beyond the point-dipole approximation, Strong Coupling with Organic Molecules - SCOM 2018 (Eindhoven, Netherlands), April 16-18, 2018 (**Oral presentation**).

[11] Neuman, T.; Esteban, R.; Casanova, D.; García-Vidal, F. J.; Aizpurua, J.; Coupling of molecular emitters and plasmonic cavities beyond the point-dipole approximation, Gordon's conference: Nanophotonics & Plasmonics (Sunday River, Newry, ME, USA), July 8-13, 2018 (Poster presentation).

[12] Neuman, T.; Ebbesen, T.; Aizpurua, J.; Origin of asymmetric plasmon-enhanced fluorescence from molecular exciton-polaritons within the theory of open-quantum systems, NFO15 (Troyes, France), August 26-31, 2018 (Poster presentation).

[13] Neuman, T.; Esteban, R.; Casanova, D.; García-Vidal, F. J.; Aizpurua, J.; Coupling of molecular emitters and plasmonic cavities beyond the point-dipole approximation, NFO15 (Troyes, France), August 26-31, 2018 (**Oral presentation**).

[14] Neuman, T.; Aizpurua, J.; Origin of asymmetric plasmon-enhanced fluorescence from molecular exciton-polaritons within the theory of open-quantum systems, Spanish conference on nanophotonics (San Sebastian, Spain), October 3-5, 2018 (Poster presentation).

[15] Neuman, T.; Esteban, R.; Casanova, D.; García-Vidal, F. J.; Aizpurua, J.; Coupling of molecular emitters and plasmonic cavities beyond the point-dipole approximation, Spanish conference on nanophotonics (San Sebastian, Spain), October 3-5, 2018 (**Oral presentation**).

[16] Neuman, T.; Esteban, R.; Giedke, G.; Schmidt, M.; Aizpurua, J.; Controlling Molecular Vibrations through Resonant Surface-Enhanced Raman Scattering, SPP9 (Copenhagen, Denmark), May 26-31, 2019 (**Oral presentation**).

[17] Neuman, T.; Trusheim, M.; Ciccarino, C.; Harris, I.; Narang, P.; Development and control of novel solid-state platforms for quantum engineering, SPIE Nanoscience+Engineering (online forum), 24 August 2020 (**invited presentation**).

[18] Roslawska, A.; Neuman, T.; Doppagne, B.; Borisov, A. G.; Romeo, M.; Scheurer, F.; Aizpurua, J.; Schull, G.; Mapping Lamb, Stark and Purcell effects at a chromophore-picocavity junction with hyper-resolved fluorescence microscopy; Faster, Smaller, Stronger, Brighter - Advances in Scanning Probe Techniques (Bad Honnef, Germany), November 1-5, 2021 (Poster presentation – **best-poster award**).

[19] Neuman, T.; Roslawska, A.; Doppagne, B.; Borisov, A. G.; Romeo, M.; Scheurer, F.; Aizpurua, J.; Schull, G.; Atomic-scale electrodynamics of molecular emitters in a plasmonic picocavity formed in a scanning tunneling microscope, CECAM workshop (Warwick, UK), July 18-22, 2022 (**invited presentation**).

SEMINAR TALKS

[1] From plasmon-mediated molecular spectroscopy to molecular quantum technologies, ISMO, Orsay, France, 10.11.2020.

[2] From plasmon-mediated molecular spectroscopy to molecular electro-optics and quantum technologies, DIPC, San Sebastian, Spain, 26.2.2021.

OUTREACH ACTIVITIES

Organizer of the **"Quantum Huddle" webinar (www.quantumhuddle.org) during 2020**. This webinar series hosted European and American experts across various fields of physics relevant for the development and characterisation of quantum technologies.

TEACHING AND MENTORING ACTIVITIES

During my postdoctoral stay at Harvard University, I was **mentoring a postgraduate student**, Derek S. Wang.

LANGUAGES

Czech - mother tongue, English - advanced (C1), exam in technical English (B1), Spanish - nivel avanzado (B2) (exam of Escuela Oficial de Idiomas, San Sebastián, Spain).