

SHAWN DIVITT

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Profile

A self-motivated, versatile researcher in experimental and rigorous theoretical science with a strong background in optics, electromagnetism, statistics, and mathematical methods. A citizen of the United States of America.

Education

- degree awarded Doctor of Philosophy, 2016
degree field optics
institution The Institute of Optics at University of Rochester, Rochester NY, USA (*in absentia* at ETH Zürich, Switzerland)
advisor Prof. Lukas Novotny
thesis *Modulation of Optical Spatial Coherence via Surface Plasmon Polaritons*
- degree awarded Master of Science, 2012
degree field optics
institution University of Rochester, Rochester NY, USA
- degree awarded Bachelor of Science, 2009 (*cum laude*)
degree fields mathematics, physics; geology minor
institution Western Washington University, Bellingham WA, USA

Experience

- position VP Engineering, 10 November 2025 - Present
location Phaseshift, College Park MD, USA
duties Optical simulation; inverse design; IP and proposal development; manufacturing; validation
- position Research Physicist, 13 October 2020 – 30 September 2025
location U.S. Naval Research Laboratory (NRL), Washington DC, USA
duties Experimental, theoretical, simulated, and modeling research in wavefront sensing, non-line-of-sight (NLOS) imaging technology, light scattering, and super-resolution imaging. Contracting Officer's Representative (COR) and Subject Matter Expert (SME) for DARPA Zenith. Drafted, proposed, and received funding for defense-related technical research initiatives and projects in applied optics.
- position Optical Engineer, 30 July 2018-9 October 2020
location U.S. Naval Research Laboratory (NRL), Washington DC, USA under contract with Jacobs Corporation (previously KeyW Corporation), Hanover MD, USA
duties Experimental and theoretical research in non-line-of-sight (NLOS) imaging technology.
- position Post-doctoral Fellow, 1 August 2016-27 July 2018
location National Institute of Standards and Technology (NIST), Gaithersburg MD, USA under contract with University of Maryland, College Park MD, USA

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- duties** Ultra-fast laser pulse shaping and holography via metasurfaces; design, fabrication and testing of cylindrical high-Q plasmonic micro-resonators for applications in lasers and sensing.
- position** Scientific Assistant, 1 July 2012-30 June 2016
- location** Swiss Federal Institute of Technology (ETH Zürich), Canton Zürich, Switzerland
- duties** Experimental and theoretical research in statistical optics as part of a doctoral thesis *in absentia*; advising of undergraduate and master's students in scientific projects; classroom and public demonstrations of optical experiments; cleanroom production of experimental samples
- position** Scientific Intern, June-August 2011
- location** Lawrence Livermore National Laboratory (LLNL), Livermore CA, USA
- duties** Prototyping and testing of an optical system containing spatial light modulators (SLMs) for use in the National Ignition Facility's (NIF) Advanced Radiographic Capability (ARC) system.

Professional Development

- advanced software proficiencies** Python, MATLAB (including hardware interfacing), Mathematica, Lumerical, LaTeX, Linux
- basic software proficiencies** Zemax, CODE V, Java, C++, LabVIEW, Javascript
- technical experience**
- optical techniques
 - super-resolution imaging (structured illumination, Fourier ptychography), speckle and non-line-of-sight (NLOS) imaging; phase retrieval; bispectrum imaging methods; phase/amplitude/polarization modulation using spatial light modulators (SLMs) and metasurfaces; ultra-fast optical pulse shaping; optical Fourier transforms and spatial filtering; lasers and LEDs; free-space optical alignment; holography; interferometry; radiometry; spatial and temporal coherence measurements (statistical optics); diffractive optics (gratings, apertures); optical (visible and NIR), confocal, and near-field (nano-optics) microscopy, spectroscopy, and detection; optical antennas
 - cleanroom techniques
 - scanning electron microscopy (SEM); scanning tunneling microscopy (STM); atomic force (AFM) and shear force (SFM) microscopy; optical and electron-beam lithography; sputter, thermal, and e-beam deposition; atomic layer deposition (ALD); plasma etching; chemical etching and cleaning

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- computational simulations
optical ray propagation (CODE V, Zemax); optical wave propagation (angular spectrum, Rayleigh-Sommerfeld, Fresnel); thin film coatings (matrix method); focal fields (Wolf); optomechanics / dynamics of optically trapped Rayleigh particles (numerical solutions of differential equations); cross-spectral density (statistical optics, covariance and spectrum) of focused and diffracted fields; scattering fields of spherical particles under illumination by arbitrary vector beams (angular spectrum); output and performance of wavefront sensors (pyramid, dual-roof, Shack-Hartmann); inverse design with JAX

professional memberships The Optical Society (OSA)

hobbies Mathematics Stack Exchange, MATLAB Central

Awards and Honors

honor description Finalist, ETH Zürich Spark Award 2019
Recognized among top five most promising inventions at ETH resulting in a patent application in the years 2018-2019

traineeship description NSF IGERT Trainee, 2010-2012
The National Science Foundation's flagship interdisciplinary training program
project name Distributed Renewable Energy: From Science and Technology to Entrepreneurship and Policy (University of Rochester)
details - training in technical entrepreneurship, economics, and energy technology
- three month internship in a government laboratory (LLNL, 2011)
- two month scientific collaboration and outreach mission to Kwame Nkrumah University of Science and Technology and to local elementary schools in Kumasi, Ghana (June-July 2012)

fellowship description Robert L. and Mary L. Sproull Fellowship, 2009-2010
The most prestigious fellowship awarded by the University of Rochester

honor description Outstanding Graduate in Physics, 2009
Awarded to a single graduate annually by Western Washington University for achievement in physics

scholarship description Willard A. and Anne W. Brown Astronomy Scholarship, 2009
Awarded by Western Washington University for achievement in physics, astronomy, mathematics, and computer science

Teaching and Advising

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- location** US Naval Research Laboratory, Washington DC, USA
- description** Advisor:
- Summer internships under the Navy SEAP program (2021, 2022, 2023, 2024)
- location** Swiss Federal Institute of Technology (ETH Zürich), Canton Zürich, Switzerland
- description** Classroom demonstrator:
- Elektromagnetische Felder und Wellen (Electromagnetic Fields and Waves, Spring 2014, Spring 2015, Spring 2016)
Course developer and lecturer:
- Practicum and Seminar Course: Optical Waves and Fourier Transforms (Fall 2015)
Advisor:
- semester projects in applied optics of one undergraduate and two master's students (Fall 2013 and Spring 2016)
- location** The Institute of Optics at University of Rochester, Rochester NY, USA
- description** Teaching assistant:
- OPT 256: Optics Laboratory (Fall 2011)
- OPT 287: Mathematical Methods for Optics and Physics (Spring 2012)

Patents

- [4] US11689821B2, "Incoherent Fourier Ptychographic Super-Resolution Imaging System with Priors," Granted June 27, 2023
- [3] EP3672120A1 "METHOD AND DEVICE FOR MULTIPLEXING INFORMATION," Filed December 18, 2018
- [2] US20210208312A1, "Low-loss metasurface optics for deep uv," Published July 8, 2021
- [1] US20190386749A1, "METASURFACE OPTICAL PULSE SHAPER FOR SHAPING AN OPTICAL PULSE IN A TEMPORAL DOMAIN," Published July 21, 2020

Publications

- [17] S. Divitt, K.P. Judd, M. Hart, W. Spruill, T. Jackson, V. Sivaprakasam, "Improved scattering rejection in transmissometry using image-plane vortex phase masks," *App. Opt.* **64**, 2663-2667 (2025). [10.1364/AO.539961](https://doi.org/10.1364/AO.539961)
- [16] S. Divitt, S. Park, H. Gemar, K.P. Judd, H. Dave, D. Lin, D.F. Gardner, A.T. Watnik, "Structured illumination and image enhancement of three-dimensional and moving objects at a distance via incoherent Fourier ptychography," *Appl. Opt.* **63**, C8-C14 (2024). [10.1364/AO.505275](https://doi.org/10.1364/AO.505275)
- [15] A. Watnik, S. Divitt, M. Hart, "Separation of coherent and incoherent light using image plane vortex phase masks," *JOSA A.* **40**, 1372-1381 (2023). [10.1364/JOSAA.489683](https://doi.org/10.1364/JOSAA.489683)

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- [13] S. Divitt, A. Watnik, "Spatial-spectral correlations of broadband speckle in around-the-corner imaging conditions," *Opt. Express* **30**, 7169-7186 (2022). [10.1364/OE.445330](https://doi.org/10.1364/OE.445330)
- [12] A. Nardi, F. Tebbenjohanns, M. Rossi, S. Divitt, A. Norrman, S. Gigan, M. Frimmer, L. Novotny, "Controlling spatial coherence with an optical complex medium," *Opt. Express* **29**, 40831-40840 (2021). [10.1364/OE.442330](https://doi.org/10.1364/OE.442330)
- [11] S. Divitt, D. Gardner, A. Watnik, "Imaging around corners in the mid-infrared using speckle correlations," *Opt. Express* **28**, 11051-11064 (2020). [10.1364/OE.388260](https://doi.org/10.1364/OE.388260)
- [10] D. Gardner, S. Divitt, A. Watnik, "Ptychographic imaging of incoherently illuminated extended objects using speckle correlations," *Appl. Opt.* **58**, 3564-3569 (2019). [10.1364/AO.58.003564](https://doi.org/10.1364/AO.58.003564)
- [9] C. Zhang, S. Divitt, Q. Fan, W. Zhu, A. Agrawal, T. Xu, and H.J. Lezec, "Low-loss Metasurface Optics down to the Deep Ultraviolet," *Light Sci Appl.* **9**, 1-10 (2020). [10.1038/s41377-020-0287-y](https://doi.org/10.1038/s41377-020-0287-y)
- [8] W. Zhu, S. Divitt, M.S. Davis, C. Zhang, H.J. Lezec and A. Agrawal, "Plasmon Lasers" in *Encyclopedia of Applied Physics*, Chennupati Jagadish ed. (2020). [10.1002/3527600434.eap819](https://doi.org/10.1002/3527600434.eap819)
- [7] S. Divitt, W. Zhu, C. Zhang, H.J. Lezec, and A. Agrawal, "Ultrafast Optical Pulse Shaping using Dielectric Metasurfaces," *Science*, eaav9632 (2019). [10.1126/science.aav9632](https://doi.org/10.1126/science.aav9632)
- [6] S. Divitt, M. Frimmer, T.D. Visser, and L. Novotny, "Modulation of optical spatial coherence by surface plasmon polaritons," *Opt. Lett.* **41**, 3094-3097 (2016). [10.1364/OL.41.003094](https://doi.org/10.1364/OL.41.003094)
- [5] S. Divitt, L. Rondin, and L. Novotny, "Cancellation of non-conservative scattering forces in optical traps by counter-propagating beams," *Opt. Lett.* **40**, 1900-1903 (2015). [10.1364/OL.40.001900](https://doi.org/10.1364/OL.40.001900)
- [4] S. Divitt and L. Novotny, "Spatial coherence of sunlight and its implications for light management in photovoltaics," *Optica* **2**, 95-103 (2015). [10.1364/OPTICA.2.000095](https://doi.org/10.1364/OPTICA.2.000095)
- [3] Z.J. Lapin, P. Bharadwaj, S. Divitt, and L. Novotny, "Localized Light-Matter Interactions with Optical Antennas," in *Nano-Structures for Optics and Photonics*, B. Di Bartolo, J. Collins, and L. Silvestri, eds. (Springer, 2015), 109-129. [10.1007/978-94-017-9133-5_3](https://doi.org/10.1007/978-94-017-9133-5_3)
- [2] S. Divitt, Z.J. Lapin, and L. Novotny, "Measuring coherence functions using non-parallel double slits," *Opt. Express* **22**, 8277-8290 (2014). [10.1364/OE.22.008277](https://doi.org/10.1364/OE.22.008277)
- [1] S. Divitt, P. Bharadwaj, and L. Novotny, "The role of gap plasmons in light emission from tunnel junctions," *Opt. Express* **21**, 27452-27459 (2013). [10.1364/OE.21.027452](https://doi.org/10.1364/OE.21.027452)

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Presentations and Workshops

- [18] Complex Light and Optical Forces (invited, Photonics West 2025), San Francisco CA, 28 January 2025
OAM vortex phase masks for enhanced scatter rejection in transmissometry
- [17] *Frontiers in Optics (FiO 2024)*, Denver CO, 24 September 2024
Scattering of arbitrary beams from spherical dielectric particles
- [16] *Imaging and Applied Optics Congress (COSI 2022)*, Virtual, 13 July 2022
Structured Illumination for High-speed Image Acquisition and Enhancement of Moving Objects Beyond 20 m Distance
- [15] *Imaging and Applied Optics Congress (COSI 2021)*, Virtual, 21 July 2021
Structured Illumination for Enhanced-Resolution Imaging of Moving Objects at Intermediate Range
- [14] *2020 IEEE Research and Applications of Photonics in Defense Conference (RAPID)*, Miramar Beach FL, 11 August 2020
Incoherent Fourier Ptychographic Super-resolution Projection and Imaging System
- [13] *OSA Imaging and Applied Optics Congress (COSI 2020)*, Washington D.C., 25 June 2020
Non-Line-of-Sight Imaging of Thermal Objects via Speckle Correlations
- [12] *CLEO 2020*, San Jose CA, 13 May 2020
Passive, Thermal, Reference-Free, Non-Line-of-Sight Imaging
- [11] *Frontiers in Optics 2019*, Washington D.C., 19 September 2019
Seeing around corners in the mid-infrared using speckle imaging
- [10] *Frontiers in Optics 2018*, Washington D.C., 19 September 2018
Dynamic Pulse Shaping by Metasurfaces
- [9] *META 2018* (invited), Marseilles, France, 27 June 2018
Metasurface Pulse Shaping
- [8] *CLEO 2018* (invited), San Jose CA, 18 May 2018
Spatial and Temporal Control of Light Using Metasurfaces
- [7] *Frontiers in Optics 2017*, Washington D.C., 20 September 2017
(poster) *Cylindrical, High-Q Surface Plasmon Cavities for Lasing and Sensing in the Visible Range*
- [6] *META 2017* (invited), Incheon, South Korea, 26 July 2017
Visible-Frequency Surface Plasmon Resonators and Lasers with High Quality Factors
- [5] *CLEO 2017*, San Jose CA, 16 May 2017
Visible Frequency Plasmon Resonator exhibiting Quality Factors exceeding 750
- [4] *Scientifica*, Zürich, Switzerland, 6 September 2015
Was ist licht? (in assistance of L. Novotny with L. Herrmann)

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- [3] *1st Joensuu Conference on Coherence and Random Polarization* (invited), Joensuu, Finland, 6 June 2014
Measurements of spectral coherence functions of sunlight using non-parallel double slits
- [2] *Treffpunkt Science City*, Zürich, Switzerland, 7 April 2013
Children's workshops in electronic communication and fiber optics (with K. Nguyen and M. Frimmer)
- [1] *Frontiers in Optics 2012*, Rochester NY, 14 October 2012
Modification of STM-induced Light Emission by Nanostructures

References

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