

# Mercedeh Khajavikhan

Associate Professor and IBM Early Career Chair, Electrical Engineering/Electrophysics Department, University of Southern California  
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## Appointments

- 08/2019, Associate Professor, University of Southern California, Electrical and Computer Engineering Dept.
- 08/2019, Courtesy Professor, University of Central Florida, CREOL, The College of Optics & Photonics
- 05/2018 – 08/2019, Associate Professor, University of Central Florida, CREOL, The College of Optics & Photonics
- 07/2012 – 05/2018, Assistant Professor, University of Central Florida, CREOL, The College of Optics & Photonics
- 01/2012 – 07/2012, Researcher, University of California San Diego, Electrical Engineering and Computer Science Dept.
- 10/2009 – 10/2011, Post-doctoral Scholar, University of California San Diego, Electrical Engineering and Computer Science Dept.
- 09/2004 – 09/2009, Research Assistant, University of Minnesota, Electrical Engineering Dept.

## Education

- 09/2004 – 09/2009, Ph.D., Electrical Engineering, University of Minnesota, MN
- 09/2000 – 09/2003, M.S., Electrical Engineering, Amirkabir University of Technology, Iran
- 09/1996 – 09/2000, B.S., Electrical Engineering, Amirkabir University of Technology, Iran

## Honors and Awards

- 2018, UCF Luminary Award- *given to exceptional faculty whose work in advancing their discipline and making a difference*
- 2018, CREOL-UCF Research Incentive Award
- 2018, DARPA Young Faculty Award
- 2017, Best student paper award in SPIE Optics and Photonics conference
- 2017, CREOL Teaching Incentive Award
- 2016, Excellence in Graduate Teaching Award- UCF CREOL
- 2016, ONR Young Investigator Award
- 2016, UCF Reach for the Stars Award
- 2015, NSF CAREER Award
- 2005, University of Minnesota, Norton Fellowship for Academic Excellence

## Synergetic Activities

- *Publishing:*
  - Topical Editor: Optics Express (since 2016)
  - Nominating and selection committee: OL chief editor, 2019
  - APL Editorial Advisory Board (since 2019)
- *Conferences:*
  - Program Chair:
    - CLEO/QELS 2020
  - Subcommittee Chair:
    - CLEO/QELS Nonlinear Optics and Novel Phenomena (FS5), 2018-2019
  - Member of technical committee:
    - CLEO/QELS Nonlinear Optics and Novel Phenomena (FS5), 2015-2017, OSA nonlinear optics (NLO), 2019, IEEE photonics conference 2017-2019, SPIE Europe 2018, SPIE Photonics West 2019, OSA Advances in Photonics 2018, CLEO-Europe 2018, SPIE Optics and Photonics, 2018-2019, Mid-Infrared Coherent Sources (MICS) 2020 Topical Meeting
  - Organizer:
    - 9th IMACS International conference on “Nonlinear evolution equations and wave phenomena: Computation and theory”, 2014,
    - Meta 2017 session on “Advances in Nanolasers”, IEEE Summer Topicals 2018 on “Non-Hermitian, Topological and Active Photonics”, George Stegeman Symposium 2018
- *OSA Foundation:* Invited lecturer at the Siegman International School on Lasers, 2017
- Member and faculty adviser of UCF Women in Lasers and Optics (WiLO), 2016-2018
- Proposal reviewer for Army Research Office, Department of Energy, National Science Foundation, Oak Ridge National Labs, ERC. European Union, Research Grants Council (Hong Kong), Oakridge Associated Universities, NSERC and Mitacs (Canada)
- 2008-present, Ad hoc reviewer for Nature, Nature Physics, Nature Photonics, Nature Communications, Science, Science Advances, Optica, Optics Letters, Optics Express, PRL, PRA, PRE, ACS Nano, ACS Photonics, IEEE Photonics Technology Letters, IEEE Journal of Selected Topics in Quantum Electronics, IEEE Journal of Lightwave Technology

## Journal Publications

Work has been featured in several science and technology news outlets including *BBC*, *Nature*, *Huffington Post*, *EE Times*, *IEEE Spectrum*, *Optics & Photonics News Magazine*, *Laser Focus world*, *Photonics Spectra Magazine*, etc.

Work established in Khajavikhan's labs has been published in *Nature* (3), *Science* (4), *Nature Physics* (1), *PRL* (3), *Optica* (2).

1. M. P. Hokmabadi, A. Schumer, D. N. Christodoulides, M. Khajavikhan, "Non-Hermitian Ring Laser Gyroscopes with Enhanced Sagnac Sensitivity," *Nature*, Accepted (2019)
2. Q. Zhong, S. Nelson, M. Khajavikhan, D.N. Christodoulides, R. El-Ganainy, "Bosonic discrete supersymmetry for quasi-two-dimensional optical arrays" *Photonics Research*, Accepted (2019)
3. W. E. Hayenga, M. Parto, J. Ren, F. Wu, M. P. Hokmabadi, C. Wolff, R. El-Ganainy, N. A. Mortensen, D. N. Christodoulides, M. Khajavikhan, "Direct generation of tunable orbital angular momentum beams in microring lasers with broadband exceptional points," *ACS Photonics*, 6, 1895 (2019)
4. W. E. Hayenga, H. Garcia-Gracia, E. Sanchez Cristobal, M. Parto, H. Hodaie, P. LiKamWa, D. N. Christodoulides, M. Khajavikhan, "Electrically Pumped Microring Parity-Time Symmetric Lasers," *Proceedings of the IEEE*, Accepted (2019)
5. C. Xu, W. E. Hayenga, M. Khajavikhan, P. Likamwa, "Measuring the frequency response of optically pumped metal-clad nanolasers," *Optics Express* (2019)
6. R. El-Ganainy, M. Khajavikhan, D. N. Christodoulides, S. Ozdemir, "The dawn of non Hermitian optics", *Nature Communications Physics* (2019) – perspective.
7. Q. Zhong, J. Ren, M. Khajavikhan, D. N. Christodoulides, S. K. Ozdemir, R. El-Ganainy, "Sensing with exceptional surfaces: combining sensitivity with robustness", *Physical Review Letters* 122, 153902 (2019)
8. M. P. Hokmabadi, N. Nye, R. El-Ganainy, D. N. Christodoulides, M. Khajavikhan, "Supersymmetric Laser Arrays", *Science* 363 623 (2019)

This work has been highlighted by:

<https://phys.org/news/2019-02-laser-built-principles-supersymmetry.html>

<https://phys.org/news/2019-02-supersymmetric-laser-array.html>

<https://physicsworld.com/a/supersymmetry-boosts-beam-quality-of-laser-arrays/>

<https://www.laserfocusworld.com/lasers-sources/article/16566819/supersymmetric-coherent-laser-beam-combination-produces-highquality-beam>

<https://www.sciencedaily.com/releases/2019/02/190228113524.htm>

[https://www.eurekalert.org/pub\\_releases/2019-02/uocf-urd022819.php](https://www.eurekalert.org/pub_releases/2019-02/uocf-urd022819.php)

<https://www.pro-physik.de/nachrichten/supersymmetrische-laser>

9. M. Parto, H. Lopez-Aviles, J. E. Antonio-Lopez, M. Khajavikhan, R. Amezcua-Correa, D. N. Christodoulides, "Observation of twist-induced geometric phases and inhibition of optical tunneling via Aharonov-Bohm effects," *Science Advances*, 5 eaau8135 (2019)
10. M. Khajavikhan, S. Wittek, M. Parto, J. Ren, D. N. Christodoulides, G. Harari, M. Segev, M. A. Bandres, "Topological Photonics Meets Lasers," *OPN Year in Review* (2018)
11. A. Mortensen, P. A. D. Goncalves, M. Khajavikhan, D. N. Christodoulides, C. Tserkezis, C. Wolff, "Optical Fluctuations and noise-limited sensing near the exceptional point of PT-symmetric resonator systems," *Optica* 5, 1342-1346 (2018)
12. Q. Zhong, M. Khajavikhan, D.N. Christodoulides, and R. El-Ganainy, "Winding around Non-Hermitian Singularities: General Theory and Topological Features," *Nature Communications* 9 4808 (2018)
13. J. Ren, Y. G. N. Liu, M. Parto, W. E. Hayenga, M. P. Hokmabadi, D. N. Christodoulides, M. Khajavikhan, "Unidirectional light emission in PT-symmetric microring lasers," *Opt. Express* 26, 27153-27160 (2018)
14. M. Parto, S. Wittek, H. Hodaie, G. Harari, M. A. Bandres, J. Ren, M. C. Rechtsman, M. Segev, D. N. Christodoulides, M. Khajavikhan, "Complex Edge-State Phase Transitions in 1D Topological Laser Arrays," *Physical Review Letters*, 120, 113901 (2018) **ISI highly cited paper**
15. Q. Zhong, D. N. Christodoulides, M. Khajavikhan, K. Makris, R. El-Ganainy, "Power-law scaling of extreme dynamics near higher-order exceptional points", *Phys. Rev. A* 97, 020105 (2018)
16. M. Bandres, S. Wittek, G. Harari, M. Parto, J. Ren, M. Segev, D. N. Christodoulides, M. Khajavikhan, "Topological Insulator Laser: Experiments," *Science*, 359, 4003 (2018) **ISI highly cited paper**

This work has been highlighted by:

[https://www.osa-opn.org/home/newsroom/2018/february/a\\_topological-insulator\\_laser/](https://www.osa-opn.org/home/newsroom/2018/february/a_topological-insulator_laser/)

<https://phys.org/news/2018-02-topological-physics-lasing-highly-efficient.html>

<https://www.nature.com/articles/d41586-018-01546-9>

<https://www.laserfocusworld.com/lasers-sources/article/16555409/topologicalinsulator-lasers-are-more-efficient-than-their-contemporary-counterparts>

<https://www.pourlascience.fr/la-topologie-inspire-la-conception-de-nouveaux-lasers-13019.php>

17. G. Harari, M. A. Bandres, Y. Lumer, M. C. Rechtsman, Y. D. Chong, M. Khajavikhan, D. N. Christodoulides, M. Segev, "Topological Insulator Laser: Theory," *Science*, 359, 4001 (2018) **ISI highly cited paper**
18. A. U. Hassan, H. Hodaei, D. N. Christodoulides, M. Khajavikhan, "Exceptional Points: An Emerging Tool for Sensor Applications," *Optics & Photonics News*, January (2018)
19. R. El-Ganainy, K. Makris, M. Khajavikhan, Z. Musslimani, S. Rotter, D. N. Christodoulides, "Non-Hermitian paradigms in physics: PT symmetry and beyond," *Nature Physics*, 14, 11–19 (2018) --Review Article **ISI highly cited paper**
20. M. Khajavikhan, M. A. Miri, A. Alu, D. N. Christodoulides, "Parity-Time Symmetry in Optics," *Encyclopedia of Modern Optics II*, (2018) --Invited Article
21. A. U. Hassan, G. L. Galmiche, G. Harari, P. LiKamWa, M. Khajavikhan, M. Segev, D. N. Christodoulides, "Chiral state conversion without encircling an exceptional point," *Physical Review A* 96 052129 (2017)
22. H. Hodaei, A. U. Hassan, S. Wittek, J. H. Garcia-Gracia, R. El-Ganainy, D. N. Christodoulides, M. Khajavikhan, "Enhanced sensitivity in photonic molecule systems using higher order non-Hermitian exceptional points," *Nature* 548, 187–191 (2017) **ISI highly cited paper**
23. M. Parto, H. Lopez-Aviles, M. Khajavikhan, R. Amezcua-Correa, D. N. Christodoulides, "Topological Aharonov-Bohm suppression of optical tunneling in twisted nonlinear multicore fibers," *Physical Review A* 96, 043816 (2017)
24. M. H. Teimouripour, M. Khajavikhan, D. N. Christodoulides, R. El-Ganainy, "Robustness and mode selectivity in parity-time (PT) symmetric lasers," *Scientific Reports* 7, 10756 (2017)
25. W. Hayenga and M. Khajavikhan, "Unveiling the Physics of Microcavity Lasers," *Light: Science & Applications - New and Views* (2017)
26. P. Aleahmad, M. Khajavikhan, D. N. Christodoulides, P. Likamwa, "Integrated multi-port structures for unidirectional optical information transport", *Scientific Reports* 7 Article number: 2129 (2017)
27. J. Ren, H. Hodaei, G. Harari, A. U. Hassan, W. Chow, M. Soltani, D. N. Christodoulides, M. Khajavikhan, "Ultrasensitive micro-scale parity-time-symmetric ring laser gyroscope," *Opt. Lett.* 42, 1556-1559 (2017)
28. A. U. Hassan, B. Zhen, M. Soljacic, M. Khajavikhan, D. N. Christodoulides, "Dynamically encircling exceptional points: Exact evolution and polarization state conversion", *Physical Review Letters* 118, 093002 (2017)
29. W. E. Hayenga, J.H. Garcia-Garcia, H. Hodaei, C. Reimer, R. Morandotti, P. Likamwa, M. Khajavikhan, "Second-order coherence properties of metallic nanolasers," *Optica*, 3 1187-1193 (2016)
30. H. Hodaei, M.A. Miri, A. U. Hassan, W. Hayenga, D. N. Christodoulides, M. Khajavikhan, "Dark state microring lasers: Mode management using exceptional points", *Opt. Lett.* 41, 3049 (2016)
31. A. AlHalawany, S. He, H. Hodaei, A. Bakry, M. A. N. Razvi, A. Alshahrie, N. J. J. Johnson, D. N. Christodoulides, A. Almutairi, M. Khajavikhan, "Enhanced UV upconversion emission using plasmonic nanocavities", *Opt. Exp.*, 24, 13999-14009 (2016)
32. A. U. Hassan, H. Hodaei, M.-A. Miri, M. Khajavikhan, D. N. Christodoulides, "An integrable nonlinear parity-time symmetric optical oscillator", *Physical Review E*, 93, 042219 (2016)
33. H. Hodaei, M. A. Miri, W. Hayenga, A. Ulhassan, M. Heinrich, D. N. Christodoulides, M. Khajavikhan, "Single mode lasing in transversely multi-moded PT-symmetric microring resonators", *Laser and Photonics Review*, 10 494–499, (2016)
34. W. E. Hayenga, H. Hodaei, J. H. Garcia-Garcia, Y. Fainman, M. Khajavikhan, "Metallic Coaxial Nanolasers", *Advances in Physics: X*, 1 262-275 (2016) Invited
35. N. Nye, A. Alhalawany, M. Khajavikhan, D. Christodoulides, "Passive PT-symmetric metasurfaces with directional field scattering characteristics", *IEEE JSTQE* 22 5000608 (2016)
36. H. Hodaei, A. U. Hassan, J.-H. Ren, W. E. Hayenga, M.A. Miri, D. N. Christodoulides, M. Khajavikhan, "Design considerations for single mode microring lasers using parity-time-symmetry", *IEEE JSTQE*, 22, 1500307 (2016)
37. A. U. Hassan, H. Hodaei, M.-A. Miri, M. Khajavikhan, D. N. Christodoulides, "Nonlinear reversal of PT-symmetric phase transition in a system of coupled semiconductor micro-ring resonators", *Physical Review A.*, 92, 063807 (2015)
38. H. Hodaei, M. A. Miri, A. Ulhassan, W. Hayenga, M. Heinrich, D. N. Christodoulides, M. Khajavikhan, "Parity-time-symmetric coupled microring lasers operating around an exceptional point", *Opt. Lett.*, 40, 4955-4958 (2015)
39. R. El-Ganainy, L. Ge, M. Khajavikhan, D. Christodoulides, "Supersymmetric laser arrays", *Physical Review A* 92, 033818 (2015)
40. H. Hodaei, M. A. Miri, M. Heinrich, D. N. Christodoulides, M. Khajavikhan, "Parity-time-symmetric microring lasers," *Science* 346, 975 (2014) **ISI highly cited paper**
41. R. El-Ganainy, M. Khajavikhan, L. Ge, "Exceptional points and lasing self-termination in photonic molecules", *Physical Review A* 90, 013802 (2014)
42. C. Lantigua, S. He, M. Akhlaghi Bouzan, W. Hayenga, N. J. J. Johnson, A. Almutairi, M. Khajavikhan, "Engineering upconversion emission spectra using plasmonic nanocavities," *Opt. Lett.* 39, 3710-3713 (2014)
43. M. Khajavikhan, A. Simic, M. Katz, J. H. Lee, B. Slutsky, A. Mizrahi, V. Lomakin and, Y. Fainman, "Thresholdless Nanoscale Coaxial Lasers", *Nature* 482 204–207 (2012) **ISI highly cited paper**

This work has been highlighted by:

<https://www.bbc.com/news/science-environment-16925088>

<https://phys.org/news/2012-02-physicists-highly-efficient-no-waste-laser.html>

<https://www.cnet.com/news/nanolaser-is-small-as-speck-of-dust/>

44. J. Lee, M. Khajavikhan, A. Simic, Q. Gu, O. Bondarenko, B. Slutsky, M. P. Nezhad, and Y. Fainman, "Electrically pumped sub-wavelength metallo-dielectric pedestal pillar lasers", *Opt. Express*, 19, 21524-21531 (2011)
45. M. Nezhad, O. Bondarenko, M. Khajavikhan, A. Simic, Y. Fainman, "Etch-free Low Loss Silicon Waveguides Using Hydrogen Silsesquioxane Oxidation Masks", *Opt. Express* 19, 18827-18832 (2011)
46. S. Zamek, L. Feng, M. Khajavikhan, D. T. H. Tan, M. Ayache, and Y. Fainman, "Micro-resonator with metallic mirrors coupled to a bus waveguide," *Opt. Express* 19, 2417-2425 (2011)
47. S. Zamek, Dawn T. H. Tan, M. Khajavikhan, M. Ayache, M. P. Nezhad, and Y. Fainman, "Compact chip-scale filter based on curved waveguide Bragg gratings," *Opt. Lett.* 35, 3477-3479 (2010)
48. M. Khajavikhan, K. John, J. R. Leger, "Experimental Measurements of Supermodes in Superposition Architectures for Coherent Laser Beam Combining," *Journal of Quantum Electronics, IEEE* 46 1221 (2010)
49. M. Khajavikhan, J. R. Leger., "Modal Analysis of Path Length Sensitivity in Superposition Architectures for Coherent Laser Beam Combining," *Selected Topics in Quantum Electronics, IEEE* 15 281(2009)
50. M. Khajavikhan, A. Hoyer-Leitzel, J. R. Leger, "Efficient conversion of light from sparse laser arrays into single-lobed far field using phase structures," *Opt. Lett.* 33 2377 (2008)

### arXiv and preprints

These papers are currently under review or revision.

51. S. Kreinberg, K. Laiho, F. Lohof, W. E. Hayenga, P. Holewa, C. Gies, M. Khajavikhan, S. Reitzenstein, "Thresholdless transition to coherent emission at telecom wavelengths from coaxial nanolasers," under revision, arXiv:1905.09924
52. M. Parto, W. E. Hayenga, A. Marandi, D. N. Christodoulides, M. Khajavikhan, "Realizing spin-Hamiltonians in nanoscale active photonic lattices," under revision
53. C. Xu, W. E. Hayenga, H. Hodaie, D. N. Christodoulides, M. Khajavikhan, P. Likamwa, "Modulation bandwidth enhancement in PT-symmetric lasers," under review
54. F. Wu, P. Jung, M. Khajavikhan, D. N. Christodoulides, "Entropic thermodynamics of nonlinear photonic chain networks," Submitted

### Conference Presentations

1. M. Parto, W. E. Hayenga, D. N. Christodoulides, M. Khajavikhan, "Mode-Dependent Coupling and Vectorial Optical Vortices in Metallic Nanolaser Arrays," CLEO- QELS, San Jose, CA (2019)
2. M. P. Hokmabadi, N. Nye, R. El-Ganainy, D. N. Christodoulides, "Supersymmetric Laser Arrays," CLEO- QELS, San Jose, CA (2019)
3. J. Leshin, Y. Alahmadi, A. U. Hassan, G. Lopez Galmiche, P. LiKamWa, D. N. Christodoulides, M. Khajavikhan, "Bimodal Directional Laser via Dynamically Encircling an Exceptional Point," CLEO- QELS, San Jose, CA (2019)
4. C. Xu, W. E. Hayenga, M. Khajavikhan, P. Likamwa, "Measuring the Frequency Response of Metallic Nanolasers," CLEO- QELS, San Jose, CA (2019)
5. Y. Liu, P. Jung, M. Parto, J. Leshin, D. N. Christodoulides, M. Khajavikhan, "Towards a Non-magnetic Topological Haldane Laser, CLEO- QELS," San Jose, CA (2019)
6. W. E. Hayenga, J. Ren, M. Parto, F. Wu, M. P. Hokmabadi, C. Wolff, R. El-Ganainy, N. A. Mortensen, D. N. Christodoulides, M. Khajavikhan, "Tunable Orbital Angular Momentum Microring Lasers Using Chiral Exceptional Points," CLEO- QELS, San Jose, CA (2019)
7. J. Leshin, A. U. Hassan, D. Christodoulides, M. Khajavikhan, "Dynamically encircling exceptional points in active media," Photonics West SPIE, San Francisco CA (2019)
8. Y. G. N. Liu, J. Leshin, M. Parto, D. N. Christodoulides, M. Khajavikhan, "Dynamical Stabilization and Phase-locking in Laser Arrays with Non-Hermitian Coupling," Photonics West SPIE, San Francisco CA (2019)
9. M. Segev, M. A. Bandres, G. Harari, S. Wittek, D. N. Christodoulides, M. Khajavikhan, "Experimental Realization of Magnetic-Free Topological Insulator Laser," IEEE Summer Topicals Hawaii (2018)
10. J. Ren, W. Hayenga, M. Parto, F. Wu, D. N. Christodoulides, M. Khajavikhan, "Tunable Orbital Angular Momentum Microring Laser," IEEE Summer Topicals Hawaii (2018)
11. M. P. Hokmabadi, W. Hayenga, J. Ren, E. Sanchez Cristobal, S. Faryadras, R. El-Ganainy, D. N. Christodoulides, M. Khajavikhan, "Experimental Realization of Supersymmetric Laser," IEEE Summer Topicals Hawaii (2018)
12. J. Ren, M. Parto, S. Wittek, M. P. Hokmabadi, D. N. Christodoulides, and M. Khajavikhan, "Unidirectional Light Generation in PT-symmetric Microring Lasers," CLEO-QELS San Jose CA (2018)— **upgraded to invited**
13. W. E. Hayenga, E. Sanchez-Cristobal, H. Garcia-Gracia, M. Parto, H. Hodaie, J. Ren, P. LiKamWa, D. N. Christodoulides, and M. Khajavikhan, "Demonstration of Electrically Injected Parity-Time-Symmetric Microring Lasers," CLEO-QELS San Jose CA (2018)
14. M. Parto, H. Lopez-Aviles, J. E. Antonio-Lopez, J. C. Alvarado Zacarias, M. Khajavikhan, R. Amezcua-Correa, and D. N. Christodoulides, "Observation of Aharonov-Bohm Suppression of Optical Tunneling in Twisted Multicore Fibers," CLEO-QELS San Jose CA (2018)
15. W. E. Hayenga, M. Parto, E. S. Cristobal, D. N. Christodoulides, and M. Khajavikhan, "Direct Generation of Structured Light in Metallic Nanolaser Arrays" CLEO-QELS San Jose CA (2018)

16. J. Ren, G. Harari, A. U. Hassan, W. Chow, M. Soltani, M. P. Hokmabadi, D. Christodoulides, and M. Khajavikhan, "PT-Symmetric Microring Laser Gyroscopes," CLEO-QELS San Jose CA (2018)
17. C. Xu, M. Khajavikhan, and P. LiKamWa, "Silicon Nitride Grating Couplers with High Efficiency and Wide Bandwidth," CLEO-QELS San Jose CA (2018)
18. M. Parto, S. Wittek, H. Hodaei, G. Harari, M. A. Bandres, J. Ren, M. C. Rechtsman, M. Segev, D. N. Christodoulides, and M. Khajavikhan, "Complex Edge-State Phase Transitions in 1D Topological Laser Arrays," CLEO-QELS San Jose CA (2018)
19. E. S. Cristobal, W. E. Hayenga, J. H. Garcia-Gracia, M. P. Hokmabadi, P. LiKamWa, and M. Khajavikhan, "Electrically Pumped Metallic Coaxial Nanolasers," CLEO-QELS San Jose CA (2018)
20. M. P. Hokmabadi, S. Faryadras, R. El-Ganainy, D. N. Christodoulides, and M. Khajavikhan, "Single Mode Supersymmetric Laser Array," CLEO-QELS San Jose CA (2018)
21. M. A. Bandres, S. Wittek, G. Harari, M. Parto, J. Ren, M. Segev, D. N. Christodoulides, and M. Khajavikhan, "Experimental Realization of Magnetic-Free Topological Insulator Laser," CLEO-QELS San Jose CA (2018)
22. J. Ren, G. Harari, A. Hassan, W. Chow, M. Soltani, D. Christodoulides, M. Khajavikhan "Ultrasensitive parity-time-symmetric microring laser gyroscope" IEEE Photonics Conference, Orlando FL (2017)
23. S. Wittek, M. Parto, H. Hodaei, G. Harari, M. Bandres, M. Rechtsman, M. Segev, D. Christodoulides, M. Khajavikhan "PT-symmetry breaking of topological edge-states in SSH micro-ring laser arrays" IEEE Photonics Conference, Orlando FL (2017)
24. M. Segev, G. Harari, M. Bandres, S. Wittek, H. Hodaei, Y. Lumer, M. Rechtsman, M. Khajavikhan, Y. Chong, D. Christodoulides "Topological Insulator Lasers" IEEE Photonics Conference, Orlando FL (2017)- Invited
25. W. Hayenga, M. Parto, H. Garcia-Gracia, E. Sanchez-Cristobal, H. Hodaei, P. Likamwa, D. Christodoulides, M. Khajavikhan "Towards electrically injected parity-time-symmetric micro-ring lasers" IEEE Photonics Conference, Orlando FL (2017)
26. H. Hodaei, Absar U. Hassan, Steffen Wittek, Midya Parto, Hipolito Garcia-Gracia, R. El-Ganainy, D. N. Christodoulides, M. Khajavikhan "Higher-order exceptional points in photonic systems," SPIE Optics and Photonics, San Diego, CA (2017)--- **Recipient of the best paper award.**
27. H. Hodaei, A. U. Hassan, S. Wittek, H. Garcia-Gracia, R. El-Ganainy, D. Christodoulides, M. Khajavikhan "PT-symmetric Microresonators: High Sensitivity at Exceptional Points" CLEO, San Jose CA (2017)
28. W. E. Hayenga, M. Parto, H. Hodaei, P. Likamwa, D. N. Christodoulides, M. Khajavikhan, "Coupled Metallic Nanolaser Arrays," CLEO, San Jose CA (2017)
29. A. U. Hassan, B. Zhen, M. Soljacic, M. Khajavikhan, D. N. Christodoulides, "Polarization state conversion through exceptional point encirclement," CLEO, San Jose CA (2017)
30. S. Wittek, G. Harari, M. Bandres, H. Hodaei, M. Parto, P. Aleahmad, M. Rechtsman, Y. Chong, D. Christodoulides, M. Khajavikhan, M. Segev, "Towards the Experimental Realization of the Topological Insulator Laser," CLEO, San Jose CA (2017)
31. M. Parto, H. E. Lopez Aviles, M. Khajavikhan, R. A. Correa; D. Christodoulides, "Topological Aharonov-Bohm Suppression of Optical Tunneling in Twisted Nonlinear Multicore Fibers," CLEO, San Jose CA (2017)
32. H. Hodaei, A. U. Hassan, W. E. Hayenga, H. Garcia-Gracia, D. Christodoulides, M. Khajavikhan "Enhanced sensitivity in PT symmetric coupled resonators" Photonics West SPIE, San Francisco CA (2017)
33. M. Heinrich, H. Hodaei, M.A. Miri, A.U. Hassan, W.E. Hayenga, D.N. Christodoulides, M. Khajavikhan "Non-Hermitian microring systems: PT-symmetric lasers, mode management and enhanced emission efficiency" The 10th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, Crete Greece (2016)
34. H. Hodaei, A. U. Hassan, J. Ren, W. E. Hayenga, D. Christodoulides, M. Khajavikhan "Ultra-sensitive PT-symmetric coupled cavities" CLEO San Jose CA (2016)
35. W. Hayenga, H. Garcia-Gracia, H. Hodaei, P. LiKamWa, M. Khajavikhan, "Second-Order Coherence Measurement of a Metallic Coaxial Nanolaser" CLEO San Jose CA (2016)
36. A. Alhalawany, S. He, H. Hodaei, N.J. J. Johnson, D. Christodoulides, A. Almutairi, M. Khajavikhan, "Enhanced UV Upconversion Emission Using Plasmonic Nanocavities" CLEO San Jose CA (2016) (Poster Presentation)
37. A. U. Hassan, H. Hodaei, M. A. Miri, M. Khajavikhan, "Reversing the transition from an unbroken to a broken phase in a PT-symmetric dimer laser", CLEO San Jose CA (2016)
38. P. Aleahmad, M. Khajavikhan, P. L. Likamwa, D. Christodoulides, "Monolithically Integrated Unidirectional Circulators Utilizing non-Hermiticity and Nonlinearity on InP" CLEO San Jose CA (2016)
39. H. Hodaei, W. Hayenga, M.-A. Miri, A. Ulhassan, D. N. Christodoulides, M. Khajavikhan, "Dark state microring lasers: using exceptional points for mode management" CLEO Post deadline Session, San Jose CA (2015)
40. W. Hayenga; M.-A. Miri; H. Hodaei, A. Ulhassan, M. Heinrich, D. N. Christodoulides, M. Khajavikhan "Single Mode Broad Area PT-Symmetric Microring Lasers", CLEO San Jose CA (2015)
41. R. El-Ganainy, M. Khajavikhan, D. N. Christodoulides, L. Ge "Supersymmetric Laser Arrays" CLEO, San Jose CA (2015)
42. H. Hodaei, W. E. Hayenga, M.-A. Miri, A. Ulhassan, D. N. Christodoulides, M. Khajavikhan "Tunable Parity-Time-Symmetric Microring Lasers" CLEO San Jose CA (2015)
43. A. Ulhassan, H. Hodaei, W. Hayenga, D. N. Christodoulides; M. Khajavikhan "Enhanced Sensitivity in Parity-Time-Symmetric Microcavity Sensors" Optical Sensors (SENSORS), Boston MA (2015)
44. H. Hodaei, M. A. Miri, M. Heinrich, D. Christodoulides, M. Khajavikhan, "PT-symmetric microring lasers", SPIE Photonics West, San Francisco CA (2015)



45. W. Hayenga, M. Khajavikhan, "Rate Equation Analysis of High-Speed Nanolasers", SPIE Photonics West, San Francisco CA (2015)
46. M.-A. Miri, N. Nye, M. Khajavikhan, D. N. Christodoulides, "PT-symmetric scatterers" SPIE Optics and Photonics, San Diego (2015) (Invited Paper)
47. A. Elhalawany, M. Khajavikhan, W. Hayenga, S. Alhasan, C. Lantigua "Enhanced ultraviolet upconversion emission using nanocavities", FiO Tucson AZ (2014)
48. H Hodaei, MA Miri, M Heinrich, DN Christodoulides, M. Khajavikhan "PT symmetry breaking and transverse mode filtering in microring lasers", FiO Laser Science, Tucson AZ (2014)
49. M.-A. Miri, H. Hodaei, M. Heinrich, M. Khajavikhan, D N Christodoulides, "PT-symmetric microring lasers", FiO Tucson AZ (2014)
50. D. N. Christodoulides, M.-A. Miri, H. Hodaei, M. Heinrich, M. Khajavikhan, "PT symmetry in optics", FiO Tucson AZ (2014) Invited
51. H. Hodaei, M. Miri, M. Heinrich, D. N. Christodoulides, and M. Khajavikhan, "PT symmetric large area single mode DFB lasers," CLEO San Jose CA (2014)
52. W.E. Hayenga, M. Akhlaghi-Bouzan, P.J. Delfyett, M. Khajavikhan "High finesse silicon ring resonators for monolithic mode-locked lasers" SPIE Optics and Photonics, San Diego CA (2014)
53. A. Elhalawani, W.E. Hayenga, S. He, C. Lantigua, N. J. J. Johnson, A. Almutairi, M. Khajavikhan, "Increased upconversion quantum yield in plasmonic structures" SPIE Optics and Photonics, San Diego CA (2014)
54. H Hodaei, MA Miri, M Heinrich, DN Christodoulides, M Khajavikhan "Single mode PT symmetric large area lasers", SPIE Optics and Photonics, San Diego CA (2014)
55. M. Khajavikhan, A. Simic, M. Katz, J.H. Lee, B. Slutsky, A. Mizrahi, V. Lomakin, Y. Eainman "Room-temperature and Continuous-wave Lasing with Nanoscale Coaxial Cavities", CLEO San Jose CA (2012)
56. M. Khajavikhan, M. Katz, A. Simic, J. H. Lee, B. Slutsky, A. Mizrahi, V. Lomakin, Y. Fainman, "Thresholdless Nanoscale Coaxial Lasers", IEEE Photonic Society Meeting IPC Post deadline session, Arlington VA (2011)
57. Y. Fainman, O. Bondarenko, A. Simic, A. Mizrahi, V. Lomakin, Q. Gu, J. Lee, M. Khajavikhan, B. Slutsky, M. Nezhad, "Active and Passive Composite Metal-Dielectric", Nanophotonic Devices", CLEO San Jose (2011)
58. J. H. Lee, A. Simic, M. Khajavikhan, O. Bondarenko, Q. Gu, B. Slutsky, M. P. Nezhad, and Y. Fainman, "Electrically Pumped Subwavelength Metallo-dielectric Laser with Low Threshold Gain," CLEO (2011)
59. M. P. Nezhad, A. Simic, O. Bondarenko, Q. Gu; J. H. Lee, M. Khajavikhan, B. Slutsky, Y. Fainman "Fabrication approaches for metallo-dielectric nanolasers," *Winter Topicals (WTM) IEEE* 2011
60. S. Zamek, D. T. Tan, M. Khajavikhan, M. P. Nezhad, and Y. Fainman, "Curved Waveguide Bragg Gratings on a Chip," in *Frontiers in Optics*, OSA Technical Digest (CD) (Optical Society of America, 2010)
61. J. Leger, M. Khajavikhan, C. Wan "Common Cavity Resonators for Passive Laser Beam Combining: Effects of Path Length Errors", SPIE Photonics West (Invited Presentation), San Francisco (2010)
62. M. Khajavikhan, J. Leger, "Experimental Demonstration of Reduced Path-length Sensitivity in Coherent Beam Combining Architectures," *Frontiers in Optics (FiO)*, San Jose (2009)
63. J. R. Leger, M. Khajavikhan, B. Tiffany, "Beam shaping in laser resonators and coherent laser arrays: An overview and current state of the art," SPIE Annual Meeting, San Diego, CA (August 2-6, 2009) (Invited)
64. M. Khajavikhan, J. Leger, "A Novel Common Cavity Approach for Coherent Beam Combining with Reducing Path-Length Sensitivity", FiO (2008)
65. M. Khajavikhan, J. Leger, "Conversion of Light from Sparse Laser Arrays into single-lobed Far-fields using phase structures", presentation, CLEO (2008)
66. J. Leger, Z. Yang, and M. Khajavikhan, "Spatial and temporal modal control of coupled lasers," High Power Laser Conference, Nizhny Novgorod, Russia (July 2006) (Invited Presentation)

### Patents

1. M. Khajavikhan, Y. Fainman, Nanoscale Coaxial Lasers, US Patent App. 13/975, 205 (2012)
2. M. Khajavikhan, D. Christodoulides, H. Hodaei, M. Soltani, Parity-time-symmetric ring laser gyroscope, U.S. Serial No. 62/415792 (2016)
3. Integrated Optical Circulator Apparatus, and Applications, US Serial No. 15/627,964 (2017)

### Book Chapter

1. M. Khajavikhan, J. R. Leger, "Modal theory of coupled resonators for external cavity beam combining," in *Coherent Laser Beam Combining*, A. Barrington, Ed. John Wiley & Sons, (2013)
2. M. Teimoripour, Q. Zhong, M. Khajavikhan, R. El-Ganainy, "Higher Order Exceptional Points in Discrete Photonics Platforms," In *Parity-time Symmetry and Its Applications*, D. Christodoulides, J. Yang, (Eds.) Springer (2018)

### Invited Talks, Keynotes, Tutorials, Plenaries

1. "Nanolaser Lattices for Emulating Spin Hamiltonians", Physics of Quantum Electronics (PQE), Snowbird, UT 2020 (Plenary)
2. "Parity-Time Symmetric Sensors", CLEO Pacific RIM, Sydney, Australia 2020 (Invited)
3. "Active Topological Photonics", Rank Prize Symposium, Lake District, England 2020 (Senior Speaker)
4. "Topological Photonics", 2020 MRS Spring Meeting in Phoenix, Phoenix, AZ 2020 (Invited)

5. "Thresholdless and Topological Lasers", Frontiers of Semiconductor Lasers DPG Spring Meeting, Dresden Germany 2020 (Tutorial)
6. "Non-Hermitian Photonics: Lasers and Sensors", SPIE Photonics West, San Francisco, CA 2020 (Invited)
7. "Supersymmetric and Topological Laser Arrays", SPIE Photonics West, San Francisco, CA 2020 (Invited)
8. "Exceptional Point based Gyroscopes", SPIE Photonics West, San Francisco, CA 2020 (Invited)
9. "Quantum inspired Photonic Devices", Lecture at the Quantum Optics Fall School, INAOE Mexico 2019, (Invited)
10. "Ring Laser Gyroscopes with Enhanced Sagnac Sensitivity", US/Middle East Conference on Photonics, New York, NY 2019 (Invited)
11. "Ring Laser Gyroscopes with Enhanced Sagnac Sensitivity", European Workshop on Fibre Sensors (EWOFS), Cyprus 2019 (Invited)
12. "Supersymmetric Laser Arrays", IEEE Photonic Conference, San Antonio, TX 2019 (Invited)
13. "Supersymmetric lasers", FiO, Washington, District of Columbia, 2019 (Invited)
14. "Supersymmetric and topological lasers", ITQW, Ojai Valley, CA 2019 (Invited)
15. "Supersymmetric Lasers", SPIE Optics and Photonics Conference, San Diego, CA 2019 (Invited)
16. "Topological Photonics", IEEE Summer Topicals, Fort Lauderdale 2019 (Tutorial)
17. "Non-Hermitian Lasers", CLEO Europe, Munich 2019 (Invited)
18. "Enhanced Sagnac Sensitivity at Exceptional Point", Piers, Rome Italy 2019 (Invited)
19. "Topological Phenomena in Active Photonic Platforms", CLEO, Science and Innovation, San Jose, CA 2019 (Invited)
20. "Supersymmetric Laser Arrays," SPIE Photonics West, San Francisco, CA, 2019 (Invited)
21. "Active Topological Photonics", SPIE Photonics West, San Francisco, CA, 2019 (Invited)
22. "Topological phenomena in active platforms", Nature Conference, Washington University of Saint Louis, Missouri 2018 (Invited)
23. "PT-symmetry photonics: lasers and sensors", FiO, Washington DC, 2018 (Invited)
24. "Topological phenomena in active platforms", SPIE Optics and Photonics, San Diego 2018 (Invited)
25. "Non-Hermitian Photonics", Non-Hermitian Workshop, Dresden, Germany, 2018 (Invited)
26. "Enhancing Sensitivity of Micro-resonators Using Exceptional Points", Advanced Photonics Congress, Zurich, Switzerland 2018 (Invited)
27. "Non-Hermitian Photonics: Optics at an Exceptional Point", Advanced Photonics Congress, Zurich, Switzerland 2018 (Invited)
28. "Non-Hermitian Photonics: Optics at an Exceptional Point", SPIE Photonics North, Montreal, Canada 2018 (Invited)
29. "Non-Hermitian Photonics: Optics at an Exceptional Point", Workshop on Topological Photonics, Odense, Denmark 2018 (Invited)
30. "Ultrasensitive micro-scale parity-time-symmetric ring laser gyroscope", SPIE Photonics West, San Francisco, CA 2018 (Invited)
31. "Generating beams with orbital angular momentum in nanoscale laser arrays", SPIE Photonics West, San Francisco, CA 2018 (Invited)
32. "Generating structured light using metallic nanolaser arrays", PQE, Snowbird, UT 2018 (Invited)
33. "Photonics molecules with enhanced sensitivity at higher order exceptional points", SPIE Nanophotonics Australasia, Melbourne, Australia 2017 (Invited)
34. "Advances in Microscale Parity-time-symmetric Lasers", FiO and Laser Science APS meeting Washington DC 2017 (Invited)
35. "Parity-time-symmetric photonics: optics at an exceptional point", The 24th Congress of the International Commission for Optics (ICO-24), Japan 2017 (Invited)
36. "Active parity-time symmetric systems", SPIE Optics and Photonics Conference, San Diego, CA 2017 (Invited)
37. "ONR Young Investigator Program (YIP) Panel Discussion", Naval Future Force Science and Technology, VA 2017 (Invited)
38. "Coherence properties of nanoscale lasers", The Siegman International School on Lasers, Leon, Mexico 2017 (Invited)
39. "Collective behaviors in arrays of coupled nanolasers", IEEE Summer Topicals, Puerto Rico 2017 (Invited)
40. "Novel photonic resonant arrangements using non-Hermitian exceptional points", INRS, Canada, January 2017 (Invited)
41. "Symmetries for lasers and sensing", ARO workshop on SUSY, Raleigh, North Carolina, 2016 (Invited)
42. "Lasing in PT-symmetric photonic molecules", 17th International Workshop on "Pseudo-Hermitian Hamiltonians in Quantum Physics, Germany 2017- (Invited)
43. "Parity-time symmetric lasers", OSA Incubator meeting, Washington DC, 2016 (Invited)
44. "Novel metallic sub-wavelength nanolasers", SPIE Photonics North, Canada, 2016 (Invited)
45. "Lasing characteristics in parity-time-symmetric microcavities", META'16, the 7th International Conference on Metamaterials, Photonic Crystals and Plasmonics in Malaga, Spain, 2016 (Invited)
46. "Parity-time symmetric lasers", SPIE Photonics West in San Francisco (CA), USA, 2016 (Invited)
47. "Thresholdless nanoscale lasers", AFRL, Dayton (OH), USA, 2015 (Invited)
48. "Non-Hermitian exceptional points for laser mode management", IEEE Photonics Conference (IPC) in Reston (VA), USA, 2015 (Invited)
49. "Parity-time symmetric lasers", IEEE Photonics Conference (IPC) in Reston (VA), USA, 2015 (Invited)
50. "Single-mode parity-time-symmetric micro-ring lasers", CLEO Pacific-Rim in Busan Korea 2015 (Invited)
51. "Coaxial nanolasers", IEEE Summer Topicals in Nassau, Bahamas, 2015 (Invited)
52. "PT symmetry in optics and nonlinear optics", CLEO Europe in Munich, Germany, 2015 (Invited)
53. "Thresholdless nanoscale lasers", TechConnect World in Santa Clara (CA), USA, 2012. (keynote speaker)

#### **Seminars (Universities, Research Labs):**

1. Colloquium at Department of Physics, Boston College, (Boston, USA): April 2019.
2. Seminar at Electrical Engineering Department, University of Texas at Austin, (Austin, USA): January 2019.

3. Colloquium at Applied Physics Department, Yale University, (New Haven, USA): October 2018.
4. Colloquium at Engineering Physics Department, Ecole Polytechnique of Montreal, (Montreal, Canada): September 2018.
5. Seminar at Electrical Engineering Department, Brown University, (Providence, USA): March 2019.
6. Seminar at Advanced Graduate Research Center, CUNY, (New York, USA): March 2019.
7. Colloquium at Physics Department, University of New Mexico, (Albuquerque, USA): March 2018.
8. Seminar at Department of Nonlinear Physics, Canberra University (Canberra, Australia): December 2017.
9. Seminar at Department of Electrical Engineering, Columbia University (New York City, USA): November 2017.
10. Seminar at Department of Electrical Engineering, University of California, San Diego (San Diego, USA): November 2017.
11. Seminar at Department of Electrical Engineering, University of California, Los Angeles (Los Angeles, USA): November 2017.
12. Seminar at Department of Electrical Engineering, University of Southern California, Los Angeles (Los Angeles, USA): November 2017.
13. CREOL Affiliate's Day (Orlando, USA): March 2016
14. Colloquium at Physics Department, University of New Mexico, (Albuquerque, USA): March 2015. OSA Seminar at Georgia Institute of Technology, (Atlanta, USA): March 2015.
15. Colloquium at Physics Department, Michigan Technological University, (Houghton, USA): September 2014.
16. Colloquium at Electrical Engineering Department, Pennsylvania State University, (State College, USA): April 2014.
17. IEEE Student Chapter Seminar at CREOL-UCF, (Orlando, USA): November 2012.
18. Seminar at NanoEngineering Department, University of California in San Diego, (San Diego, USA): June 2012.
19. Colloquium at Electrical Engineering Department, University of New Mexico, (Albuquerque, USA): February 2012.
20. Colloquium at Electrical Engineering Department, University of Southern California, (Los Angeles, USA): November 2011.
21. Seminar at Media Lab, MIT, (Boston, USA): September 2009.

#### **Doctoral Dissertations**

1. M. Parto, "Artificial magnetism and topological phenomena in optics," Ph.D. Dissertation Submitted to the CREOL, The College of Optics and Photonics, University of Central Florida, Orlando, 2019
2. W. Hayenga, "Fundamental Properties of Metallic Nanolasers," Ph.D. Dissertation Submitted to the CREOL, The College of Optics and Photonics, University of Central Florida, Orlando, 2018
3. H. Hodaiei, "Novel Photonic Resonance Arrangements Using Non-Hermitian Exceptional Points," Ph.D. Dissertation Submitted to the CREOL, The College of Optics and Photonics, University of Central Florida, Orlando, 2017

#### **Hossein Hodaiei was selected as the student of the year at CREOL (2017)**

4. M. Khajavikhan, "Coherent beam combining for high power laser applications," Ph.D. Dissertation Submitted to the Department of Electrical Engineering, University of Minnesota, 2009