Nader Behdad

Curriculum Vitae

(Updated August 11, 2018)

Department of Electrical and Computer Engineering
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RESEARCH INTERESTS AND PORTFOLIO

- **Applied Electromagnetics**: Electrically-small antennas, antenna arrays, phased-array antennas, and antennas for military communications and electronic warfare applications.
- **Microwave Medical Applications**: Microwave ablation, traveling-wave EPR imaging systems, microwave system design for EPR, and microwave imaging systems.
- **Millimeter-Wave and Infrared Devices**: Antenna-coupled infrared detectors, infrared frequency selective surfaces and filters, and mm-wave phased arrays.
- **Periodic Structures and Metamaterials**: Microwave lenses and reflectarrays, frequency selective surfaces, and radar absorbing materials.
- **High-Power Microwaves**: High-power microwave metamaterials, metamaterial-enhanced vacuum tube amplifiers, breakdown issues in periodic structures, and field emission cathodes.

EDUCATION

University of Michigan - Ann Arbor Ph.D. in Electrical Engineering 2006
Dissertation Title: High-Performance, Multi-Functional, and Miniaturized Integrated Antennas

University of Michigan - Ann Arbor M.S. in Electrical Engineering 2003

Sharif University of Technology B.S. in Electrical Engineering 2000

WORK EXPERIENCE

Professor 01/17-Present
Department of Electrical and Computer Engineering
University of Wisconsin, Madison

- **Harvey D. Spangler Faculty Scholar** 2016-2019
- **H. I. Romnes Faculty Fellow** 2016-2021

Associate Professor 08/13-01/17
Department of Electrical and Computer Engineering
University of Wisconsin, Madison

Assistant Professor 1/09-07/13
Department of Electrical and Computer Engineering
University of Wisconsin, Madison

- **ONR-ASEE Senior Summer Faculty Fellow** Summer 2009
  Naval Research Laboratory, Washington, DC
  Remote Sensing Division, Code 7211

Assistant Professor 08/06 - 12/08
Department of Electrical Engineering and Computer Science
University of Central Florida, Orlando, FL

Research Engineer 01/05-05/05
EMAG Technologies Inc., Ann Arbor, MI

Graduate Student Research Assistant 01/02-08/06
Center for Wireless Integrated Micro Systems (WIMS)
University of Michigan, Ann Arbor, MI

OUTSIDE ACTIVITIES AND CONSULTING

Wisconsin State Public Defenders Office July-August 2018
Consulted with the defense in a homicide case on analyzing historical cell site/cell phone records.

Aurora Flight Sciences, Manassas VA. 09/15-3/16
Consultant working on antenna design for satellite telemetry and tracking.

GKN Aerospace, Applied Composites AB, Linköping, Sweden 2013 and 2014
Paid speaker giving workshops on designing frequency selective surfaces and stealth radomes.

HONORS AND AWARDS

- **Fellow of the IEEE** 2017
  For contributions to subwavelength electromagnetic periodic structures
- **Rising Star Distinguished Alumni Award** 2016
  Department of Electrical Engineering and Computer Science
  University of Michigan, Ann Arbor
- **H. I. Romnes Faculty Fellowship** 2016-2021
  Office of the Vice Chancellor for Research and Graduate Education
  University of Wisconsin-Madison
- **Harvey D. Spangler Faculty Scholar Award** 2016-2019
  College of Engineering, University of Wisconsin-Madison
- **Vilas Associates Award** 2016-2018
  Office of the Vice Chancellor for Research and Graduate Education
  University of Wisconsin-Madison
- **General Co-Chair** 2016
  National Academies' 4th Arab-American Frontiers of Science, Engineering, and Medicine symposium, Abu Dhabi, U.A.E.
- **Member of Organizing Committee** 2015
  National Academies' 3rd Arab-American Frontiers of Science, Engineering, and Medicine symposium, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, December 5-7, 2015.
- **Invited Participant** 2014

National Academies' 2nd Arab-American Frontiers of Science, Engineering, and Medicine symposium, Muscat, Oman December 13-15, 2014.

- **R. W. P. King Prize Paper Award of the IEEE Antennas and Propagation Society** *for the paper* 2014
  M. Li and N. Behdad, "Wideband True-Time-Delay Microwave Lenses Based on Metallo-Dielectric and All-Dielectric Lowpass Frequency Selective Surfaces," *IEEE Transactions on Antennas and Propagation*, vol.61, no.8, pp.4109-4119, August 2013.
- **Piergiorgio L. E. Uslenghi Letters Prize Paper Award of the IEEE Antennas and Propagation Society** *for the paper* 2012
  N. Behdad, M. A. Al-Joumayly, and M. Li, "Biologically Inspired Electrically Small Antenna Arrays With Enhanced Directional Sensitivity," *IEEE Antennas and Wireless Propagation Letters*, Vol. 10, pp. 361-364, 2011.
- **Office of Naval Research (ONR) Young Investigator Award** 2011
- **National Science Foundation (NSF) CAREER Award** 2011
- **Air Force Office of Scientific Research (AFOSR) Young Investigator Award** 2011
- **ONR-ASEE Senior Summer Faculty Fellowship** 2009
  Naval Research Laboratory, Washington DC
- **Elected Member** 2009
  Commission B (Fields and Waves), United States National Committee of the International Union of Radio Science
- **International Union of Radio Science (URSI) Young Scientist Award** 2008

AWARDS WITH STUDENTS

- **Best Paper Award** *for the following paper* 2018
  Mojtaba Ahmadi Almasi, Hani Mehrpouyan, Vida Vakilian, Nader Behdad, Hamid Jafarkhani, "A New Reconfigurable Antenna MIMO Architecture for mmWave Communication", IEEE ICC 2018, 20-24 May 2018, Kansas City, MO.
- **Best Student Paper Award in the Student Paper Competition** *for the following paper* 2018
  Y. Mohtashami, N. Behdad, and S. C. Hagness, "A balun-free hybrid helix/monopole antenna for microwave ablation," USNC/URSI National Radio Science Meeting, Jan. 4-7, 2018, Boulder, CO, USA.
- **Harold Peterson Best Dissertation Award** 2017, 2013
  Awarded to the best Ph.D. dissertation completed within the previous year at the ECE department of UW-Madison
  Amin Momeni (2017)
  Meng Li (2014)
- **Third Place in the Student Paper Competition** *for the following paper* 2015

A. Momeni and N. Behdad, "Wideband polarization converters based on miniaturized-element frequency selective surfaces," CNC/USNC-URSI student paper competition, 2015 IEEE Int. Symposium on Antennas and Propagation and North American Radio Science Meeting, 19-24 July 2015, Vancouver, BC, Canada.

- **Finalist in the Student Paper Competitions of the IEEE International Symposium on Antennas and Propagation (AP-S/URSI)** (from among >150 submissions worldwide) — 2014, 2013, 2012, and 2010
    - Kasra Ghaemi (2014)
    - Hung Luyen (2014)
    - Meng Li (2013)
    - Chien-Hao Liu (2012)
    - Meng Li (2010)
- **Winner of the Student Paper Competition** *for the following paper* — 2013
  C. H. Liu and N. Behdad, "Metamaterials with Discrete Nonlinear Responses for High-Power Microwave Applications," *IEEE Pulsed Power & Plasma Science*, San Francisco, CA 16-21 June 2013.
- **Honorable Mention in the Student Paper Competition of the IEEE International Symposium on Antennas and Propagation (AP-S/URSI)** — 2018, 2016, 2014, 2013
    - Bahar Behzadnezhad (2018)
    - Amin Momeni (2016 and 2014)
    - Chien-Hao Liu (2014)
    - Hung Luyen (2013)
- **Second Place in the Student Paper Competition** *for the following paper* — 2011
  M. Li[#] and N. Behdad, "Fludically Tunable Phase Shifting Surfaces for High-Power Tunable Lens Applications," *2011 Antenna Applications Symposium,* Robert Allerton Park, Monticello IL, September 20-22, 2011.
- **Third Place in the Student Paper Competition** *for the following paper* — 2010
  M. Al-Joumayly, S. Aguilar, N. Behdad and S.C. Hagness, " Miniaturized Patch Antennas with Multiple Bands of Operation for Microwave Breast Imaging," *2010 Antenna Applications Symposium*, Sep. 21-23, 2010, Allerton Retreat Center, Monticello, IL.
- **Best Student Paper Award** *for the following paper* — 2008
  Rajesh Paryani, Parveen Wahid, and Nader Behdad "A Wideband, Dual-Polarized, Differentially Fed Cavity-Backed Slot Antenna," *Antenna Applications Symposium, Allerton Park, Monticello, IL*

RESEARCH

I. PUBLICATIONS, PATENTS, AND PRESENTATIONS

PUBLICATION SUMMARY

- 100+ Journal papers, 34 invited conference papers, and 150+ contributed conference papers.

- 48 invited talks and workshops in 10 different countries.
- Citation information for papers with more than 25 citations is provided.
- Total citations: 4,400, Hirsh Index: 33, i10 index: 71.
- The citation numbers reported are from Google Scholar. http://scholar.google.com/citations?user=eck4TFEAAAAJ&hl=en
- [#] indicates my advisees and students.

BOOK CHAPTER

1. T. Y. Shih[#] and N. Behdad "Applications of the Characteristic Mode Theory to Antenna Design," in Developments in Antenna Analysis and Synthesis, *Edited by Raj Mittra.* To be published by IET, London, UK.

JOURNAL PAPERS

J1. E. Mohammadi[#], B. Behzadnezhad[#], and N. Behdad, "An Angle-Sensing Infrared Detector Using a Two-Element Biomimetic Antenna Array," *IEEE Trans. Antennas Propag.*, 2018 (in press).

J2. T. Shih[#] and N. Behdad, "Wideband, Non-Foster Impedance Matching of Electrically-Small Transmitting Antennas," *IEEE Trans. Antennas Propag.*, 2018 (in press).

J3. K. Ghaemi[#], R. Ma[#], N. Behdad, " A Small-Aperture, Ultra-Wideband HF/VHF Direction Finding System For Unmanned Aerial Vehicles ", *IEEE Trans. Antennas Propag.*, 2018 (in press).

J4. M. Li[#], R. Ma[#], N. Behdad, "Low-Cost UWB Direction Finding System Using a Switched Beam Antenna", *IEEE Antennas and Propagation Magazine*, 2018 (in press).

J5. Y. Mohtashami[#], H. Luyen[#], J. F. Sawicki[#], J. D. Shea, N. Behdad, and S. C. Hagness, "Performance comparison of triaxial, choke dipole, and balun-free base-fed monopole antennas for microwave ablation," *IEEE Antennas Propag. Mag.*, 2018 (in press).

J6. M. R. Nikkhah[#], M. A. Panahi[#], H. Luyen[#], H. Bahrami, and N. Behdad, "Capacity-Enhancement in MIMO Systems Using Biomimetic Electrically-Small Antenna Arrays," *IET Microwaves, Antennas & Propagation,* Accepted for publication (2018).

J7. J. F. Sawicki[#], H. Luyen[#], Y. Mohtashami[#], J. D. Shea, N. Behdad, and S. C. Hagness, "The Performance of Higher-Frequency Microwave Ablation in the Presence of Perfusion," *IEEE Transactions on Biomedical Engineering,* Accepted for publication, 2018.

J8. N. Strachen[#], J. Booske, and N. Behdad, "A mechanically based magneto-inductive transmitter with electrically modulated reluctance," PLoS ONE, vol. 13, no. 6, pp. e0199934, 2018.

J9. T. Rowe[#], T.-Y. Shih[#], and N. Behdad, "Power handling capabilities of non-Foster impedance matching networks: Using gridded vacuum tubes and power transistors," *IEEE Antennas Propag. Mag.*, vol. 60, no. 4, pp. 60-69, Aug. 2018.

J10. Y. Mohtashami[#], H. Luyen[#], S. C. Hagness, and N. Behdad, "Non-coaxial-based microwave ablation antennas for creating symmetric and asymmetric coagulation zones," *Journal of Applied Physics,* vol. 123, pp. 214903, 2018.

J11. B. Behzadnezhad[#], B. D. Collick, N. Behdad, and A. McMillan, "Dielectric Properties of 3D-Printed Materials for Anatomy Specific 3D-Printed MRI coils," The Journal of Magnetic Resonance, vol. 289, pp. 113-121, April 1, 2018.

J12. M. Ranjbar Nikkhah[#], K. Ghaemi[#], and N. Behdad, "An Electronically Tunable Biomimetic Antenna Array," *IEEE Transactions on Antennas and Propagation,* vol. 66, no. 3, pp. 1248-1257, Mar. 2018.

J13. M. Li[#] and N. Behdad, "Dual-band platform-mounted HF/VHF antenna design using the characteristic mode theory," *IET Proceedings on Microwaves, Antennas and Propagation*, vol. 12, no. 4, pp. 452-458, 2018.

J14. J. Wu[#], M. Li[#], and N. Behdad, "A Wideband, Unidirectional Circularly Polarized Antenna for Full-Duplex Applications," *IEEE Transactions on Antennas and Propagation,* vol. 66, no. 3, pp. 1559-1563, Mar. 2018.

J15. R. Lian[#], T. Y. Shih[#], Y. Yin, and N. Behdad, "A High-Isolation, Ultra-Wideband Simultaneous Transmit and Receive Antenna With Monopole-Like Radiation Characteristics," *IEEE Transactions on Antennas and Propagation,* vol. 66, no. 2, pp. 1002-1007, Feb. 2018.

J16. E. Mohammadi[#] and N. Behdad, "A Wide Dynamic Range Polarization Sensing Long Wave Infrared Detector," *Scientific Reports,* vol. 7, p. 17475, 2017/12/12 2017.

J17. H. Luyen[#], S. C. Hagness, and N. Behdad, "A Minimally-invasive coax-fed microwave ablation antenna with a tapered balun," *IEEE Trans. Antennas Propag.*, vol. 65, no. 12, pp. 7280-7287, Dec. 2017.

J18. B. Sima[#], S. M. A. Momeni Hasan Abadi[#], and N. Behdad, "A reflective-type, quasi-optical metasurface filter," *Journal of Applied Physics,* vol. 122, 064901, 2017.

J19. M. Ranjbar Nikkhah[#], K. Ghaemi[#], and N. Behdad, "A three-element biomimetic antenna array with an electrically-small triangular lattice," *IEEE Trans. Antennas Propag.*, vol. 65, no. 8, pp. 4007-4016, Aug. 2017.

J20. Y. Mohtashami[#], S. Hagness, and N. Behdad, "A hybrid slot/monopole antenna with directional heating patterns for microwave ablation," *IEEE Trans. Antennas Propag.*, vol. 65, no. 8, pp. 3889-3896, Aug. 2017.

J21. T. Rowe[#], P. Forbes[#], J. H. Booske and N. Behdad, "Inductive meandered metal line metamaterial for rectangular waveguide linings," *IEEE Trans. Plasma Sci.*, vol. 45, no. 4, pp. 654-664, Apr. 2017.

J22. R. O. Mays[#], N. Behdad, S. C. Hagness, "Array sensitivity for model-based microwave breast imaging," *IEEE Trans. Antennas Propag.*, vol. 65, no. 6, pp. 2958-2965, Jun. 2017.

J23. H. Luyen[#], S. C. Hagness, and N. Behdad, "Reduced-diameter designs of coax-fed microwave ablation antennas equipped with baluns," *IEEE Antennas Wireless Propag. Lett.,* vol. 16, pp. 1385-1388, 2017.

J24. M. Li[#] and N. Behdad, "A compact, capacitively-fed UWB antenna with monopole-like radiation characteristics," *IEEE Trans. Antennas and Propag.*, vol. 65, no 3, pp. 1026-1037, Mar. 2017.

J25. M. Gao[#], S. M. A. Momeni Hasan Abadi[#], and N. Behdad, "A hybrid miniaturized-element frequency selective surface with a third-order bandpass response," *IEEE Antennas Wireless Propag. Lett.*, vol. 16, pp. 708-811, 2017.

J26. **(invited paper)** J. F. Sawicki[#], J. D. Shea, N. Behdad, and S. C. Hagness, "The impact of frequency on the performance of microwave ablation," *International Journal of Hyperthermia*, vol. 33, no. 1, pp. 61-68, Feb. 2017.

J27. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "Broadband true-time-delay circularly-polarized reflectarray with linearly-polarized feed," *IEEE Trans. Antennas Propag.,* vol. 64, no. 11, pp. 4891-4896, Nov. 2016.

J28. R. T. Rowe[#], N. Behdad, and J. H. Booske, "Metamaterial-enhanced resistive wall amplifier design using periodically spaced meandered lines," *IEEE Trans. Plasma Sci.,* vol. 44, no. 10, pp. 2476-2484, Oct. 2016

J29. S. M. A. Momeni Hasan Abadi[#], John H. Booske, and N. Behdad, "Macro-electro-mechanical systems (MÆMS) based concept for microwave beam steering in reflectarray antennas," *Journal of Applied Physics*, vol. 120, 054901, pp. 1 – 8, 2016.

J30. T.-Y. Shih[#] and N. Behdad, "Bandwidth enhancement of platform-mounted HF antennas using the characteristic mode theory," *IEEE Trans. Antennas Propag.,* vol. 64, no. 7, pp. 2648-2659, Jul. 2016. (**Citation #: 19)**

J31. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "A broadband, circular-polarization selective surface," *Journal of Applied Physics,* vol. 119, 244901, pp. 1-8, 2016.

J32. M. Gao[#], S. M. A. Momeni Hasan Abadi[#], and N. Behdad, "A dual-band, inductively-coupled miniaturized-element frequency selective surface with higher-order bandpass response," *IEEE Trans. Antennas Propag.*, vol. 64, no. 8, pp. 3729-3734, Aug. 2016.

J33. Y. Qiu, Y. H. Jung, S. Lee, Juhwan Lee, T.-Y. Shih[#], Y. Xu, R. Xu, W. Lin, J. C. Williams, N. Behdad, and Z Ma, "Flexible capacitively loaded antenna with parylene conformal coating," *Microwave Journal*, vol. 59, no. 4, pp. 134-142, Apr. 2016.

J34. H. Mi, C.-H. Liu[#], T.-H. Chang, J.-H. Seo, H. Zhang, S. J. Cho, N. Behdad, Z. Ma, C. Y. Yao, Z. Cai, and S. Gong, "Characterizations of biodegradable epoxy-coated cellulose nanofibrils (CNF) thin film for flexible microwave applications," *Cellulose,* vol. 23, pp. 1989-1995, Mar. 2016.

J35. S. M. A. Momeni Hasan Abadi[#], J. H. Booske, and N. Behdad, "Exploiting mechanical flexure as a means of tuning the responses of large-scale periodic structures," *IEEE Trans. Antennas and Propag.*, vol. 64, no. 3, pp. 933-943, Mar. 2016. **(Citation #: 11)**

J36. Y.H. Jung, Y. Qiu, S. Lee, T.-Y. Shih[#], Y. Xu, R. Xu, J. Lee, A. A. Schendel, W. Lin, J. C. Williams, N. Behdad, and Z. Ma, "A compact parylene coated WLAN flexible antenna for implantable electronics," *IEEE Antennas Wireless Propag. Lett.,* vol. 15, pp. 1382-1385, 2016.

J37. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "Wideband linear-to-circular polarization converters based on miniaturized element frequency selective surfaces," *IEEE Trans. Antennas Propag.*, vol. 64, no. 2, pp. 525-534, Feb. 2016. **(Citation #: 36)**

J38. K. Ghaemi[#] and N. Behdad, "A low-profile, wideband antenna with vertically-polarized directional radiation," *IEEE Antennas Wireless Propag. Lett.*, vol. 15, pp. 1093-1096, 2016.

J39. T. Bhattacharjee[#], H. Jiang, and N. Behdad, "A fluidically-tunable, dual-band patch antenna with closely-spaced bands of operation," *IEEE Antennas Wireless Propag. Lett.,* vol. 15, pp. 118-121, 2016.

J40. C.-H. Liu[#], P. Carrigan, B. Kupczyk, X. Xiang, N. Behdad, J. Sharer, and J. H. Booske, "Metamaterials for rapidly forming large-area distributed plasma discharges for high-power

microwave applications," *IEEE Trans. Plasma Sci.,* vol. 43, no. 12, pp. 4099-4109, Dec. 2015.

J41. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "Inductively-coupled miniaturized-element frequency selective surfaces with narrowband, high-order bandpass responses," *IEEE Trans. Antennas Propag.*, vol. 63, no. 11, pp. 4766-4774, Nov. 2015. **(Citation #: 15)**

J42. T. Bhattacharjee[#], H. Jiang, and N. Behdad, "Fluidic beam steering in parasitically-coupled patch antenna arrays," *Electronic Lett.*, vol. 51, no. 16, pp. 1229-1231, 6 Aug. 2015.

J43. K. Ghaemi[#] and N. Behdad, "A low-profile, vertically-polarized ultra-wideband antenna with monopole-like radiation characteristics," *IEEE Trans. Antennas Propag.,* vol. 63, no. 8, pp. 3699-3705, Aug. 2015. **(Citation #: 16)**

J44. T. Rowe[#], J. H. Booske, and N. Behdad, "Metamaterial-enhanced resistive wall amplifiers: Theory and particle-in-cell simulations," *IEEE Trans. Plasma Sci.,* vol. 43, no.7, pp.2123-2131, Jul. 2015.

J45. T.-Y. Shih[#] and N. Behdad, "A compact, broadband spiral antenna with uni-directional circularly-polarized radiation patterns," *IEEE Trans. Antennas Propag.*, vol. 63, no. 6, pp. 2776-2781, Jun. 2015. **(Citation #: 10)**

J46. H. Luyen[#], S. C. Hagness, and N. Behdad, "A balun-free helical antenna for minimally invasive microwave ablation," *IEEE Trans. Antennas Propag.*, vol. 63, no. 3, pp. 959-965, Mar. 2015. **(Citation #: 16)**

J47. A. Masoumi[#], K. Ghaemi[#], and N. Behdad, "A two-element biomimetic antenna array with enhanced angular resolution and optimized power extraction," *IEEE Trans. Antennas Propag.*, vol. 63, no. 3, pp. 1059-1066, Mar. 2015.

J48. S. M. A. Momeni Hasan Abadi[#], K. Ghaemi[#], and N. Behdad, "Ultra-wideband, true-time-delay reflectarray antennas using ground-plane-backed, miniaturized-element frequency selective surfaces," *IEEE Trans. Antennas Propag.*, vol. 63, no. 2, pp. 534-542, Feb. 2015. **(Citation #: 36)**

J49. R. O. Mays[#], N. Behdad, and S. C. Hagness, "A TSVD analysis of the impact of polarization on microwave breast imaging using an enclosed array of miniaturized patch antennas," *IEEE Antennas Wireless Propag. Lett.*, vol. 14, pp. 418-421, 2015. **(Citation #: 12)**

J50. T. Bhattacharjee[#], H. Jiang, and N. Behdad, "Large-scale fluidic tuning of sub-wavelength periodic structures," *IEEE Antennas Wireless Propag. Lett.*, vol. 14, pp. 190-193, 2015.

J51. T. Bhattacharjee[#], H. Jiang, and N. Behdad, "A fluidic colorimetric sensor design for water hardness detection," *IEEE Sensors Journal*, vol. 15, no. 2, pp. 819-826, Feb. 2015.

J52. (Invited Paper) N. Behdad, "A review of recent advances in designing true-time-delay microwave lenses exploiting metamaterials with non-resonant constituting unit cells," *Applied Computational Electromagnetics Society Journal*, vol. 29, no. 12, pp. 934-943, Dec. 2014.

J53. Y. J. Qiu, Y. H. Jung, S. Lee, T. Y. Shih, J. Lee, Y. H. Xu, R. M. Xu, W. G. Lin, N. Behdad, and Z. Q. Ma, "Compact parylene coated flexible antenna for WLAN and upper-band UWB applications," *Electronics Lett.*, vol. 50, no. 24, pp. 1782-1784, 20 Nov. 2014. (**Citation #: 17**)

J54. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "Design of wideband, FSS-based multi-beam antennas using the effective medium approach," *IEEE Trans. Antennas Propag.*, vol. 62, no. 11, pp. 5557-5564, Nov. 2014. **(Citation #: 27)**

J55. C.-H. Liu[#], J. Neher[#], J. H. Booske, and N. Behdad, "Investigating the effective range of VUV-mediated breakdown in high-power microwave metamaterials," *Journal of Applied Physics*, vol. 116, no. 14, pp. 143302-143302-7, 2014.

J56. H. Luyen[#], F. Gao, S. C. Hagness, and N. Behdad, "Microwave ablation at 10.0 GHz achieves comparable ablation zones to 1.9 GHz in ex vivo bovine liver," *IEEE Trans. Biomed. Eng.*, vol. 61, no. 6, pp. 1702-1710, Jun. 2014. **(Citation #: 36)**

J57. C.-H. Liu[#], J. Neher[#], J. H. Booske, and N. Behdad, "Investigating the physics of simultaneous breakdown events in high-power-microwave (HPM) metamaterials with multiresonant unit cells and discrete nonlinear responses," *IEEE Trans. Plasma Sci.*, vol. 42, no. 5, part 1, pp. 1255-1264, May 2014.

J58. S. M. A. Momeni Hasan Abadi and N. Behdad, "An electrically small, vertically polarized ultrawideband antenna with monopole-like radiation characteristics," *IEEE Antennas Wireless Propag. Lett.*, vol. 13, pp. 742-745, 2014. **(Citation #: 16)**

J59. S. M. A. Momeni Hasan Abadi[#], M. Li[#], and N. Behdad, "Harmonic-suppressed miniaturized-element frequency selective surfaces with higher-order bandpass responses," *IEEE Trans. Antennas Propag.*, vol. 62, no. 5, pp. 2562-2571, May 2014. **(Citation #: 32)**

J60. S. M. Aguilar[#], M. A. Al-Joumayly[#], M. Burfeindt, N. Behdad, and S. Hagness, "Multi-band miniaturized patch antennas for a compact, shielded microwave breast imaging array," *IEEE Trans. Antennas and Propag.*, vol. 62, no. 3, pp. 1221-1231, Mar. 2014. **(Citation #: 36)**

J61. A. R. Masoumi[#] and N. Behdad, "Architecture, design, and nonlinear optimization of three-element biomimetic antenna arrays," *IEEE Antennas Wireless Propag. Lett.*, vol. 12, pp. 1416-1419, 2013.

J62. A. R. Masoumi[#] and N. Behdad, "An improved architecture for two-element biomimetic antenna arrays," *IEEE Trans. Antennas Propag.*, vol. 61, no. 12, pp. 6224-6228, Dec. 2013. **(Citation #: 17)**

J63. C.-H. Liu[#] and N. Behdad, "Investigating the impact of microwave breakdown on the responses of high-power microwave metamaterials," *IEEE Trans. Plasma Sci.*, vol. 41, no. 10, part 2, pp. 2992-3000, Oct. 2013. **(Citation #: 12)**

J64. M. Li[#] and N. Behdad, "Wideband true-time-delay microwave lenses based on metallo-dielectric and all-dielectric lowpass frequency selective surfaces," *IEEE Trans. Antennas Propag.*, vol. 61, no.8, pp. 4109-4119, Aug. 2013.
2014 Winner of the R. W. P. King Prize Paper Award of the IEEE Antennas and Propagation Society. (Citation #: 52)

J65. M. Li[#], Y. Yusuf[#], and N. Behdad, "Compact, low-profile, ultra-wideband antenna utilizing dual-mode coupled radiators," *Progress in Electromagnetic Research B,* vol. 50, pp. 235-251, 2013.

J66. N. Behdad, M. Li[#], and Y. Yusuf[#], "A very low profile, omni-directional, ultra-wideband antenna," *IEEE Antennas Wireless Propag. Lett.,* vol. 12, pp. 280-283, 2013. **(Citation #: 29)**

J67. A. Masoumi[#], Y. Yusuf[#], and N. Behdad, "Biomimetic antenna arrays based on the directional hearing mechanism of the parasitoid fly *Ormia Ochracea," IEEE Trans. Antennas Propag.,* vol. 61, no. 5, pp. 2500-2510, May 2013. **(Citation #: 14)**

J68. J. Brady[#], N. Behdad, and A. Sayeed, "Beamspace MIMO for millimeter wave communications: system architecture, modeling, analysis, and measurements," *IEEE Trans. Antennas Propag.*, vol. 61, no. 7, pp. 3814-3827, Jul. 2013. **(Citation #: 245)**

J69. C.-H. Liu[#] and N. Behdad, "High-power microwave filters and frequency selective surfaces exploiting electromagnetic wave tunneling through epsilon-negative layers," *Journal of Applied Physics,* vol. 113, no. 6, pp. 064909-064909-9 2013. (9 Pages) **(Citation #: 21)**

J70. T. A. Carstens, M. Corradini, J. P. Blanchard, C.-H. Liu[#], M. Li[#], N. Behdad, and Z. Ma, "Thermoelectric powered wireless sensors for dry cask storage," *IEEE Trans. Nucl. Sci.*, vol. 60, no.2 part 1, pp.1072-1079, Apr. 2013.

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C33. J. F. Sawicki[#], J. D. Shea, N. Behdad, and S. C. Hagness, "Investigation of High-Frequency Microwave Ablation in the Presence of Perfusion," *2016 IEEE Int. Symp. Antennas and Propagation and USNC/URSI Radio Sci. Meeting,* June 26-July 1, 2016, Fajardo, Puerto Rico.

C34. M. Li[#] and N. Behdad, "A Compact, Omnidirectional, Capacitively-Fed Antenna for Ultrawideband Applications," *2016 IEEE Int. Symp. Antennas and Propagation and USNC/URSI Radio Sci. Meeting,* June 26-July 1, 2016, Fajardo, Puerto Rico

C35. T. Rowe[#], T.-Y. Shih[#], and N. Behdad, "Power and Bandwidth Limitations of Non-Foster Electrically-Small Antennas for Ultra-Wideband Transmit Application," *2016 IEEE Int. Symp. Antennas and Propagation and USNC/URSI Radio Sci. Meeting,* June 26-July 1, 2016, Fajardo, Puerto Rico.

C36. H. Luyen[#], S. C. Hagness, and N. Behdad, "A minimally invasive, coax-fed microwave ablation antenna with a tapered-slot balun," *2016 IEEE Int. Symp. Antennas and Propagation and USNC/URSI Radio Sci. Meeting,* June 26-July 1, 2016, Fajardo, Puerto Rico.

C37. T.-Y. Shih[#], T. Rowe[#], and N. Behdad, "Efficiency Enhancement of Ultra-Wideband, Non-Foster Matched Electrically-Small HF Antennas," *2016 IEEE Int. Symp. Antennas and Propagation and USNC/URSI Radio Sci. Meeting,* June 26-July 1, 2016, Fajardo, Puerto Rico.

C38. Y. Mohtashami[#], S. C. Hagness, N. Behdad, "A Minimally-Invasive Integrated Slot/Monopole Antenna for Generating Anisotropic Microwave Ablation Zones," *2016 IEEE Int. Symp. Antennas and Propagation and USNC/URSI Radio Sci. Meeting,* June 26-July 1, 2016, Fajardo, Puerto Rico.

C39. M. Gao[#], A. Momeni[#], and N. Behdad, "Dual-Band Miniaturized-Element Frequency Selective Surface With Independently Controllable Transmission Frequencies," *2016 IEEE Int. Symp. Antennas and Propagation and USNC/URSI Radio Sci. Meeting,* June 26-July 1, 2016, Fajardo, Puerto Rico.

C40. E. Mohammadi[#], B. Behzadnezhad[#], and N. Behdad, "Design, Fabrication, and Characterization of an Angle-Sensing Long-Wave Infrared Detector," *2016 IEEE Int. Symp. Antennas and Propagation and USNC/URSI Radio Sci. Meeting,* June 26-July 1, 2016, Fajardo, Puerto Rico.

C41. A. Momeni[#] and N. Behdad, "True-Time-Delay UWB Reflectarray with Linear to Circular Polarization Transformation," *2016 IEEE Int. Symp. Antennas and Propagation and USNC/URSI Radio Sci. Meeting,* June 26-July 1, 2016, Fajardo, Puerto Rico **(received honorable mention in the student paper competition).**

C42. A. Momeni[#] and N. Behdad, "Random Frequency Selective Surfaces With Harmonic Suppressed Frequency Responses," *2016 IEEE Int. Symp. Antennas and Propagation and USNC/URSI Radio Sci. Meeting,* June 26-July 1, 2016, Fajardo, Puerto Rico.

C43. T. Rowe[#], N. Behdad, and J. H. Booske, "Theory and Simulation of a Reletivistic High-Power Microwave Metamaterial-Enhanced Resistive Wall Amplifier" *International Conference on Plasma Science*, June 19-23, 2016, Banff, AB, Canada.

C44. T. Rowe[#], T.-Y. Shih[#], J. H. Booske, and N. Behdad, "Gridded Vacuum Tube Use in Transmitting Wideband Non-Foster Electrically Small Antennas," *2016 IEEE International Vacuum Electronics Conference,* Monterey, CA, April 19-21, 2016.

C45. T. Rowe[#], N. Behdad, and J. H. Booske, "Metamaterial Design for a Metamaterial-Enhanced Resistive Wall Amplifier," *2016 IEEE International Vacuum Electronics Conference,* Monterey, CA, April 19-21, 2016.

C46. T. Rowe, T.-Y. Shih, and N. Behdad, "Transmitting Power Handling Limitations of a Wideband, Non-Foster Electrically-Small Antenna," *2016 IEEE International Conference on Wireless Information Technology and Systems (ICWITS) and Applied Computational Electromagnetics (ACES),* Honolulu, HI, March 13-17, 2016.

C47. S. M. A. Momeni Hasan Abadi[#], J. H. Booske, and N. Behdad, "MAcro Electro Mechanical Systems (MAEMS) Based Beam Steering in Reflectarray Antennas," USNC/URSI National Radio Science Meeting, Jan. 6-9, 2016, Boulder CO.

C48. T.-Y. Shih[#], J. H. Booske, and N. Behdad, "Bandwidth enhancement of platform-mounted HF antennas using the theory of characteristic modes," USNC/URSI National Radio Science Meeting, Jan. 6-9, 2016, Boulder CO.

C49. T.-Y. Shih[#] and N. Behdad, "Bandwidth Enhancement of HF Antennas Mounted on Military Platforms Using a Characteristic-Modes-Based Design Approach*," International Symposium on Antennas and Propagation (ISAP2015)*, 9-12 Nov. 2015, Hobart, Tasmania, Australia.

C50. T.-Y. Shih[#] and N. Behdad, "Bandwidth Enhancement of Expeditionary-Fighting-Vehicle-Mounted Antennas Using the Characteristic Mode Theory,*" Antenna Applications Symposium*, Robert Allerton Park, Monticello IL, Sep. 22-24 2015.

C51. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "Wideband Polarization Converters Based on Miniaturized-Element Frequency Selective Surfaces*," 2015 IEEE Int. Symp. Antennas and Propagation and North American Radio Sci. Meeting,* 19-25 July 2015, Vancouver, BC, Canada.

C52. S. M. A. Momeni Hasan Abadi[#], J. H. Booske, and N. Behdad, "Exploiting Mechanical Flexure to Design Tunable Periodic Structures*," 2015 IEEE Int. Symp. Antennas and Propagation and North American Radio Sci. Meeting,* 19-25 July 2015, Vancouver, BC, Canada.

C53. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "Miniaturized-Element Frequency Selective Surfaces with Narrowband, Higher-Order Bandpass Responses*," 2015 IEEE Int. Symp. Antennas and Propagation and North American Radio Sci. Meeting,* 19-25 July 2015, Vancouver, BC, Canada.

C54. C. H. Liu[#], K. Ghaemi[#], and N. Behdad, "A Small-Aperture, VHF Direction Finding System Exploiting Biomimetic Antenna Arrays*," 2015 IEEE Int. Symp. Antennas and Propagation and North American Radio Sci. Meeting,* 19-25 July 2015, Vancouver, BC, Canada.

C55. T. Y. Shih[#] and N. Behdad, "Bandwidth Enhancement of Platform-Mounted HF Antennas Using the Characteristic Modes Theory*," 2015 IEEE Int. Symp. Antennas and Propagation and North American Radio Sci. Meeting,* 19-25 July 2015, Vancouver, BC, Canada.

C56. K. Ghaemi[#] and N. Behdad, "A low-profile, wideband, vertically-polarized antenna with directional radiation patterns in the azimuth plane," *2015 IEEE Int. Symp. Antennas and Propagation and North American Radio Sci. Meeting,* 19-25 July 2015, Vancouver, BC, Canada.

C57. H. Luyen[#], S. C. Hagness, and N. Behdad, "Non-Coaxial-Based Balanced Antenna for Microwave Ablation," *2015 IEEE Int. Symp. Antennas and Propagation and North American Radio Sci. Meeting,* 19-25 July 2015, Vancouver, BC, Canada.

C58. Y. Mohtashami[#], S. C. Hagness, and N. Behdad, "Interstitial Antennas for Generating Asymmetric Heating Patterns in Microwave Ablation," *2015 IEEE Int. Symp. Antennas and Propagation and North American Radio Sci. Meeting,* 19-25 July 2015, Vancouver, BC, Canada.

C59. J. F. Sawicki[#], J. D. Shea, N. Behdad, and S. C. Hagness, "Investigation of High-Frequency Microwave Ablation using Floating-Sleeve Dipole Antennas," *2015 IEEE Int. Symp. Antennas and Propagation and North American Radio Sci. Meeting,* 19-25 July 2015, Vancouver, BC, Canada.

C60. R. O. Mays[#], N. Behdad, and S. C. Hagness, "Model-Based Inverse Scattering for Microwave Breast Imaging: An Analysis of Tissue Feature Sensitivity versus Model Error Sensitivity," *2015 IEEE Int. Symp. Antennas and Propagation and North American Radio Sci. Meeting,* 19-25 July 2015, Vancouver, BC, Canada.

C61. R. T. Rowe[#], N. Behdad, and J. H. Booske, "Metamaterial-Enhanced Resistive Wall Amplifiers," *16th International Vacuum Electronics Confernce (IVEC 2015)*, April 27-29, 2015, Beijing, China.

C62. K. Ghaemi[#] and N. Behdad, "A Low-Profile, Wideband, Vertically-Polarized Antenna with Directional Radiation Patterns in the Azimuth Plane," 19th International Conference on Antennas and Propagation, December 2-5 2014, Kaohsiung, Taiwan.

C63. A. R. Masoumi[#] and N. Behdad, "Non-Foster Techniques for Designing Broadband Electrically-Small Antennas and Biomimetic Antenna Array," *2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, July 6-12, 2014, Memphis, TN.

C64. T.-Y. Shih[#] and N. Behdad, "Miniaturization of A Circularly-Polarized, Uni-Directional, Ultra-Wideband Spiral Antenna," *2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, July 6-12, 2014, Memphis, TN.

C65. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "Wideband Multi-Beam Antenna Apertures Using Metamaterial-Based Superstrates," *2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, July 6-12, 2014, Memphis, TN. **Received honorable mention in the student paper competition of the conference.**

C66. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "Ultra-Wideband, True-Time-Delay, Metamaterial-Based Reflectarray Antenna," *2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, July 6-12, 2014, Memphis, TN.

C67. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "A Harmonic-Suppressed Miniaturized-Element Frequency Selective Surface With a Second-Order Bandpass Response," *2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, July 6-12, 2014, Memphis, TN.

C68. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "A Miniaturized, Low-Profile, Omni-Directional Ultra-Wideband Antenna," *2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, July 6-12, 2014, Memphis, TN.

C69. A. Rashidi[#] and N. Behdad, "Metamaterial-Enhanced Slow-Wave Structures for Traveling Wave Tube Applications," *2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, July 6-12, 2014, Memphis, TN.

C70. C.-H. Liu[#] and N. Behdad, "Investigating Failure Mechanisms in High-Power Microwave Frequency Selective Surfaces," *Submitted to the 2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, July 6-12, 2014, Memphis, TN.
Received honorable mention in the student paper competition of the conference.

C71. K. Ghaemi[#] and N. Behdad, "A Low-Profile, Vertically-Polarized, Compact, Ultra-Wideband Antenna with a 10:1 Bandwidth," *2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, July 6-12, 2014, Memphis, TN.
Finalist in the student paper competition. One of the 15 finalists selected from among ~150 submissions worldwide.

C72. H. Luyen[#], S. C. Hagness, and N. Behdad, "A Balun-Free Coax-Fed Helical Antenna for Minimally-Invasive Microwave Ablation," *2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, July 6-12, 2014, Memphis, TN.
Finalist in the student paper competition. One of the 15 finalists selected from among ~150 submissions worldwide.

C73. A. Rashidi[#] and N. Behdad, "Metamaterial-Enhanced Traveling Wave Tubes," *15th IEEE International Vacuum Electronics Conference,* April 22-24, 2014, Monterey, CA.

C74. C.-H. Liu[#], J. Neher[#], J. H. Booske, and N. Behdad, "Investigating the Physics of Simultaneous Breakdown Events in Metamaterials with Multi-Resonant Unit Cells," *15th IEEE International Vacuum Electronics Conference,* April 22-24, 2014, Monterey, CA.

C75. T.-Y. Shih[#] and N. Behdad, "A Miniaturized, Ultra-Wideband, Circularly Polarized Spiral Antenna," *International Workshop on Antenna Technology (iWAT 2014)*, March 4-6, 2014, Sydney, Australia.

C76. C.-H. Liu[#], J. Neher[#], J. H. Booske, and N. Behdad, "Investigating the Physics of Microwave Induced Breakdown in Metamaterials with Multi-Resonant Constituting Unit Cells," *55th Annual Meeting of the APS Division of Plasma Physics,* Vol. 58, no. 16, November 11-15 2013, Denver, CO.

C77. J. H. Booske, B. Kupczyk, A. Garcia, C.-H. Liu[#], X. Xiang, N. Behdad, and J. Scharer, "Reduced breakdown delay in high power microwave dielectric window discharges via penning-like mixtures and patterened metallization," *55th Annual Meeting of the APS Division of Plasma Physics,* Vol. 58, no. 16, November 11-15 2013, Denver, CO.

C78. T. Bhattacharjee[#], H. Jiang, and N. Behdad, "Sensor design for water hardness detection," *IEEE Sensors 2013*, pp. 1-4, November 4-6 2013, Baltimore, MD.

C79. B. Kupczyk, C. H. Liu[#], X. Xiang, N. Behdad, J. Scharer, and J. H. Booske, "Reduced Breakdown Delay in High Power Microwave Dielectric Window Discharges," *IEEE Pulsed Power & Plasma Science*, San Francisco, CA 16-21 June 2013.

C80. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "Harmonic-Suppressed Miniaturized-Element Frequency Selective Surfaces for Low-Observable Antenna Applications," *2013 AP-S/URSI Symposium*, Orlando, FL.

C81. N. Behdad, "An Extremely Low-Profile Ultra-Wideband Antenna with Monopole-Like Radiation Characteristics," *2013 AP-S/URSI Symposium*, Orlando, FL.

C82. S. M. A. Momeni Hasan Abadi[#] and N. Behdad, "Multi-Beam Antennas Using Planar Lenses Fed With Focal Plane Arrays," *2013 AP-S/URSI Symposium*, Orlando, FL.

C83. H. Luyen[#], S. Hagness, and N. Behdad, "Tissue Ablation at 10 GHz vs. 1.9 GHz: Ex Vivo Experiments Demonstrate Comparable Ablation Zones," *2013 AP-S/URSI Symposium*, Orlando, FL.
Received honorable mention in the student paper competition of the conference.

C84. R. O. Mayes[#], S. C. Hagness, and N. Behdad, "A TSVD Analysis of an Enclosed Array of Multi-Band Patch Antennas for Microwave Breast Imaging," *2013 AP-S/URSI Symposium*, Orlando, FL.

C85. M. Li[#] and N. Behdad, "All-Dielectric, True-Time-Delay, Planar Microwave Lenses," *2013 AP-S/URSI Symposium*, Orlando, FL.
Finalist in the student paper competition. One of the 15 finalists selected from among ~150 submissions worldwide.

C86. A. Masoumi[#], K. Ghaemi[#], and N. Behdad, "Coupled antenna arrays with enhanced angular resolutions," *2013 AP-S/URSI Symposium*, Orlando, FL.

C87. C.-H. Liu[#] and N. Behdad, "Plasma tunable metamaterials and periodic structures," *2013 International Vacuum Electronics Conference (IVEC 2013)*, pp. 1-2, DOI: 10.1109/IVEC.2013.6571008

C88. Y. Yusuf[#] and N. Behdad, "Dual-mode, compact, low-profile ultra-wideband antennas," *Proceedings of the 2012 IEEE International Conference on Wireless Information Technology and Systems,* 11-16 November 2012, Maui, HI, pp. 1-4, DOI: 10.1109/ICWITS.2012.6417710

C89. P. M. Senadeera, J. Griggs, M. Li[#], N. Behdad, H. Savci, Z. Xie, and N. S. Dogan, "X-Band Energy Harvester with miniaturized on-chip Slot Antenna Implemented in 0.18- μm RF CMOS," 2012 IEEE International Conference on Ultra-Wideband, Syracuse, NY, 17-20 September 2012, pp. 448-452. DOI: 10.1109/ICUWB.2012.6340475

C90. Chien-Hao Liu[#] and N. Behdad, "Analysis of Electromagnetic Wave Tunneling Through Stacked Single-Negative Metamaterial Slabs: a Microwave Filter Theory Approach," *2012 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, July 8-14, 2012, Chicago, IL, pp. 1-2 (DOI: 10.1109/APS.2012.6349305).

C91. Chien-Hao Liu[#] and N. Behdad, "High-Power Microwave Filters and Frequency Selective Surfaces Utilizing EM Wave Tunneling Through ε-Negative Layers," *2012 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, July 8-14, 2012, Chicago, IL, pp. 1-2 (DOI: 10.1109/APS.2012.6349304).
Finalist in the student paper competition. One of the 15 finalists selected from among ~150 submissions worldwide.

C92. M. Li[#] and N. Behdad, "Frequency Selective Surfaces for High-Power Microwave (HPM) Applications," *2012 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, July 8-14, 2012, Chicago, IL, pp. 1-2 (10.1109/APS.2012.6348722).

C93. M. Li[#] and N. Behdad, "Ultra-Wideband, True-Time-Delay, Metamaterial-Based Microwave Lenses," *2012 IEEE International Symposium on Antennas and Propagation and USNC-*

URSI National Radio Science Meeting, July 8-14, 2012, Chicago, IL, pp. 1-2 (DOI: 10.1109/APS.2012.6349044).

C94. Y. Yusuf[#] and N. Behdad, "A Biologically-Inspired Nanoantenna Array," *2012 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, July 8-14, 2012, Chicago, IL, pp. 1-2 (DOI: 10.1109/APS.2012.6349221).

C95. Y. Yusuf[#] and N. Behdad, "Compact, Low-Profile UWB Antennas Exploiting the Concept of Closely-Coupled Dual-Mode Radiators," *2012 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, July 8-14, 2012, Chicago, IL, pp. 1-2.

C96. A. R. Masoumi[#] and N. Behdad, "Performance Enhancement of Super-Resolving Biomimetic Antenna Arrays," *2012 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, July 8-14, 2012, Chicago, IL, pp. 1-2 (DOI: 10.1109/APS.2012.6349412).

C97. J. H. Brady[#], N. Behdad, and A. Sayeed, "Discrete Lens Array Modeling and Design for Optimum MIMO Communications at Mm-Wave," *2012 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, July 8-14, 2012, Chicago, IL, pp. 1-2 (10.1109/APS.2012.6349292).

C98. M. J. Burfeindt, J. D. Shea, A. M. Weiss, N. Behdad, B. D. Van Veen, and S. C. Hagness, "Microwave Breast Imaging Using an Enclosed Array of Multi-Band Miniaturized Patch Antennas," *2012 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, July 8-14, 2012, Chicago, IL.

C99. Chien-Hao Liu[#] and N. Behdad, "Electromagnetic Wave Tunneling Through Multiple Epsilon-Negative Metamaterial Layers: A Microwave Filter Theory Approach," *USNC/URSI National Radio Science Meeting*, January 4-7, 2012 Boulder, CO.

C100. J. H. Brady[#], N. Behdad, and A. Sayeed, "Microwave Lens Modeling For mm-Wave Communications," *USNC/URSI National Radio Science Meeting*, January 4-7 2012, Boulder, CO.

C101. M. Li[#] and N. Behdad, "Fludically Tunable Phase Shifting Surfaces for High-Power Tunable Lens Applications," *2011 Antenna Applications Symposium,* Robert Allerton Park, Monticello IL, September 20-22, 2011.
Winner of the second place award in the student paper competition.

C102. N. Behdad, M. Li[#], and M. Al-Joumayly[#], "Ultra-Low Profile, Compact UWB Antennas Based on the Concept of Closely Coupled, Dual-Mode Radiators," *2011 Antenna Applications Symposium,* Robert Allerton Park, Monticello IL, September 20-22, 2011.

C103. M. Li[#] and N. Behdad, "Beam Scanning in Patch Antenna Arrays Using A Microfluidic Technique," *IEEE Int. Symp. Antennas and Propag. & USNC/URSI Nat. Radio Sci. Meeting*, July 3-8, 2011, Spokane WA.

C104. M. Al-Joumayly[#] and N. Behdad, "Wideband True-Time-Delay Microwave Lenses Using Low-Profile, Sub-wavelength Periodic Structures," *IEEE Int. Symp. Antennas and Propag. & USNC/URSI Nat. Radio Sci. Meeting*, July 3-8, 2011, Spokane WA.

C105. M. Al-Joumayly[#] and N. Behdad, "High-Resolution Discrete Lens Arrays Using Miniaturized-Element Frequency Selective Surfaces," *IEEE Int. Symp. Antennas and Propag. & USNC/URSI Nat. Radio Sci. Meeting*, July 3-8, 2011, Spokane WA.

C106. M. Al-Joumayly[#], S. Aguilar[#], S. C. Hagness, and N. Behdad, "Multi-Band, Miniaturized Patch Antenna Elements for Microwave Breast Imaging Applications," *IEEE Int. Symp. Antennas and Propag. & USNC/URSI Nat. Radio Sci. Meeting*, July 3-8, 2011, Spokane WA.

C107. M. Al-Joumayly[#], S. Aguilar[#], S. C. Hagness, and N. Behdad, "Bandwidth Enhancement of Miniaturized Patch Antennas," *2011 IEEE Int. Symp. Antennas and Propag. & USNC/URSI Nat. Radio Sci. Meeting*, July 3-8, 2011, Spokane WA.

C108. A. Sayeed and N. Behdad, " Continuous Aperture Phased MIMO: A New Architecture for Optimum Line-of-Sight Link," *IEEE Int. Symp. Antennas and Propag. & USNC/URSI Nat. Radio Sci. Meeting*, July 3-8, 2011, Spokane WA. **(Citations #: 25)**

C109. M. Li[#] and N. Behdad, "Microfluidically-Tunable Sub-wavelength Periodic Structures," *USNC-URSI National Radio Science Meeting*, 5-8 January 2011, Boulder, CO

C110. N. Behdad and M. Al-Joumayly[#], "Super-Resolving Biomimetic Electrically Small Antennas and Their Applications," *2010 Antenna Applications Symposium*, Robert Allerton Park, Monticello, IL September 2010.

C111. N. Behdad and M. Al-Joumayly[#], "Biomimetic Electrically Small Antennas," *2010 IEEE International Conference on Wireless Information Technology and Systems*, Aug. 28-Sep. 3, 2010, Honolulu, Hawaii, USA. **(Citations #: 17)**

C112. M. Al-Joumayly[#], S. Aguilar[#], N. Behdad and S.C. Hagnes, " Miniaturized Patch Antennas with Multiple Bands of Operation for Microwave Breast Imaging," *2010 Antenna Applications Symposium*, Sep. 21-23, 2010, Allerton Retreat Center, Monticello, IL. **Winner of the third place award in the student paper competition of the conference.**

C113. S. Aguilar[#], M. Al-Joumayly[#], S. C. Hagness, and N. Behdad, "Design of a Miniaturized Dual-Band Patch Antenna as an Array Element for Microwave Breast Imaging," *2010 IEEE Antennas and Propagation Society/URSI Symposium*, Toronto, ON.

C114. M. Al-Joumayly[#] and N. Behdad, "Design of Conformal, High-Resolution Microwave Lenses Using Sub Wavelength Periodic Structures," *2010 IEEE Antennas and Propagation Society/URSI Symposium*, Toronto, ON. **(Citations #: 5)**

C115. S. Aguilar[#], M. Al-Joumayly[#], J. D. Shea, N. Behdad, and S. C. Hagness, "Microwave Dielectric Properties Study of a PCL-Based Thermoplastic Material Substrate," *2010 IEEE Antennas and Propagation Society/URSI Symposium*, Toronto, ON.

C116. M. Li[#] and N. Behdad, "A Technique for Designing Liquid-Tunable RF Lenses," *2010 IEEE Antennas and Propagation Society/URSI Symposium*, Toronto, ON. s
Finalist in the student paper competition. One of the 15 finalists selected from among ~150 submissions worldwide.

C117. M. Al-Joumayly[#] and N. Behdad, "Dual-Band Frequency Selective Surfaces with Higher-Order Band-Pass Responses," *2010 IEEE Antennas and Propagation Society/URSI Symposium*, Toronto, ON.

C118. M. Li[#] and N. Behdad, "Design of Low Profile Single/Dual Band High-Order Frequency Selective Surfaces," *2010 IEEE Antennas and Propagation Society/URSI Symposium*, Toronto, ON.

C119. M. Al-Joumayly[#] and N. Behdad, "A Generalized Method for Synthesizing Miniaturized Element Band-Pass Frequency Selective Surfaces," *2010 IEEE Antennas and Propagation Society/URSI Symposium*, Toronto, ON.

C120. Rajesh C. Paryani[#], Parveen Wahid, and Nader Behdad, "A Wideband, Dual-Polarized, Differentially Fed Cavity-Backed Slot Antenna," *in Proc. of the 2008 Antennas Applications Symposium*, Sep. 16-18 2008, Monticello, IL.
Winner of the best paper award in the student paper competition of the conference.

C121. Dan Shi, Nader Behdad, Jia-Yi Chen, and Michael P. Flyn, "A 5GHz Fully Integrated Super-regenerative Receiver with On-chip Slot Antenna in 0.13µm CMOS," *in Proc. of the 2008 IEEE VLSI Circuits Symposium*, pp. 34-35, 18-20 June 2008. **(Citations: 22)**

C122. M. Al-Joumayly[#] and N. Behdad, "Low-Profile, second-order band-pass frequency selective surfaces with miniaturized elements" *in Proc. of the 2008 URSI General Assembly*, Aug 7-16 2008, Chicago, IL.

C123. R. C. Paryani[#], P. F. Wahid, and N. Behdad, "A wide-band, dual-polarized, differentially-fed cavity-backed slot antenna," *in Proc. of the 2008 URSI General Assembly*, Aug 7-16 2008, Chicago, IL.

C124. N. Behdad, "Uni-planar dual-polarized miniaturized antenna," *in Proc. of the 2008 URSI General Assembly*, Aug 7-16 2008, Chicago, IL.

C125. N. Behdad, M. Al-Joumayly[#], and M. Salehi[#], "Thin and low-profile miniaturized-element frequency selective surfaces with higher-order band-pass responses," *in Proc. of the 2008 URSI General Assembly*, Aug 7-16 2008, Chicago, IL.

C126. N. Behdad, M. Al-Joumayly[#], and M. Salehi[#] "A Low-Profile Frequency Selective Surface with Higher-Order Band-Pass Response," *in Proc. of the 2008 IEEE AP-S/URSI Symposium, San Diego, CA, July 5-12, 2008. (URSI Paper)*

C127. R. Paryani[#] and N. Behdad, "A Wideband, Dual-Polarized, Cavity-Backed Slot Antenna for Phased Array Applications," *in Proc. of the 2008 IEEE AP-S/URSI Symposium, San Diego, CA, July 5-12, 2008. (URSI Paper)*

C128. M. Salehi[#] and N. Behdad, "A Novel Technique for Design of Low-Profile, Dual-Band Frequency Selective Surface with Second-Order Band-Pass Response," *in Proc. of the 2008 IEEE AP-S/URSI Symposium, San Diego, CA, July 5-12, 2008. (URSI Paper)*

C129. M. Al-Joumayly[#] and N. Behdad, "A Low-Profile, Second-Order, Miniaturized Element Frequency Selective Surface," *in Proc. of the 2008 IEEE AP-S/URSI Symposium, San Diego, CA, July 5-12, 2008. (URSI Paper)*

C130. M. Al-Joumayly[#] and N. Behdad, "A Highly-Efficient, Unidirectional Miniaturized Slot Antenna," *in Proc. of the 2008 IEEE AP-S/URSI Symposium,* San Diego, CA, July 5-12, 2008, pp. 1-4.

C131. N. Behdad, "Miniaturized-Element Frequency Selective Surfaces Using Sub-Wavelength Periodic Structures," *in Proceedings of the IEEE Radio and Wireless Symposium (RWS2008),* vol. 1, pp. 347-350, 22-24 Jan. 2008, Orlando, FL.

C132. M. Al-Joumayly[#] and N. Behdad, "Unidirectional Miniaturized Slot Antennas," *in Proceedings of the IEEE Radio and Wireless Symposium (RWS2008),* vol. 1, pp. 735-738 , 22-24 Jan. 2008, Orlando, FL.
Finalist in the student paper competition of the conference.

C133. M. Al-Joumayly[#], and N. Behdad, "Miniaturization of Cavity-Backed Slot Antennas," *in Proc. of the 2007 Ant. Applications Symp.,* 18-21 Sep. 2007, Monticello, IL, vol. 1, pp. 160-168.
Finalist in the student paper competition of the conference.

C134. N. Behdad, D. Shi, W. Hong, K. Sarabandi, and M. P. Flynn, "A 0.3mm^2 Miniaturized X-Band On-Chip Slot Antenna in 0.13μm CMOS", *in Proceedings of the 2007 IEEE Radio Frequency Integrated Circuits (RFIC) symposium*, pp. 441-444, Honolulu, HI. **(Citations: 44)**

C135. N. Behdad, "Design of Dual-Band Cavity-Backed Slot Antennas Using Lumped Elements", *in Proceedings of the 2007 IEEE Antennas and Propagation Society International Symposium*, pp. 815-820, Honolulu, HI, June 9-15, 2007.

C136. W. Hong, N. Behdad, and K. Sarabandi, "Design of Tri-band Reconfigurable Active RFID Antenna", *in Proceedings of the 2007 IEEE Antennas and Propagation Society International Symposium*, pp. 117-120, Honolulu, HI, June 9-15, 2007.

C137. Hong, W., N. Behdad, and K. Sarabandi, "Tri-Band Reconfigurable Antenna for Active RFID," *in Proceedings of the 2006 Antennas Appliction Symposium,* Monticelo, IL, pp. 176-189, September 20-22, 2006

C138. N. Behdad and K. Sarabandi, "A Miniaturized Band-Pass Frequency Selective Surface," *in Proceedings of the 2006 IEEE International Antennas and Propagation & URSI Symposium*, pp. 4171 – 4174, Albuquerque, NM, July 9-14, 2006.

C139. Hong, W., N. Behdad, and K. Sarabandi, "Tri-Band Reconfigurable Antenna for RFID Applications," *in Proceedings of the 2006 IEEE International Antennas and Propagation & URSI Symposium*, pp. 2669-2669, Albuquerque, NM, July 9-14, 2006

C140. Van Caekenberghe, K., N. Behdad, and K. Sarabandi, "2-Bit Tunable MEMS Slot Antenna for Ka-Band," *in Proceedings of the 2006 USNC/URSI Symposium*, Albuquerque, NM, July 9-14, 2006. (URSI Paper)

C141. Hong, W., N. Behdad, and K. Sarabandi, "Design of Efficient Slot Antenna for On-Chip Wireless Systems," *in Proceedings of the 2006 IEEE International Antennas and Propagation & URSI Symposium*, pp. 3931-3934, Albuquerque, NM, July 9-14, 2006.

C142. Van Caekenberghe, K., N. Behdad, and K. Sarabandi, "An On-Chip Slot Antenna for ZigBee and IEEE 802.14.5 WPAN Applications," *in Proceedings of the 2006 USNC/URSI Meeting*, Albuquerque, NM, July 9-14, 2006. (URSI Paper)

C143. K. Sarabandi and N. Behdad, "A New Class of Frequency Selective Surfaces Based on the Concept of Meta-Materials", *In Proceeding of the XXVIII General Assembly of International Union of Radio Science*, New Delhi, India, Oct. 23-29, 2005.

C144. W. Hong, N. Behdad, and K. Sarabandi, "Miniaturized Cavity-Backed Slot Antenna", *Proceedings of the 29th Antenna Application Symposium*, Monticello, IL, Sep 27-29 2005, pp. 166-174. (*finalist in the student paper competition)*

C145. N. Behdad and K. Sarabandi, "A Compact Ultra-Wideband Antenna for Time- and Frequency-Domain Applications", *In Proceedings of the 2005 IEEE Antennas and Propagation Society International Symposium*, vol. 2B, pp. 552-554, Washington, DC, July, 3-8 2005.

C146. N. Behdad and K. Sarabandi, "A Compact Dual-/Multi-Band Wireless LAN Antenna", *In Proceedings of the 2005 IEEE Antennas and Propagation Society International Symposium*, vol. 2B, pp. 527-531, Washington, DC, July, 3-8 2005. **(Citations: 24)**

C147. N. Behdad, H. Al-Wazzan, and K. Sarabandi, "Ultra-Wideband Indoor Channel Measurements Using a Sensitive Synchronized Stepped-Frequency System", *In Proceedings of the 2005 USNC/URSI National Radio Science Meeting*, Washington, DC, July, 3-8 2005. (URSI Paper)

C148. N. Behdad and K. Sarabandi, "Coupled Sectorial Loop Antenna (CSLA) for Ultra-Wideband Applications", *Proceedings of the 28th Antenna Applications Symposium*, Monticello, IL, Sep 14-17 2004, pp. 159-168. (*finalist in the student paper competition)*

C149. N. Behdad and K. Sarabandi, "Dual Resonant Slot Antenna for Wireless Applications", *Proceedings of the 2004 IEEE Antennas and Propagation Society International Symposium*, Monterey, CA, June 20-26 2004, Vol. 2, pp. 1931-1934.

C150. N. Behdad and K. Sarabandi, "A Wideband Multiresonant Single-Element Slot Antenna", *Proceedings of the 2004 IEEE Antennas and Propagation Society International Symposium*, Monterey, CA, June 20-26 2004, Vol.2, pp. 1891-1894. **(Citations: 5)**

C151. N. Behdad and K. Sarabandi, "A Wideband Bi-Semicircular Slot Antenna", *Proceedings of the 2004 IEEE Antennas and Propagation Society International Symposium*, Monterey, CA, June 20-26 2004, Vol. 2, pp. 1903-1906. **(Citations: 11)**

C152. N. Behdad and K. Sarabandi, "Dual Band Reconfigurable Slot Antennas Using Lumped Elements", *Proceedings of the 2004 USNC/URSI National Radio Science Meeting*, Monterey, CA, June 20-26 2004, Vol. 1, pp. 91

C153. N. Behdad and K. Sarabandi, "A Novel Quad-Pole Slot Antenna with Very Large Bandwidth", *Presented in the student paper competition of the 2004 USNC/URSI National Radio Science Meeting*, 5-8 Jan 2004, Boulder, Colorado. **Winner of the second place prize in student paper competition of the conference.**

C154. N. Behdad and K. Sarabandi, "A Novel Approach for Bandwidth Enhancement of Slot Antennas", *Proceedings of the 27th Antenna Applications Symposium, Monticello*, IL, September 17-19 2003, pp.176-188.
Winner of best student paper award in the student paper competition of the conference.

C155. A. Nashashibi, N. Behdad, and K. Sarabandi, "A Sensitive Ultra Wide Band Propagation Measurement System", *Proceedings of the 2003 IEEE Antennas and Propagation Society International Symposium*, Columbus, Ohio, June 22-27 2003, Vol. 4, pp. 759-762.

C156. N. Behdad and K. Sarabandi, "Miniaturized Slot Antennas with Enhanced Bandwidth", *Proceedings of the 2003 IEEE Antennas and Propagation Society International Symposium*, Columbus, Ohio, June 22-27 2003, Vol. 1, pp. 447-450.

C157. N. Behdad and K. Sarabandi, "Antenna Miniaturization using Distributed Inductive Loading", *Proceedings of the 2003 IEEE Antennas and Propagation Society International Symposium*, Columbus, Ohio, June 22-27 2003, Vol. 1, pp. 308-311. **(Citation #: 5)**

INVITED TALKS, PRESENTATIONS, AND WORKSHOPS

1. N. Behdad, "Metamaterial- and metasurface-based microwave lenses and reflectarrays," Harbin Institute of Technology, Harbin, China, May 21, 2018.
2. N. Behdad, "N. Behdad, "Angle and Polarization Sensing With Infrared Antennas," Harbin Institute of Technology, Harbin, China, May 22, 2018.
3. N. Behdad, "Microwave Thermal Therapy for Minimally-Invasive Treatment of Cancer," Harbin Institute of Technology, Harbin, China, May 23, 2018.
4. N. Behdad, "Metamaterial- and metasurface-based microwave lenses and reflectarrays," Harbin Engineering University, Harbin, China, May 25, 2018.
5. N. Behdad, "Microwave Thermal Therapy for Minimally-Invasive Treatment of Cancer," Harbin Engineering University, Harbin, China, May 25, 2018.

6. N. Behdad, “Affordable Phased-Array Antenna Technology Using Electronically-/Mechanically-Tunable Metamaterials” Faculty of Science, Universite Abdelmalek Essaaidi, Tetouan, Morocco, Jan. 18, 2018.
7. N. Behdad, “Microwave Thermal Therapy for Minimally-Invasive Treatment of Cancer” ENSIAS, King Mohamed V University, Rabat, Morocco, Jan. 16, 2018.
8. N. Behdad, “Novel, High-Frequency Microwave Ablation Antenna Design for Minimally-Invasive Treatment of Cancer” EECS Department, University of Michigan, Nov. 10, 2016.
9. N. Behdad, “Affordable Phased-Array Antenna Technology Exploiting Reconfigurable Metamaterials” ECE Department, University of Southern California, Sep. 30, 2016.
10. N. Behdad, “High-power microwave research at the applied EM laboratory of UW-Madison,” Presented at the L-3 Communications Electron Dynamics Division University Day, Aug. 26, 2016
11. N. Behdad, “Biomimetic Electrically-Small Antenna Arrays,” Army Research Lab, Adelphi, MD, Aug. 4 2016.
12. N. Behdad, “Bandwidth Enhancement of HF Antennas Using Characteristic Mode Theory” Altair Corporation Webinar, March 30, 2016.
13. N. Behdad, “Sub-Wavelength Periodic Structures and Their Applications,” ECE Department, Boise State University, Boise, ID, March 11, 2016.
14. N. Behdad, “True-Time-Delay Microwave Lenses and Reflectarrays Based on Sub-Wavelength Periodic Structures,” ECE Department, University of Central Florida, Orlando FL, Jan. 29, 2016.
15. N. Behdad, “Applications of Miniaturized-Element Frequency Selective Surfaces in Designing Microwave Lenses, Reflectarrays, and Polarization Converters,” ECE Department, University of Toronto, Dec. 11, 2015.
16. N. Behdad, “High-power microwave research at the applied EM laboratory of UW-Madison,” *Presented at the L-3 Communications Electron Dynamics Division University Day,* Aug. 27, 2015.
17. N. Behdad, “Overview of Recent Progress in the Applied Electromagnetics Area,” *Aurora Flight Sciences*, Manassas VA, May 13, 2015.
18. N. Behdad, “High-Frequency Microwave Ablation for Targeted, Minimally-Invasive Cancer Treatment,” Department of Electrical Engineering, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, March 30, 2015.
19. N. Behdad, “Biologically-Inspired, Super-Resolving Electrically-Small Antenna Arrays,” Department of Electrical Engineering, National Chung Cheng University, Chiayi, Taiwan, December 1 2014.
20. N. Behdad, “High-Frequency Microwave Ablation for Targeted, Minimally-Invasive Cancer Treatment,” Department of Electrical Engineering, University of Southern California, Aug. 29, 2014.
21. N. Behdad, “Compact and Low-Profile Ultra-Wideband Antennas for Military Communications Applications,” SPAWAR – Space and Naval Warfare Systems Command, San Diego, CA, Aug. 26, 2014.

22. N. Behdad, "High-power microwave research at the applied EM laboratory of UW-Madison," *Presented at the L-3 Communications Electron Dynamics Division University Day,* Aug. 18, 2014.

23. N. Behdad, "Wideband, True-Time-Delay Microwave Lenses and Reflectarrays Using Miniaturized-Element Frequency Selective Surfaces," IETR (Institut d'Electronique et de Télécommunications de Rennes), Université de Rennes, Rennes, France, June 24, 2014.

24. N. Behdad, "High-Frequency Microwave Ablation for Targeted, Minimally-Invasive Cancer Therapy," Electrical Engineering Department, École polytechnique fédérale de Lausanne - EPFL, Lausanne, Switzerland, June 20, 2014.

25. N. Behdad, two-day workshop at Lunds Tekniska Högskola, Lund, Sweden *(Invited and sponsored by Swedish Defense Material Administration (FMV))*.

    Two workshops on June 16, 2014:

    - **Morning:** Harmonic Suppressed Frequency Selective Surfaces and Their Applications in Designing Low-Observable Antennas
    - **Afternoon:** Tunable, High-Power Microwave Metamaterials

    Two workshops on June 17, 2014:
    - **Morning:** Microwave lenses and high-gain antenna apertures based on miniaturized-element frequency selective surfaces.
    - **Afternoon:** Low-profile, ultra-broadband antennas for military communications systems.

26. N. Behdad, "High-Frequency Microwave Ablation for Targeted, Minimally-Invasive Thermal Therapy," Department of Electrical and Information Technology, Lunds Tekniska Hogskola – LTH, Lund, Sweden, June 18 2014.

27. N. Behdad, "Wideband, True-Time-Delay Microwave Lenses and Reflectarrays Using Miniaturized-Element Frequency Selective Surfaces," Department of Information and Communication Technology, University of Pisa, Pisa, Italy, June 13, 2014. (università di pisa, dipartimento di ingegneria dell'informazione).

28. N. Behdad, "High-frequency microwave ablation for minimally-invasive treatment of cancer," Department of Electrical Engineering, Technical University of Denmark (DTU), Lyngsby, Denmark, June 10, 2014.

29. N. Behdad, "Closely coupled multi-mode radiators: A new concept for improving the performance of electrically small antennas," *2014 Office of Naval Research Communications Gathering*, May 13-14 2014, Naval Research Laboratory, Washington DC.

30. N. Behdad, "Design, modeling, and characterization of metamaterial-based true-time-delay microwave lenses," *2013 International Workshop on Computational Electromagnetics and Applications*, November 18-20 2013, Harbin Engineering University, Harbin, China.

31. N. Behdad, "High-power microwave research at the applied EM laboratory of UW-Madison," *Presented at the L-3 Communications Electron Dynamics Division University Day,* Aug. 19, 2013.

32. N. Behdad, presented a two-day workshop at Lunds Tekniska Högskola, Lund, Sweden *(Invited and sponsored by Swedish Defense Material Administration (FMV))*. 6/10/2013-6/11/2013.

    The following topics were included in the workshop:

    - Overview of Current Research in the Applied EM Laboratory at UW-Madison (0.5 day)

- Biomimetic Electrically Small Antennas (0.25 day)
- Low-Profile Ultra-Wideband Antennas (0.25 day)
- Miniaturized-Element Frequency Selective Surfaces (MEFSSs) and Their Applications (1 day)

33. N. Behdad, “Biomimetic Electrically Small Antennas and Antenna Arrays,” IEEE AP-S/MTT local chapter in Orlando, Department of Electrical and Computer Engineering, University of Central Florida, Orlando FL, November 30, 2012.
34. N. Behdad, “Biologically-Inspired Electrically Small Antenna Arrays,” ECE Colloquium Series, Department of Electrical and Computer Engineering, University of Akron, OH, October 4, 2012.
35. M. J. Burfeindt, N. Behdad, B. D. Van Veen, and S. C. Hagness, “Microwave Technologies for Breast Health and Disease Management,” RF and Analog ICs for Biomedical Applications Workshop, 2012 IEEE International Microwave Symposium, 17-22 June 2012, Montreal, QC. (Presenter: M. J. Burfeindt)
36. N. Behdad, "Biomimetic Super-Resolving Antenna Apertures,” Institute of Defense and Government Advancement, 8th Annual Unmanned Aerial Vehicle (UAV) Summit, April 23-25, 2012, Washington DC.
37. N. Behdad, “Insect Hearing Inspired Approach to Small Antennas,” BME Department Seminar (BME 517), University of Wisconsin-Madison, October 12, 2011, Madison, WI.
38. N. Behdad, "Insect-Inspired Antenna Arrays: A Concept for Achieving Fundamental Performance Gains from Electrically Small Antennas,” Institute of Defense and Government Advancement, 8th Military Antennas Summit, September 12, 2011, Washington DC.
39. N. Behdad, "Insect-Inspired Electrically Small Antenna Arrays," ECE Department, University of Texas at Austin, September 2, 2011, Austin, TX.
40. N. Behdad, "Insect-Inspired Electrically Small Antenna Arrays," Qualcomm Corporate R&D, August 24, 2011, San Diego, CA
41. N. Behdad, "Super-Resolving, Biomimetic Electrically Small Antennas and Their Applications," IEEE Central North Carolina Chapter, NC A&T State University, April 1, 2011, Greensboro, NC.
42. N. Behdad, "Super-Resolving, Biomimetic Electrically Small Antennas and Their Applications," ECE Department Seminar (ECE 600), University of Wiscosnin-Madison, March 28, 2011, Madison, WI.
43. N. Behdad**,** “Miniature Antennas and Their Medical Applications,” Keynote Speech at Medtronic’s Quarterly Technology Review, April 9, 2010, Shoreview, MN.
44. N. Behdad, “Ultra-Wideband, Low-Profile, Electrically Small Antennas Utilizing Artificial Magnetic Conductors: A Progress Review,” Naval Research Laboratory, Washington, D.C., Remote Sensing Division (Code 7211), July 17, 2009.
45. N. Behdad, “Antenna Miniaturization: Theory, Techniques, and Limitations,” presented to the Cardiac Rhythm Disease Management division of Medtronic, Inc., Shoreview, MN, Feb 15, 2008.
46. N. Behdad, “Body Implanted Miniaturized Antennas,” presented to the Cardiac Rhythm Disease Management division of Medtronic, Inc., Shoreview, MN, Feb 15, 2008.

47. N. Behdad, "Multifunctional and Miniaturized Antennas for Wireless Integrated Microsystems", Seminar presented at the College of Engineering of University of South Florida, Tampa, FL. Tuesday Feb 27, 2007.
48. N. Behdad, "Size Reduction of Antennas and Frequency Selective Surfaces" Seminar presented at the IEEE APS/MTT Chapter, Melbourne, FL, Tuesday July 24, 2007.

PATENTS

Issued:

1. "True-Time-Delay, Low-Pass Lens," Inventors: **N**. **Behdad** and M. Li, Notice of allowance received.
2. "Tunable Spatial Phase Shifter," U.S. Patent 9,640,867, May 2, 2017 Inventors: **N. Behdad** and J. H. Booske.
3. "Electrically-small, low-profile, ultra-wideband antenna," U.S. Patent 9,431,712, Aug. 30, 2016, Inventors: S. M. A. Momeni Hasan Abadi and **N. Behdad**.
4. "Traveling wave tube loaded by a material having negative permittivity and positive permeability," U.S. Patent 9,406,477, Aug. 2, 2016, Inventors: A. Rashidi and **N. Behdad.**
5. "Ultra-wideband, Low-Profile Antenna," U.S. Patent 9,337,540, May 10, 2016, Inventors: **N. Behdad** and K. Ghaemi.
6. "Electrically Small, Super-Directive Antennas," U.S. Patent, 8,849,229, September 30, 2014, Inventor: **N. Behdad**.
7. "Hybrid Analog-Digital Phased MIMO Transceiver System," U.S. Patent, 8,811,511, August 19, 2014, Inventors: A. Sayeed and **N. Behdad**.
8. "Electrically Small, Source Direction Resolving Antennas," U.S. Patent 8,362,956, January 29, 2013, Inventors: **N. Behdad** and M. Al-Joumayly.
9. "Ultra-wideband, low-profile antenna", US Patent 8,228,251, July 24, 2012, Inventors: **N. Behdad**, M. Al-Joumayly, and M. Salehi.
10. "Low-profile frequency selective surface device and methods of making the same", US Patent 7,639,206, Dec. 29, 2009, Inventor: **N. Behdad**.
11. "Coupled Sectorial Loop Antenna for Ultra-Wideband Applications". US Patent No. 7,268,741, Sep. 11, 2007, Inventors: K. Sarabandi and **N. Behdad**.

Pending:

12. "Magneto inductive transmitter with electrically modulated reluctance," Inventors: J. Booske, **N. Behdad**, and N. D. Strachen, filed with USPTO on July 10, 2018.
13. "Wideband, Polarization Rotating Phased Array", Inventors: **N. Behdad,** Z. Yang, H. Luyen, and J. Booske, filed with USPTO on May 14, 2018.
14. "Dipole Antenna for Microwave Ablation," Inventors: Y. Mohtashami, **N. Behdad**, and S. C. Hagness, filed with USPTO on January 3, 2018, Application Number 15/860,943.
15. "Microwave Ablation Antenna System with Slot Balun", Inventors: H. Luyen, S. C. Hagness, and **N. Behdad**, Filed with USPTO on 3/9.2017.
16. "Microwave Ablation Antenna System with Reflector and Slot", Inventors: **N. Behdad**, S. C. Hagness, and Y. Mohtashami, Filed with USPTO on 3/9/2017.

17. "Traveling Wave Electron Paramagnetic Resonance Imaging System", Inventors: B. Behzadnezhad, A. McMillan, and **N. Behdad**, filed with USPTO in May 2017.

18. "Microwave Ablation Antenna System," Inventors: **Nader Behdad**, S. C. Hagness, and H. Luyen, filed with USPTO on 3/10/2014 (USSN 14/202,768).

RESEARCH
2. GRANTS AND CONTRACTS

ACTIVE PROJECTS:

1. STTR Phase II: Medical Electro Textile Sensor Simulations, Defense Health Agency (via sub-contract from the LR Technologies, Inc.), 8/1/2018-7/31/2020, $310,918.

2. "Mechanisms underlying effects of vagus nerve stimulation: studies in behaving non-human primates with simultaneous PET-fMRI and behavioral testing", DARPA, PI: Luis Populin, 7 other PIs/Co-PIs/Senior Personnel. Nader Behdad's role: Co-Investigator, $1.756M, 1/1/2018-12/31/2019.

3. "Flexible Miniaturized Microwave Antennas for Minimally Invasive Catheter-Based Microwave Ablation of Tumors", Intuitive Surgical, PI: S. C. Hagness, Co-PI: N. Behdad, $49,999, 1/1/2018-12/31/2018.

4. AFOSR MURI: Multipactor and Breakdown Susceptibility and Mitigation in Space-based RF systems, Air Force Office of Scientific Research, PI: J. H. Booske, Co-PIs: N. Behdad and Dane Morgan, $1,503,147 (out of $7.5M), 9/1/2017-8/31/2020.

5. Computer Simulations on Various Corrugated and Dielectric Loaded Accelerating Structures, Argonne National Laboratory, PI: Nader Behdad, 8/14/2017-9/31/2019, $123,000.

6. EARS: Collaborative Research: Overcoming Propagation Challenges at Millimeter-Wave Frequencies via Reconfigurable Antennas, PI: Nader Behdad, 10/1/2016-9/30/2019, $313,427 (UW-Madison's share of $1.2M total funding split between four universities).

7. Metamaterial-Enhanced Resistive Wall Amplifiers, Air Force Office of Scientific Research, PI: Nader Behdad, Co-PI: J. Booske, 9/15/2016-9/13/2019, $600,660.

8. MÆMS-Enabled Affordable Phased-Array Antenna Technologies, Office of Naval Research, PI: Nader Behdad, Co-PI: John H. Booske, 3/1/2016-2/27/2019, $1,152,269.

9. Platform-Enhanced, Wideband, Directional, and Dual-Polarized Electrically-Small Antennas for HF, VHF, and UHF Application, Office of Naval Research, PI: Nader Behdad, 1/1/2016-12/31/2018, $553,822.

10. Electrically-small antennas for super-resolving direction finding and high-power electronic attack at HF/VHF frequencies, Office of Naval Research, PI: Nader Behdad (no Co-PI), 3/1/2015-2/28/2018 (no-cost extension to 2/28/2019), $1,300,943.

11. EARS: Signal processing techniques for enhancing spectrum access in wireless networks using coupled antenna arrays, National Science Foundation, PI: Hamid R. Bahrami (U-Akron), Co-PI: Nader Behdad (UW-Madison), 9/1/2014-8/31/2017 (no cost extension to 8/31/2018), $400,000. UW-Madison's share: $150,000.

PENDING PROPOSALS:

1.

PAST PROJECTS

1. CAREER: Biomimetic Super-Resolving Electrically Small Antenna Arrays, National Science Foundation, 4/1/2011-3/31/2016 (no cost extension to 3/31/2018), PI: Nader Behdad, $426,000 ($6000 REU Supplement and $20,000 RET Supplement).
2. Emittance Studies of Novel Cathodes, Air Force Office of Scientific Research, PI: John Booske, Co-PI: Nader Behdad, 5/1/2015-4/31/2018, $103,672.
3. A biologically-inspired, platform-integrated VHF antenna system for compact ground robots, Army Research Office, 7/1/2017-3/31/2018, $35,060.
4. STTR Phase I: Medical Electro Textile Sensor Simulations, Defense Health Agency (via sub-contract from the LR Technologies, Inc.), 9/1/2017-2/28/2018, $49,967.
5. Bio-inspired, sub-wavelength detectors for multi-modal sensing and imaging, Office of Naval Research, PI: Nader Behdad, Co-PI: Zongfu Yu, 7/1/14-6/31/17 (no cost extension to 12/31/2017), $750,000.
6. High-frequency microwave ablation for targeted, minimally invasive cancer therapy, National Science Foundation, PI: Nader Behdad, Co-PIs: Susan. C. Hagness, Josh Medow; 9/1/14-8/31/17, $390,000.
7. STTR: Phase I: Additive Manufacturing for Microwave Vacuum Electron Device Cost Reduction, PI: N. Behdad, Co-PI: J. H. Booske, 10/1/2016-12/12/2016, $29,191.
8. Platform for investigating structure-function associations during lung development, UW Institute for Clinical and Translational Research (ICTR), PI: Alan McMillan, Co-PI: Nader Behdad, 6/1/2015-5/31/2016, $43,211.
9. Super-Resolving Electronic Compass and Geo-Location System Using Biomimetic Antenna Arrays, Wisconsin Alumni Research Foundation - Accelerator Program, PI: Nader Behdad, 8/1/2014- 8/31/2016, $176,390.
10. EARS: Beamspace Communication Techniques and Architectures for Enabling Gigabit Mobile Wireless at Millimeter-Wave Frequencies, National Science Foundation, 10/1/2012-9/30/2015 (No cost extension to 9/30/2016), PI: Akbar Sayeed, Co-PI: Nader Behdad, $505,839. ($6,000 REU Supplement)
11. Microfluidically-Tunable Metamaterial Lenses for Wideband, High-Power, Phased-Array Applications, National Science Foundation, 05/1/2011-04/31/2016, PI: Nader Behdad, Co-PI: Hongrui Jiang, $374,000 ($14,000 REU Supplement).
12. An integrated microwave approach for image-guided thermoablation of breast cancer, UW Office of the Vice Chancellor for Research and Graduate Education Interdisciplinary Research Committee, PI: Susan Hagness, Co-PIs: Nader Behdad, Barry Van Veen, and Lee Wilke, 7/1/2015-6/30/2016, $74,436.
13. Minimally-Invasive Microwave Ablation Technology for Targeted Cancer Treatment, Wisconsin Alumni Research Foundation – Accelerator Program, PI: Nader Behdad, Co-PI: Susan Hagness, 7/1/2014-12/31/2015, $155,563.
14. Research Gift in Support of Antenna-Related Research at Behdad's Group, CommScope, 1/15/2014-Open, $34,520, (PI: Nader Behdad).
15. Closely coupled multi-mode radiators: A new concept for improving the performance of electrically small antennas, Office of Naval Research – Young Investigator Program, 04/01/2011-04/30/2014, PI: Nader Behdad, $510,000. (No cost extension to 8/31/2015).

16. High-Power Microwave Metamaterials for Phased-Array, Pulse Shaping, and Anti-HPM Applications, Air Force Office of Scientific Research - Young Investigator Program, 4/15/2011-4/14/2014, PI: Nader Behdad, $360,000.
17. Low Observable Antennas Using Miniaturized-Element Frequency Selective Surfaces, L3-Randtron, 10/1/2012-12/20/2013, PI: Nader Behdad, $60,500.
18. Near-Field Measurement System for Ultra-Wideband Antenna Characterization, Office of Naval Research (DURIP), 6/15/2012-6/14/2013, PI: Nader Behdad, $272,633.
19. 3-D quantitative microwave breast imaging system for comparison with MRI, National Institute of Health, 09/26/2011-08/31/2013, PI: S. Hagness and B. Van Veen, Co-PIs: N. Behdad, G. Sisney, and F. Kelcz, $346,012. (No cost extension to 8/31/2014)
20. EAGER: A Novel Hybrid Analog-Digital Architecture for Optimum Agile Wireless Communication Using Discrete Lens Arrays, National Science Foundation, 9/15/2010-8/31/2012, PI: A. Sayeed, Co-PI: N. Behdad, $150,000.
21. Ultra-Wideband, Low-Profile, Electrically Small Miniaturized Antennas Utilizing Artificial Magnetic Conductors, Army Research Laboratory (Phase II SBIR), 9/1/2010-8/31/2012, $250,000, PI: N. Behdad, Co-PI: S. Hagness.
22. Ultra-Wideband, Low-Profile, Electrically Small Miniaturized Antennas Utilizing Artificial Magnetic Conductors, Army Research Lab through Intelligent Automation Inc. (Phase I SBIR Option), 10/22/2009-2/22/2010, PI: N. Behdad, $15,000.
23. Ultra-Wideband, Low-Profile, Electrically Small Miniaturized Antennas Utilizing Artificial Magnetic Conductors, Army Research Lab through Intelligent Automation Inc. (Phase I SBIR), 8/21/2008-2/22/2009, PI: N. Behdad, $21,000.
24. A New Technology for Developing Very Large Aperture Deployable Phased-Array Antennas, NASA through Florida Space Grant Consortium, 8/1/2008-7/30/2009, Role: PI, $25,000.
25. Compact Low-Profile Antenna, Sponsor: Harris Corporation Government Communications Systems Division, 4/1/2007-3/31/2008, PI; P. Wahid, Co-PI: N. Behdad and X. Gong (33% credit each), $60,000.
26. RCS Reduction of an Airborne Antenna Using Miniaturized Element Frequency Selective Surfaces, Science Applications International Corporation, 7/1/2007-6/31/2008, Role: PI, $11,151.

12. “A biologically-inspired system for high-resolution microwave/mm-wave imaging", University of Wisconsin's Graduate School Fall Research Competition, 7/1/2013-6/30/2014, PI: N. Behdad, $35,635.
13. “Biologically-Inspired Super-Gain Antennas", University of Wisconsin's Graduate School Fall Research Competition, 7/1/2012-6/30/2013, PI: N. Behdad, $34,969.
14. Continuous Aperture Phased MIMO: MIMO-DLA: A Hybrid Analog-Digital Wireless Transceiver Architecture for Enhanced Performance, Wisconsin Alumni Research Foundation - Accelerator Program, 6/1/2010-5/31/2013, PI: A. Sayeed, Co-PI: N. Behdad, $205,823
15. Ultrawideband 3-D Microwave Breast Tomography, University of Wisconsin's Graduate School Fall Competition, 9/1/2010-8/31/2011, PI: Susan Hagness, CoPIs: B. Van Veen and N. Behdad, $34,343.

16. Millimeter-Wave Component and System Characterization for Interdisciplinary Research, UCF Presidential Initiative to Fund Major Research Equipment, 2006-2007, P.I.: N. Behdad, Co-PI: X. Gong, S. Kuebler, L. Wei, $200,000.
17. Design and Fabrication of Highly-Efficient Volumetric Miniaturized Antennas for Wireless Integrated Micro-Systems, UCF In-House Research Grant, 2007, P.I.: N. Behdad, $7,500.

RESEARCH
3. STUDENT SUPERVISION AND MENTORING

CURRENT POST-DOCTORAL RESEARCHERS and SCIENTISTS:

1. Dr. Hung Luyen, June 2017 – present
   Post-doctoral research fellow
   Research topic: Phased-array antennas
2. Dr. Kai Ren, January 2018 - present
   Post-doctoral research fellow
   Research topic: Platform-based, electrically-small radiators

CURRENT GRADUATE STUDENTS

Thesis Advisees:

1. Konstantinos Mavrakakis, Ph.D., Jan. 2014-May 2019
   Sub-wavelength periodic structures, microwave lenses, and polarization converters
2. Elham Mohammadi, Ph.D., May 2015-May 2019
   Millimeter-wave/IR imaging
3. Ruyu Ma, Ph.D., Sep. 2015-May 2019
   Ultra-wideband antennas for direction finding
4. Bahareh Behzadnezhad, Ph.D., Jan. 2015-May 2019
   Traveling-wave electron paramagnetic resonance imaging (EPRI)
5. Mohammad Ranjbar Nikkhah, Ph.D., Sep. 2015-May 2019
   Biomimetic antenna arrays
6. Nathan D. Strachen, Ph.D., Sep. 2016-TBD
   Non-foster, broadband, electrically-small antennas.
7. Yuzhang Zhang, Ph.D., Sep. 2016-TBD
   Reconfigurable mmWave antennas for MIMO communications systems
8. Patrick Forbes, Ph.D., Jan. 2017-TBD
   Metamaterial-Enhanced Resistive Wall Amplifiers
9. Ruben F. Delgado Castillo, Ph.D., Sep. 2017-TBD
   Electrically-small Antennas
10. Alex Bouvy, Ph.D., Sep. 2017-TBD
    Electrically-small Antennas
11. Muhammadeziz Tuxunniyazi, Ph.D., Sep. 2017-TBD
    Reconfigurable antennas at mm-wave bands
12. Sasha Siy, Ph.D., Sep. 2017-TBD

Waveguides and periodic structures for particle accelerators

13. Zongtang Zhang, Ph.D., Sep. 2017-TBD
    Metasurface Antennas
14. Jinuan Lin, Ph.D., Sep. 2018-TBD
    Metamaterial-enhanced resistive wall amplifiers

Visiting Ph.D. Students:

1. Yi Chen Zhong, Oct. 2017-Oct. 2019
   Visiting Ph.D. student from the University of Electronic Science and Technology of China
   Research project: Metasurface-based antennas

PAST POST DOCTORAL RESEARCHERS AND SCIENTISTS SUPERVISED

Researchers Funded By My Group:

1. Dr. Steven (Mingjian) Li, July 2015-July 2017
   Post-doctoral research fellow
   Research topic: Electrically-small antennas for electronic warfare applications.
2. Dr. Mohammad Ghaffari, June 2016-Aug. 2016
   Post-doctoral research fellow
   Research topic: Fabrication of nano-antennas.
3. Dr. Jacob Shea, Sep. 2014-Jan. 2016.
   Assistant Scientist (part time)
   Research topic: Microwave ablation.
4. Dr. Chien-Hao Liu, July 2014-July 2015,
   Research Topic: Electrically-small antenna arrays for direction finding applications
   Employment after UW: Assistant Professor at National Taiwan University
5. Dr. Arash Rashidi, Nov. 2012-March 2014,
   Research Topic: Metamaterial-enhanced millimeter-wave traveling wave tubes
   Employment after UW: EcoMotors
6. Dr. Yazid Yusuf, Aug. 2011-Sep. 2012,
   Research Topic: Compact, low-profile wideband antennas
   Employment after UW: Triquint Semiconductors

Visiting researchers not funded by my group:

1. Prof. Dong Jian, Dec. 2015-January 2017.
   Visiting scholar
   Research topic: Software defined radios and phased arrays
2. Prof. Kuang Zhang, Jan. 2015-Feb. 2016.
   Visiting scholar
   Research topic: Acoustic metamaterials

PAST PH.D. STUDENTS SUPERVISED

Ph.D. Dissertations Supervised

1. Daniel Enderich, Ph.D., Aug. 2018
   Dissertation Title: A Novel Emission Electron Microscope for the Study of Field Emission Cathodes and their Emittance
   Employment: Research Physicist at Air Force Research Laboratory

2. James Sawicki, Ph.D., Aug. 2018
   Dissertation Title: Multiphysics Principles of Microwave Ablation for Probe Miniaturization and Ablation Monitoring
   Employment: Boston Scientific
3. Yahya Mohtashami, Ph.D., Aug. 2018
   Dissertation Title: Minimally Invasive Microwave Ablation Antennas for the Generation of Directional and Non-Directional Heating Patterns
   Employment: Post-doc at University of California Santa Barbara
4. Hung Luyen, Ph.D., May 2017
   Dissertation Title: Miniaturization of Microwave Ablation Antennas,
   Employment: Post-doctoral fellow at University of Wisconsin
5. Kasra Ghaemi, Ph.D., May 2017
   Dissertation Title: Low-profile, Compact, and Broadband Antennas for HF, VHF, and UHF Applications
   Employment: Staff Antenna Engineer at Motorola
6. Ting-Yen Shih, Ph.D., May 2017
   Dissertation Title: Bandwidth Enhancement and Miniaturization Techniques for Small Antennas
   Employment: Assistant Professor at University of Idaho
7. R. Tyler Rowe, Ph.D., May 2017
   Thesis Title: Theoretical, Computational, and Experimental Studies of a Metamaterial-Enhanced Resistive Wall Amplifier.
   Employment: Space-X
8. Amin Momeni, Ph.D., Aug. 2016
   Thesis Title: Electromagnetic Wavefront Manipulation with Miniaturized-Element Frequency Selective Surfaces.
   Employment: TDK Corp.
9. R. Owen Mays, Ph.D., Aug. 2016
   Thesis Title: Microwaves in Heterogeneous Tissue: Development and Evaluation of Arrays and Antennas for Breast Imaging, Tumor Treatment, and Treatment Monitoring.
   Employment: Lawrence Livermore National Lab
10. Tonmoy Bhatacharjee, Ph.D., Sep. 2015
    Thesis Title: Fluidically Reconfigurable Microwave Devices and Optical Sensors
    Employment: Aerospace Corporation
11. Amir R. Masoumi, Ph.D., Dec. 2014
    Thesis Title: Biologically-Inspired, Electrically-Small Antenna Arrays
    Employment: Motorola Mobility
12. Chien-Hao Liu, Ph.D., May 2014
    Thesis Title: Frequency Selective Surfaces and Metamaterials for High-Power Microwave Applications
    Employment: Assistant Professor at National Taiwan University
13. Meng Li, Ph.D., May 2013
    Thesis Title: Tunable Frequency Selective Surfaces and True-Time-Delay Lenses for High Power Microwave (HPM) Applications

Employment: Qualcomm

14. Suzette Aguilar, Ph.D., Oct. 2012
    Thesis Title: 3D Multi-Frequency Antenna Arrays for Clinical Validation of Microwave Breast Imaging
    Employment: Motorola
15. Mudar Al-Joumayly, Ph.D., May 2011
    Thesis Title: Microwave Lenses for High-Power Phased-Array Applications
    Employment: Triquint Semiconductor
16. Rajesh Paryani, Ph.D., May 2010
    Thesis Title: Design of a wideband dual-polarized cavity-backed slot antenna
    Employment: Pharad LLC

Visiting Ph.D. Students:

1. Di Wu, April 2017-Sep. 2017
   Visiting Ph.D. student from Hong Kong University
   Research project: Electrically-small, simultaneous transmit and receive antennas
2. Xue Yang, April 2017-Sep. 2017
   Visiting Ph.D. student from Tsinghua University, Beijing China
   Research project: Antenna/FSS integration
3. Ruina Lian, Sep. 2016-Sep. 2017
   Visiting Ph.D. Student from Xidian University, Xi'an China
   Research topic: Low-profile, omni-directional, simultaneous transmit and receive antennas
4. Jie Wu, Sep. 2016-Sep. 2017
   Visiting Ph.D. Student from University of Electronic Science and Technology of China, Chengdu, China
   Research topic: Simultaneous transmit and receive antennas
5. Boyu Sima, Visiting Ph.D. Student, Oct. 2015-Sep. 2016
   Visiting Ph.D. Student from Nanjing University
   Research: Optical metamaterials
6. Meng Gao, Sep. 2014-Sep. 2016
   Visiting Ph.D. Student from Northwestern Polytechnic Institute, Xi'an China
   Research area: Frequency selective surfaces
7. Shunyong Hu, Sep. 2015-Aug. 2016
   Visiting Ph.D. Student from University of Electronic Science and Technology of China (UESTC), Chengdu, China
   Research area: Tunable leaky-wave antenna arrays
8. Trung Kien Pham, Spring 2015
   Visiting Ph.D. Student from University of Rennes 1, Rennes, France
   Research area: Metamaterial-based apertures

PAST M.S. STUDENTS SUPERVISED

1. Bahareh Behzadnezhad, M.S., May 2017
   Project Title: Traveling wave Electron Paramagnetic Resonance Imaging.
   Employment: Continued Ph.D. at UW-Madison
2. James Sawicki, M.S., May 2016

Project Title: Impact of frequency on the performance of microwave ablation
Employment: Continued Ph.D. at UW-Madison

3. Kasra Ghaemi, M.S., May 2014
Project Title: Low-Profile Ultrawideband Antenna with Monopole-Like Radiation Pattern Over a 10:1 Bandwidth.
Employment: Continued Ph.D. at UW-Madison

4. Hung Luyen, M.S., May 2014
Project Title: The application of high-frequency microwaves in tissue ablation for cancer treatment.
Employment: Continued Ph.D. at UW-Madison

5. Amin Momeni, M.S., Dec. 2013
Project Title: Harmonic-Suppressed Miniaturized-Element Frequency Selective Surfaces with Higher-Order Bandpass Responses.
Employment: Continued Ph.D. at UW-Madison

6. Se Myoung Oh, M.S., May 2011
Project Title: Development and Experimental Characterization of a Fluidically Tunable Frequency Selective Surface
Employment: South Korean Air Force Officer

7. Bin Yu, M.S., Dec. 2010
Project Title: A wireless system for multi-channel transmission of EEG Signal
Employment: RF Engineer at OlinkStar

8. Mohsen Salehi, M.S., Apr. 2009
Project Title: Miniaturized-element frequency selective surfaces
Employment: PhD Student, Virginia Tech

RESEARCH SUPERVISION OF UNDERGRADUATE STUDENTS

1. Yiming Liu, Dec. 2017 – present
2. Tristan Steiner, Oct. 2016- Dec. 2017
3. Patrick Forbes, Dec. 2015-Dec. 2016
4. Wyatt Rufener, Sep. 2015-Sep. 2016
5. Bahareh Behzadnezhad, Summer 2014
6. Joel Neher, Jan. 2012-Dec. 2014
7. Daniel Ramirez, 06/2012-08/2013
8. Long Tran, Summer and Fall 2012
9. Dhananjaya Rao, Summer 2010
10. Supatta Niramarnkarn, Summer 2010
11. R. Irene Villegas, Feb. 2008-Aug. 2009
12. Philip Marraccini, Jan. 2007, Aug. 2008

TEACHING

COURSES TAUGHT AT UNIVERSITY OF WISCONSIN-MADISON

- ECE 841 – Electromagnetic Transmission and Radiation, Spring 2018.
  Graduate Level Course, Enrollment: 7.
- ECE 219 – Analytical Methods for Electromagnetics, Fall 2017
  Undergraduate Level Course, Enrollment: 134
- ECE 744 – Theory of Microwave Circuits and Devices, Spring 2017
  Graduate Level Course, Enrollment: 9.
- ECE 841 – Electromagnetic Transmission and Radiation, Fall 2016.
  Graduate Level Course, Enrollment: 12.
- ECE 740 – Electromagnetic Theory, Fall 2015,
  Graduate Level Course, Enrollment: 10.
- ECE 744 – Theory of Microwave Circuits and Devices, Spring 2015,
  Graduate Level Course, Enrollment: 13
- ECE 740 – Electromagnetic Theory, Fall 2014,
  Graduate Level Course, Enrollment: 12.
- ECE 841 – Electromagnetic Transmission and Radiation, Spring 2014,
  Graduate Level Course, Enrollment: 10.
- InterEgr 102 – Introduction to Society's Engineering Grand Challenges
  Freshman Level Course, Enrollment: 125 (with 4 other instructors)
- ECE 744-Theory of Microwave Circuits and Devices, Spring 2013,
  Graduate Level Course, Enrollment: 12.
- ECE 220-Electrodynamics I, Fall 2012,
  Required Undergraduate Level Course, Enrollment: 83.
- ECE 841-Electromagnetic Transmission and Radiation, Spring2012,
  Graduate Level Course, Enrollment: 17.
- ECE 220-Electrodynamics I, Fall 2011,
  Required Undergraduate Level Course, Enrollment: 72.
- ECE 744-Theory of Microwave Circuits and Devices, Spring 2011,
  Graduate Level Course, Enrollment: 17.
- ECE 420-Electromagnetic Wave Transmission, Fall 2010,
  Senior (Elective) Undergraduate Course, Enrollment: 20.
- ECE 841-Electromagnetic Transmission and Radiation, Spring2010,
  Graduate Level Course, Enrollment: 17.
- ECE 420-Electromagnetic Wave Transmission, Fall 2009,
  Senior Undergraduate Course, Enrollment: 22.
- ECE 744-Theory of Microwave Circuits and Devices, Spring 2009,
  Graduate Level Course, Enrollment: 11.

COURSES EVALUATIONS AT UNIVERSITY OF WISCONSIN-MADISON

Scores are out of a maximum of 5.0

Question	S '09	F '09	S '10	F '10	S '11	F '11	S '12	F '12	S '13	S '14	F '14	S '15	F '15	F'16	S '17	F '17	S '18
1. Preparation for class	4.91	4.94	4.71	4.94	4.75	4.74	4.62	4.59	4.33	4.63	4.10	4.40	4.40	4.50	4.40	4.19	4.43
2. Effective use of class time relative to course content	4.55	4.69	4.64	4.69	4.44	4.61	4.23	4.55	4.42	4.63	4.30	4.20	4.70	4.58	4.70	4.13	4.43
3. Clarity of communication	4.55	4.50	4.50	4.31	4.56	4.37	4.46	4.27	4.08	4.75	4.20	3.90	4.30	4.33	4.30	3.95	4.14
4. Attitude towards course	4.82	4.81	4.86	4.75	4.88	4.92	4.46	4.66	4.33	4.63	4.90	4.40	4.40	4.75	4.40	4.37	4.71
5. Attitude towards students	4.82	4.75	4.86	4.44	4.75	4.45	4.54	4.48	4.42	4.63	4.80	4.30	4.20	4.67	4.20	4.34	4.29
6. Knowledge of subject of this course	4.91	4.94	4.64	4.88	4.50	4.89	4.69	4.82	4.58	5.00	4.80	4.30	4.50	4.75	4.50	4.49	5.00
7. Responsiveness to questions	4.91	4.81	4.79	4.56	4.69	4.66	4.62	4.40	4.50	4.75	4.20	4.40	4.70	4.58	4.70	4.21	4.57
8. Ability to create student interest	4.27	4.44	4.50	4.31	4.38	3.89	4.00	3.84	3.83	4.25	3.90	3.80	4.20	4.25	4.20	3.6	4.14
9. Posts and maintains an adequate number of office hours for conference purposes	4.82	4.88	4.93	4.47	4.75	4.53	4.31	4.50	4.09	4.38	3.67	4.60	4.60	4.42	4.60	4.07	4.14
10. General rating of this instructor compared with all instructors you have had.	4.73	4.81	4.79	4.44	4.60	4.21	4.50	4.09	4.08	4.63	4.30	3.70	4.00	4.42	4.00	3.71	3.29

Fall 2013 – The course did not have an official instructor evaluation.
Spring 2016 – On sabbatical leave.

COURSES TAUGHT AT UNIVERSITY OF CENTRAL FLORIDA

- EEL 3470-Electromagnetic Fields, Fall 2006
  Required undergraduate course (the first course in the subject of Electromagnetics for Electrical Engineering students), Enrollment: 62
- EEL 6463-Antenna Analysis and Design II, Spring 2007

The second graduate level course on the subject of Antenna Design and Analysis. Available only to M.S. and Ph.D. students, Enrollment: 7

- EEL 4436-Microwave Engineering, Fall 2007
  Senior level undergraduate elective course, Enrollment: 16
- EEL 3041-Circuit Analysis, Spring 2008
  Required level undergraduate course for students majoring in Information Technology and Computer Science. Enrollment: 49
- EEL 5462-Antenna Analysis and Design, Fall 2008
  First graduate level course in the antenna design and analysis area. Enrollment: 21

K-12 TEACHERS SUPERVISED THROUGH RET PROGRAMS

No.	Name	Dates	Activity Topic
1.	Katie Leary	Summer 2014	Developing a course module demonstrating the principles of digital communications to middle school students.
2.	Katie Leary	Summer 2013	Developing a course module for middle school students demonstrating the concept of biomimetics as a means of solving problems in engineering.
3.	Kira Jacobson	Summer 2012	Developed a course module for high-school student demonstrating the relationship between the directional hearing of small animals and small antennas.

SERVICE

EDITORIAL ACTIVITIES

- General Co-Chair, 4th Arab-American Frontiers in Science, Engineering, and Medicine Symposium, co-organized by U.S. National Academies and Masdar Institute, Nov. 5-7 2016, Abu Dhabi, U. A. E.
- Member of organizing committee, 3rd Arab-American Frontiers in Science, Engineering, and Medicine Symposium, co-organized by U.S. National Academies and King Abdullah University of Science and Technology, Dec. 5-7 2015, Thuwal, Saudi Arabia.
- Associate Editor, IEEE Antennas and Wireless Propagation Letters, April 21, 2011 to December 31, 2015.

  Handled papers in the antenna design and analysis, frequency selective surfaces, periodic structures, biomedical applications, and metamaterials fields
- Associate Editor, Journal of Electromagnetic Engineering and Science, 2014-2017.

  Journal of the Korean Institute of Electromagnetic Engineering and Science.

- Technical Program Committee (TPC) Member for:
    - 2018 IEEE Antennas and Propagation Society Int. Symp., July 8-13, 2018, Boston, MA.
    - 12th International Symposium on Medical Information and Communication Technology, ISMICT 2018, 26-28 March 2018, Sydney, Australia.
    - 2017 IEEE Antennas and Propagation Society Int. Symp., July 9-14, 2017, San Diego, CA.
    - 2017 IEEE International Workshop on Antenna Technology (iWAT), March 1 – March 3, 2017, Athens, Greece.
    - 2016 IEEE International Workshop on Antenna Technology (iWAT), Mar. 29 – Mar. 2, 2016, Cocoa Beach, FL.
    - 2016 IEEE AP-S/URSI Meeting, June 26-July 1, 2016, Fajardo, Puerto Rico.
    - 9th European Conference on Antennas and Propagation, EuCAP 2015, April 12-17 2015, Lisbon, Portugal.
    - 2015 International Workshop on Antenna Technology (iWAT 2015), March 4-6 2015, Seoul, South Korea.
    - 2011 IEEE Antennas and Propagation Society International Symposium (IEEE APS/URSI).
    - 2009 IEEE Wireless and Microwave Technology Conference (WAMICON 2009), in Clearwater, FL.
- Co-Chair for Technical Program Committee, 2012 IEEE Antennas and Propagation Society International Symposium, Chicago, IL July 8-13.
- Special session or convened session organizer for:
    - 2017 IEEE International Workshop on Antenna Technology (iWAT), Mar. 1 – Mar. 3, 2017, Athens, Greece.
    - 2016 IEEE International Workshop on Antenna Technology (iWAT), Feb. 29 – Mar. 2, 2016, Cocoa Beach, FL.
    - 11th European Conference on Antennas and Propagation, EuCAP 2017, March 19-24 2017, Paris, France.
    - 2014 Progress in Electromagnetic Research Symposium (PIERS 2014) in Guangzhou China.
    - 2011 IEEE APS/URSI symposium, Spokane WA

PROPOSAL REVIEW ACTIVITIES

- Proposal reviewer for Air Force Office of Scientific Research, Summer 2018
- NSF Panel ECCS-CCCS division, Spring 2015
- NSF Panelist for ECCS-CCCS division, CAREER proposal panel, Fall 2013
- Ad hoc reviewer NSF CISE division (Fall 2015)
- Ad hoc reviewer NSF CISE CCF Algorithmic Foundations Medium competition (Spring 2015)

- Ad hoc reviewer NSF Office of International Science and Engineering (Fall 2014)
- Ad hoc reviewer NSF CISE/CIF division (Fall 2013)
- Proposal reviewer for Oak Ridge Associated Universities (ORAU)

REVIEWER ACTIVITIES AND CONFERENCE SERVICES

- Peer reviewer for more than 20 international journal publications including:
    - IEEE Transactions on Antennas and Propagation; IEEE Antennas and Wireless Propagation Letters; IEEE Antennas and Propagation Magazine; Journal of Applied Physics; Applied Physics Letters; Applied Physics A: Materials Science & Processing; IEEE Transactions on Plasma Science; IEEE Transactions on Microwave Theory and Techniques; IEEE Microwave and Wireless Component Letters; IET Proceedings on Microwaves Antennas and Propagation; IEEE Microwave Magazine; IEEE Transactions on Electromagnetic Compatibility; IEEE Transactions on Instrumentation and Measurement; IEEE Transactions on Magnetics; IEEE Transactions on Wireless Communications; International Journal of Antennas and Propagation; International Journal of Microwave Science and Technology; International Journal of Electronics and Communications; Sensors; International Journal of Applied Electromagnetics and Mechanics; Journal of Physics and Chemistry of Solids; Journal of Progress in Electromagnetics Research (PIERS); Journal of Electromagnetic Waves and Applications (JEWA)
- Reviewer and/or session chair at the following conferences:
    - IEEE Antennas and Propagation Society International Symposium (IEEE AP-S/URSI), every year from 2006 to 2018 except 2009.
    - ISCAS 2011 (IEEE International Symposium of Circuits and Systems)
    - IEEE International Workshop on Antenna Technology and Novel Metamaterials, 2009, 2015, 2016, 2017.
    - Session Chair, 2008 URSI General Assembly, Chicago, IL
    - 68th IEEE Vehicular Technology Conference, VTC-2008 Fall, Calgary
    - 2008 IEEE Conference on Communications, Beijing, China
    - 2006 WAMICON conference in Clearwater, FL.
- Served as a text book manuscript reviewer for:
    - *Wiley (2016, 2014)*
    - *Wiley-VCH (2013)*
    - *CRC Pres (2008)*
    - *Prentice Hall (Pearson) (2007)*
    - *Oxford University Press* (2006)

DEPARTMENTAL SERVICE

Mentoring activities:

- Mentoring committee for Eric Severson (Assistant Professor, ECE), 2017-
- Mentoring committee for Kassem Fawaz (Assistant Professor, ECE), 2017-

Committee service at the University of Wisconsin-Madison:

- Graduate Committee (Chair), 2018-2019
- Graduate Committee (Chair), 2017-2018
- Awards Committee, 2017-2018
- Graduate Committee, 2016-2017
- Course assignment coordinator, Applied Physics Division, 2016-2017.
- Graduate student committee, 2016-2017.
- Course assignment coordinator, Applied Physics Division, 2014-2015.
- Graduate committee: 2014-2015.
- Undergraduate advising and scholarship committee: 2011-2014.
- Annual faculty performance review committee: 2013-2014.
- Graduate advising committee: 2010-2011.
- Graduate admission committee: 2009-2010.
- Dissertation Committee Member for more than 50 students.

At the University of Central Florida:

- Laboratory Committee: 2006-2007, 2007-2008, Fall 2008.
- Undergraduate (Photonics Track) Committee: 2007-2008, Fall 2008.
- Dissertation Committee Member.

Dissertation committee membership outside of home institution:

- External committee member for Liang (Tony) Liang, University of Toronto, Canada, Ph.D. in Electrical Engineering, 2015.
- External committee member for Michele Borgese, University of Pisa, Italy, Ph.D. in Electrical Engineering, 2016.
- External committee member for Ashish Chittora, Indian Institute of Technology, Bombay, India, Ph.D. in Electrical Engineering, 2016.
- External committee member for Francesco Alessio Dicandia, University of Pisa, Italy, Ph.D. in Electrical Engineering, 2018.