Jonathan D. Chisum

Assistant Professor
Department of Electrical Engineering
University of Notre Dame
275 Fitzpatrick Hall
Notre Dame, IN 46556 U.S.A.

Phone: 574-631-3915
Fax: 574-631-4393

email: jchisum@nd.edu
URL: https://microwavelab.nd.edu/

---

1 Higher Education

2011: PH.D. in Electrical Engineering, University of Colorado at Boulder
2008: M.S. in Electrical Engineering, University of Colorado at Boulder
2003: B.S. in Electrical Engineering, Seattle Pacific University

2 Previous Positions

2012-2015: Member Technical Staff, MIT Lincoln Laboratory, Lexington, MA, USA
2006-2011: Graduate Research Assistant, University of Colorado at Boulder, Boulder, CO, USA
2009: Visiting Researcher, VTT-Millilab, Espoo, Finland
2006-2008: NIST PREP Graduate Research Fellow, Boulder, CO, USA
2002-2006: Hardware Design Engineer, Ballard Technology, Inc., Everett, WA, USA

3 Scholarships & Fellowships

2009: MIT Lincoln Laboratory Graduate Student Fellowship
2006-2008: National Institute of Standards and Technology, PREP Fellowship
1999-2003: Seattle Pacific University Trustees Scholarship

4 Distinctions, Honors, and Awards

2020: University of Notre Dame, Department of Electrical Engineering Outstanding Teacher Award
2018: Elected Senior Member, Union for Radio Science (URSI), #M1810532181
2017: Elevated to Senior Member, IEEE, #80610594
2017-present: Elected Member, U.S. National Committee for the International Union for Radio Science (URSI) Commission D: Electronics and Photonics
2016: Keysight RF System Award for ECEDHA
2014: MIT Lincoln Laboratory Communications Workshop, Outstanding Presentation "coin"

5 Books & Monographs

N/A

6 Refereed Publications

Advisee indicators: graduate advisees† and undergraduate advisees*. Chisum group contributions and journal impact factors included inline.
Refereed Journal Article Statistics (updated: August, 2021)

- Total (2015–present): 13 published, 1 accepted, 2 under review
- Total (all time): 16 published
- Mean impact factor (2015–present): 3.17
- Mean impact factor (all time): 3.00
- Articles in IEEE Transactions: 8
- Articles in AIP Journals: 2
- Articles in Nature Publishing Group: 1 (in-press))

Mean impact factor of Refereed Journal Articles from 2015 to Present: **3.17** (updated with 2021 impact factors).

6.1 Refereed Journal Articles – 2015 to Present

1. 2021: (Submitted) N. Kleber, M. Haenggi, **J. Chisum**, B. Hochwald, J. Laneman, "Directivity in RF Sensor Networks for Widespread Spectrum Monitoring," IEEE Trans. Cogn. Commun. Netw.
   Contribution: Advised sensor antenna modeling and participated in data analysis. Impact factor: 4.574.
2. 2021: (Submitted) N. Garcia†, **J. Chisum**, "Feed Corrective Lenslets for Enhanced Beamscan in Lens Antenna Systems," Submitted to IEEE Antennas Wireless Propag. Lett., May 25, 2021.
   Contribution: Soley Chisum group. Impact factor: 3.726.
3. 2021: (in revision) M. Filmer, M. Huebner, T. Zirkle, X. Jehl, M. Sanquer, **J. Chisum**, A. Orlov, G. Snider, "Gate reflectometry of single-electron box arrays using calibrated low temperature matching networks," Nature Scientific Reports.
   Contribution: Conceived of the matching network optimization protocol, supervised high frequency experiments, and analyzed data. Impact Factor 4.379.
4. 2021: (in-press) D. Connelly†, G. Csaba, H. Aquino, G. Bernstein, A. Orlov, W. Porod, **J. Chisum**, "Efficient Electromagnetic Transducers for Spin-Wave Devices," in Nature Scientific Reports, Aug 27, 2021.
   DOI: 10.21203/rs.3.rs-852082/v1
   Contribution: Primarily Chisum group. Conceived of and executed design, simulation and analysis methods and designed the wideband structures. Impact factor: 4.379.
5. 2021: W. Wang†, N. Garcia†, and **J. Chisum**, "The Systematic Design of Non-commensurate Impedance Matching Tapers for Ultra Wideband Gradient Index (GRIN) Lens Antennas," in IEEE Trans. Antennas Propag. (pre-print), Jun 5, 2021.
   https://ieeexplore.ieee.org/document/9490525
   DOI:10.1109/TAP.2021.3096552
   Contribution: Soley Chisum group. Impact Factor 4.371.
6. 2021: H. R. O. Aquino, D. Connelly†, A. Orlov, **J. Chisum**, G. H. Bernstein and W. Porod, "Design of a Coplanar-Waveguide-Based Microwave-to-Spin-Wave Transducer," in IEEE Trans. Magnetics (pre-print).
   https://ieeexplore.ieee.org/abstract/document/9442735 DOI:10.1109/TMAG.2021.3084097
   Contribution: Helped to conceive of theoretical approach. Advised measurement and analysis. Impact Factor 1.700.
7. 2020: N. Garcia† and **J. Chisum**, "Reduced dimensionality optimizer for efficient design of wideband millimeter-wave 3D metamaterial GRIN lenses," in Microw. Opt. Techn. Lett., vol. 63, no. 5, pp. 1372-1376, May 2021.
   https://onlinelibrary.wiley.com/doi/full/10.1002/mop.32755 DOI:10.1002/MOP.32755
   Contribution: Solely Chisum group. Impact Factor 1.392.
8. 2020: T. Zirkle, M. Filmer, **J. Chisum**, A. Orlov, E. Dupont-Ferrier, J. Rivard, M. Huebner, M. Sanquer, X. Jehl and G. Snider, "Radio frequency reflectometry of single-electron box arrays for nanoscale voltage sensing applications," in MDPI Appl. Sciences, vol. 10, no. 24, pp.8797:1–29. Dec. 2020.
   https://www.mdpi.com/2076-3417/10/24/8797
   DOI:10.3390/app10248797.
   Contribution: Advised design of matching networks, participated in analysis of measurements and development of theoretical and simulation models. Impact Factor: 2.679.

9. 2020: D. Connelly† and **J. Chisum**, "VO_2 antennas with metallic inclusions for low-loss reconfigurable cognitive radios," in Microw. Opt. Techn. Lett., vol. 63, no. 4, pp. 1257–1263, Apr 2021. Published Nov. 19, 2020.
https://onlinelibrary.wiley.com/doi/10.1002/mop.32729
DOI:10.1002/mop.32729
Contribution: Solely Chisum group. Impact Factor 1.392.
10. 2020: N. Estes†, K. Gao, B. Hochwald, J. Nicholas Laneman and **J. Chisum**, "Efficient modeling of low-resolution millimeter-wave transceivers for massive MIMO wireless communications systems," in Microw. Opt. Techn. Lett., , vol. 63, no. 4, pp. 1134–-1140, Apr 2021. Published Nov. 16, 2020.
https://onlinelibrary.wiley.com/doi/10.1002/mop.32727
DOI:10.1002/mop.32727
Contribution: Primary Chisum group. Impact Factor 1.392.
11. 2020: D. A. Connelly† and **J. D. Chisum**, "Dynamically Reconfigurable Microwave Circuits Leveraging Abrupt Phase-Change Material," in IEEE Trans. Microw. Theory Techn., vol. 68, no. 10, pp. 4188-4205, Oct. 2020.
https://ieeexplore.ieee.org/document/9161288
DOI:10.1109/TMTT.2020.3012137
Contribution: Solely Chisum group. Impact Factor 3.599.
12. 2020: M. Filmer, T. Zirkle, **J. Chisum**, A. Orlov, and G. Snider, "Using single-electron box arrays for voltage sensing applications," Appl. Phys. Lett. vol. 116, no. 21, pp. 213103, May 26, 2020.
https://aip.scitation.org/doi/10.1063/5.0005425 DOI:10.1063/5.0005425
Contribution: Advised design, fabrication, and analysis/modeling of microwave instrumentation for readout of SEB sensors. Impact Factor 3.791.
13. 2020: N. Garcia† and **J. Chisum**, "High-efficiency, Wideband GRIN Lenses with Intrinsically Matched Unit-cells," in IEEE Trans. Antennas Propag., vol. 68, no. 8, pp. 5965-5977, published Apr. 2020, printed Aug. 2020.
https://ieeexplore.ieee.org/abstract/document/9082819
DOI:10.1109/TAP.2020.2990289
Contribution: Solely Chisum group. Impact Factor 4.371.
14. 2019: N. Kleber†, C. Dietlein, and **J. Chisum**, "Cooperative Cross-Correlation Algorithm To Optimize Linearity of Fused RF Sensor Measurements," IEEE Sensors J., vol. 20, no. 7, pp. 3766-3776, published Dec 13, 2019, printed Apr 1, 2020.
https://ieeexplore.ieee.org/abstract/document/8932572
DOI:10.1109/JSEN.2019.2959255
Contribution: Solely Chisum group. Impact Factor 3.301.
15. 2019: A. Papathanasopoulos, Y. Rahmat-Samii, N. Garcia†, and **J. D. Chisum**, "A Novel Collapsible Flat-Layered Metamaterial Gradient-Refractive-Index (GRIN) Lens Antenna," IEEE Trans. Antennas Propag., vol. 68, no. 3, pp. 1312-1321, published Oct 4, 2019, printed March 2020.
https://ieeexplore.ieee.org/abstract/document/8859611
DOI:10.1109/TAP.2019.2944546
Contribution: Advised design and analysis. Responsible for prototype and fabrication methods and modeling of errors. Impact Factor 4.371.
16. 2018: J.C. Merritt IV† and **J.D. Chisum**, "High-Speed Cross-Correlation for Spectrum Sensing and Direction Finding of Time-Varying Signals," IEEE Sensors J., vol. 18, no. 15, pp. 6161-6168, August 1, 2018.
https://ieeexplore.ieee.org/abstract/document/8385152/
DOI:10.1109/JSEN.2018.2847598
Contribution: Solely Chisum group. Impact Factor 3.301.

6.2 Refereed Journal Articles - Prior to 2015

17. **J.D. Chisum** and Z. Popovic, "Performance Limitations and Measurement Analysis of a Near-Field Microwave Microscope for Nondestructive and Subsurface Detection," IEEE Trans. Microw. Theory Techn., vol. 60, no. 8, pp. 2605-2615, Aug. 2012.
http://ieeexplore.ieee.org/abstract/document/6222358/
DOI:10.1109/TMTT.2012.2201739
Impact Factor: 3.599.
18. **J.D. Chisum**, E.N. Grossman, and Z. Popovic, "A General Approach to Low Noise Readout of Terahertz Imag-

ing Arrays," Rev. Sci. Instrum., vol. 82, no. 6, pp. 065106, Jun. 2011. http://aip.scitation.org/doi/full/10.1063/1.3599419 DOI:10.1063/1.3599419
Impact Factor: 1.604.

19. V. Viikari, **J. Chisum**, and H. Seppa, "Wireless passive photo detector for insect tracking," Microw. Opt. Technol. Lett., vol. 52, no. 10, pp. 2312–2315, Oct. 2010. http://onlinelibrary.wiley.com/doi/10.1002/mop.25427/full DOI:10.1002/mop.25427
Impact Factor: 1.392.

6.3 Refereed Conference Publications

20. N. Garcia† and **J. Chisum**, "Compound GRIN Lens Fanbeam Antenna for Wide-angle Scanning," accepted for presentation at the 2021 IEEE Intl. Ant. Propag. Symp. & USNC-URSI NRSM, Singapore, Dec 2021.
21. N. Estes† and **J. Chisum**, "A 10MHz-1GHz Mitigated Shunt Capacitance Hybrid LNA for Use in a Ka-Band Envelope Detector Baseband Output," presented at the 2021 USNC-URSI National Radio Science Meeting, Boulder CO, Jan, 2021.
https://www.usnc-ursi-archive.org/nrsm/2021/Proceedings/pdfs/0000226.pdf
22. Hadrian Aquino, David Connelly†, Adam Papp, Alexei Orlov, **Jonathan Chisum**, Gary H Bernstein, Wolfgang Porod, "Towards a Chip-Scale Millimeter-Wave Spectrum/Signal Analyzer Using Spin-Wave Diffraction and Interference," in Proc. of 2020 IEEE Silicon Nanoelectronics Workshop (SNW), Honolulu, HI, USA, Jun 13-14, 2020.
DOI:10.1109/SNW50361.2020.9131613
23. H. Aquino, D. Connelly†, A. Orlov, J. Chisum, G. H. Bernstein and W. Porod, "Using Coplanar Waveguides as Spin-Wave Sources with Improved Bandwidth," 2020 Device Research Conference (DRC), Columbus, OH, USA, 2020, pp. 1-2.
https://ieeexplore.ieee.org/document/9135163
DOI:10.1109/DRC50226.2020.9135163
24. N. Garcia† and **J. Chisum**, "Wide-angle Beam-scanning with Squinted Feed Elements," in Proc. of 2020 IEEE Ant. Propag. Symp. and USNC URSI, Montreal, CA, Jul 2020.
https://ieeexplore.ieee.org/document/9321642

25. K. Gao, J. N. Laneman, N. J. Estes†, **J. Chisum**, and B. Hochwald, "Channel Estimation with One-Bit Transceivers in a Rayleigh Environment," in Proc. 2019 IEEE Globecom Workshop, Waikoloa, HI, USA, Dec. 9-13, 2019.
https://ieeexplore.ieee.org/abstract/document/9024647
DOI:10.1109/GCWkshps45667.2019.9024647
26. K. Gao, J. N. Laneman, N. J. Estes†, **J. Chisum**, and B. Hochwald, "Training for Channel Estimation in Nonlinear Multi-Antenna Transceivers," presented at 2019 IEEE Info. Theory and Appl. Workshop, Feb. 2019. Available: arXiv:1912.06924 [cs.IT]
27. N. Estes† and **J. Chisum**, "Increased Power Handling of Vanadium Dioxide T/R Switches Using a Resonant Topology," in Proc. 2019 IEEE MTT-S Intl. Microw. Symp. (IMS), Boston MA, Jun. 2-7, 2019.
https://ieeexplore.ieee.org/abstract/document/8701088
DOI:10.1109/MWSYM.2019.8701088
28. D. Connelly†, G. Csaba, G. Bernstein, A. Orlov, **J. Chisum**, and W. Porod, "Towards a simulation framework for coupled microwave and micromagnetic structures," in Proc. of 2019 Intl. Workshop Comp. Nanotechn., pp.85-86, Chicago IL, May 20-24, 2019.
http://in4.iue.tuwien.ac.at/pdfs/iwce/iwcn2_2019/IWCN_2019_085-086.pdf
29. David J. Benirschke, Abbas Termos, Nikolaus Kleber, David Connelly†, Bertrand Hochwald, **Jonathan Chisum**, Scott S. Howard, "Realization of a plug-and-play, low SWAP-C, MIR imaging system utilizing a commercially available low-cost VOx microbolometer array for enabling imaging applications," Proc. SPIE 10795, Electro-Optical and Infrared Systems: Technology and Applications XV, 107950D, Oct. 9 2018.
https://www.spiedigitallibrary.org/conference-proceedings-of-spie/10795/2325588/Realization-of-a-plug-and-p
10.1117/12.2325588.full
DOI:10.1117/12.2325588
30. Erica Messinger, Kathleen L. Melde, **Jonathan Chisum**, Julio Urbina, Jing Wang, Stephen E. Ralph, "Different strategies for preparing students to tackle the RF engineering challenges of tomorrow – a Panel Discussion,"

in Proc. 2018 ASEE Annu. Conf. & Expo., Salt Lake City UT, June 27, 2018.
https://peer.asee.org/30334

31. W. Bai† and **J. Chisum**, "A Compact, Wide Field-of-View Gradient-index Lens Antenna for Millimeter-wave MIMO on Mobile Devices," in Proc. 86th IEEE Veh. Technol. Conf., Fall 2017, Toronto, Canada, Sep 24-27, 2017.
https://ieeexplore.ieee.org/abstract/document/8288369
DOI:10.1109/VTCFall.2017.8288369
32. N. Garcia†, W. Bai†, T. Twahirwa*, D. Connelly†, **J. Chisum**, "Silicon Micromachined High-contrast Artificial Dielectrics for Millimeter-wave Transformation Optics Antennas" in Proc. 2017 IEEE Int. Symp. on Antennas and Propag., San Diego, CA, Jul 9-14, 2017, pp. 1971-1972.
https://ieeexplore.ieee.org/abstract/document/8073028
DOI:10.1109/APUSNCURSINRSM.2017.8073028
33. J. Merritt IV†, C. Dietlein, **J. Chisum**, "Collaborative and Responsive Sensors for Low-cost Spectrum Sensing and Geolocation," in Proc. 9th NATO Mil. Sens. Symp. (SET-241), Quebec City, Canada, Jun 2, 2017.
https://www.sto.nato.int/publications/STO%20Meeting%20Proceedings/STO-MP-SET-241/MP-SET-241-13-4.pdf
34. N. Kleber, A. Termos, G. Martinez, J. Merritt†, B. Hochwald, **J. Chisum**, A.D. Striegel, J.N. Laneman, "Radio-Hound: A Pervasive Sensing Platform for Sub-6 GHz Dynamic Spectrum Monitoring", Proc. of the 2017 IEEE Int. Symp. on Dynamic Spectrum Access Networks (DySPAN), Baltimore MD, pp. 1-2, Mar 6-9, 2017.
http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7920764&isnumber=7920740
DOI:10.1109/DySPAN.2017.7920764
35. K. Gao, N.J. Estes†, B. Hochwald, **J. Chisum**, J.N. Laneman, "Power-Performance Analysis of a Simple One-Bit Transceiver", Proc. of the 2017 Inf. Theory and Appl. Workshop, San Diego CA, Feb. 12-17 2017.
http://ita.ucsd.edu/workshop/17/files/paper/paper_108.pdf
36. N. Estes†, **J. Chisum**, "Sub-surface Spatial Resolution of a Near-field Scanning Microwave Microscope," in Proc. 2016 NAECON-OIS Conf., Dayton OH, Jul 2016, pp. 464-467.
http://ieeexplore.ieee.org/document/7856850/ doi: 10.1109/NAECON.2016.7856850
37. A. Bolstad, J. Vian, **J. Chisum**, Y. Suh, "An Array-based Compressed Sensing Receiver Architecture," Proc. of the 2016 IEEE Int. Symp. on Phased Array Systems and Techn., Waltham, MA, Oct 18-21 2016.
http://ieeexplore.ieee.org/document/7832659/
DOI:10.1109/ARRAY.2016.7832659
38. A. K. Bolstad, J. E. Vian, **J. D. Chisum** and Y. Suh, "Practical sub-Nyquist sampling via array-based compressed sensing receiver architecture," Proc. of the 2016 IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM), Rio de Janerio, pp. 1-5, Jul 10-13 2016.
http://ieeexplore.ieee.org/document/7569669/
doi:10.1109/SAM.2016.7569669
39. A. Imtiaz, T.M. Wallis, S.H. Lim, **J. Chisum**, Z. Popovic, and P. Kabos, "Near-field antenna as a Scanning Microwave Probe for characterization of materials and devices," in Proc. Fourth (2010) Europ. Conf. on Antennas and Propag. (EuCAP), Barcelona, Spain, Apr 12-16 2010.
http://ieeexplore.ieee.org/abstract/document/5505692/
40. **J.D. Chisum**, M. Ramirez, and Z. Popovic, "Planar Circuits for Non-contact Near-Field Microwave Probing," in the IEEE MTT-S Europ. Microw. Conf. Digest, pp. 802-805, Sep 29 2009.
https://ieeexplore.ieee.org/abstract/document/5295982
DOI:10.23919/EUMC.2009.5295982
41. C. Dietlein, **J. Chisum**, M. Ramirez, E. Grossman, and Z. Popovic, "Integrated microbolometer antenna characterization from 95–650 GHz," in Proc. 2007 IEEE MTT-S Int. Microw. Symp. (IMS), Honolulu, HI, pp. 1165-1168, Jun 9, 2007.
http://ieeexplore.ieee.org/document/4264036/
DOI:10.1109/MWSYM.2007.380337
42. E.N. Grossman, C.R. Dietlein, **J. Chisum**, A. Luukanen, J.E. Bjarnason, E.R. Brown, "Spectral decomposition of ultrawideband terahertz imagery," in the Proc. of the SPIE, vol. 6548, pp. 654807-1-654807-8, Apr 09, 2007.
http://proceedings.spiedigitallibrary.org/proceeding.aspx?articleid=1302144
DOI:10.1117/12.719632

7 Conference Abstracts & Short Manuscripts

1. W. Wang†, M. Roddy*, N. Garcia†, N. Estes†, and **J. Chisum**, "Sparse-fed GRIN Lens Antennas for Low-cost and Low-power Millimeter-wave Beamscanning," accepted for presentation at the 2021 IEEE Ant. Propag. Symp. and USNC URSI.
2. D. Connelly† and **J. Chisum**, "High Radiation Efficiency Phase-change Material Antennas with Conductive Inclusions," presented at the 2019 IEEE Ant. Propag. Symp. and USNC URSI, Atlanta, GA, Jul 2019. https://www.usnc-ursi-archive.org/aps-ursi/2019/abstracts/1805.pdf
3. N. Estes†, N. Garcia† and **J. Chisum**, "The Onset of Grating Lobes in Arrays of Electrically Large Apertures: A Study for Lenslet Arrays," presented at 2019 IEEE Int. Symp. on Antennas and Propag., Atlanta, GA, Jul 2019. https://www.usnc-ursi-archive.org/aps-ursi/2019/abstracts/1777.pdf
4. D. Connelly† and **J. Chisum**, "Concepts for VO2-Based Reconfigurable Distributed Microwave Circuits" presented at 2018 IEEE Int. Symp. on Antennas and Propag., Boston, MA, Jul 8-13, 2018. https://www.usnc-ursi-archive.org/aps-ursi/2018/papers/2379.pdf
5. W. Bai†, N. Garcia†, **J. Chisum**, "Tradeoffs in Millimeter-wave Beam-steering Technologies," Poster session at the 3rd NSF MMW RCN Workshop, Tuscon AZ, Jan. 18-19, 2018. https://mmwrcn.ece.wisc.edu/wp-content/uploads/sites/678/2017/12/NSF-MMW-RCN-Arizona-2018-Chisum-final.pdf
6. D. Connelly†, **J. Chisum**, "Assessment of VO2Phase-change Materials for Programmable Microwave Circuits" presented at 2018 USNC URSI National Radio Science Meeting, Boulder CO, Jan. 2018. https://www.usnc-ursi-archive.org/nrsm/2018/papers/D1-3.pdf
7. N. Estes†, **J. Chisum**, "Nonlinear Characterization of Phase-change Switches for Reconfigurable Millimeter-wave Front-ends," presented at 2018 USNC URSI National Radio Science Meeting, Boulder CO, Jan. 2018. https://www.usnc-ursi-archive.org/nrsm/2018/papers/D1-2.pdf
8. **J.D. Chisum**, and Z. Popovic, "A Scanning Lock-in Vector Near-field Probe for Noise Limited Microwave Measurements," presented at the 2010 IEEE Int. Symp. on Antennas and Propag., Toronto, Canada, Jul 2010.

8 Other Publications

8.1 Patents

1. (Provisional) "Sparse phased-array-fed focusing aperture antennas without grating lobes," Filed: Apr 20, 2021. Application #: 63/177,332.
2. (Provisional) "Compound lenses for improving beam-scan performance of reflector and lens antennas," Filed: Apr 16, 2021. Application #: 63/175,734.
3. (Patent Pending) "Local Oscillator Synchronization for Coherent Phased-Array," Filed: Nov 24, 2020. Application #: 17/102,666.
   11,121,896
4. (Patent Pending) "High Contrast Gradient Index Lens Antennas," #US 20200018874A1, Filed: Jul 13, 2018. https://patents.google.com/patent/US20200018874A1
5. (Patent Granted) "LOW-RESOLUTION, LOW-POWER, RADIO FREQUENCY RECEIVER", #11,121,896 Granted: 9/14/2021.
6. (Patent Granted) "Methods and Apparatus for Spin-Wave-Based Spectrum Analyzer", #US 20170248640 A1 application, #10,613,129 granted, Filed: Feb 22, 2016, Granted Apr 7, 2020. https://patents.google.com/patent/US20170248640A1/
7. (Patent Granted) "Methods and Apparatus for Array-based Compressed Sensing," #US 20180083816 A1, Filed: May 15, 2015, Granted: Jul 30, 2019. https://patents.google.com/patent/US20180083816A1/

8.2 Reports Not For Public Release

1. **J. Chisum**, "Non-Foster Circuits for Wideband Metamaterials," MIT Lincoln Laboratory Technical Report, Oct 2015 [not for public release].
2. **J. Chisum**, "Overview and Assessment of Microwave Metamaterials", MIT Lincoln Laboratory Technical Report, Oct 2014 [not for public release].

9 Invited Lectures & Addresses

9.1 External

1. Jan 2021: Panelist at USNC URSI 2021 National Radio Science Meeting, Boulder CO (virtual), "Successful Proposal Writing for Sustainable and Impactful Research—From Tenure Track to Endowed Chair"
2. Sept 2018: Present to Air Force Research Laboratory RYW Spectrum Warfare Division, Dayton OH, "Low-power Beam-scanning Lens Antennas and Reconfigurable Antennas"
3. June 6, 2018: Present to Disruptive Technologies Lab at NAVSEA Naval Surface Warfare Center Carderock (NSWC-Carderock), "RadioHound – A Mobile Spectrum Measurement Device"
4. June 27, 2018: Panelist at the American Society for Engineering Education annual conference, Salt Lake City, UT, "Different strategies for preparing students to tackle the RF engineering challenges of tomorrow – a Panel Discussion"
5. November 13, 2017: Keysight Technologies, Santa Rosa, CA – "High-precision Gradient-index Lenses for Reproducible Millimeter-wave Beam-steering Antennas"
6. October, 2017: NATO System Concepts and Integration Workshop (SCI-297) – Army Research Laboratory, Adelphi MD – "Low-cost and Low-power Distributed Spectrum Sensing in Congested Environments"
7. August, 2017: Qualcomm, San Diego CA – "Silicon Micromachined Millimeter-wave Transformation Optics Antennas"
8. October, 2016: Sandia National Laboratories, Albuquerque NM – "Sub-surface Nanoelectronic Characterization"
9. July, 2016: Panelist at the Naval Surface Warfare Center Crane (NSWC-Crane), Microelectronics Integrity Meeting (MIM2016), Indianapolis IN – "Sub-surface Spatial Resolution of Scanning Near-field Microwave Microscope"
10. May, 2015: Presenter at CS-MANETCH 2015 Workshop – "RF for Device and Fab Engineers: Power Amplifier Design"
11. May, 2014: Presenter at Lincoln Laboratory Communication Workshop – "Non-Foster Circuits for Wideband Metamaterials"

9.2 Internal (at Notre Dame)

12. Feb, 2019: (Invited) Wireless Institute Colloquium: "How does a radio work and why do we need all that stuff?"

10 Grants and Sponsored Programs

Total funding: $7.6M (2015-present)
Funding to Chisum: $3.6M (2015-present)

10.1 External funding

1. MLWiNS: Quantity Versus Quality in Spectrum Sensing with Distributed Sensors
   - Principle investigators: Bertrand Hochwald (lead), Jonathan Chisum, Siddharth Joshi
   - Sponsor: NSF & Intel
   - Total budget: $443,334
   - Duration: 7/1/2020-6/30/2023
   - Allocation of credit: 33%
   - Role: assisting with sensor applications and modeling
2. Co-designed Aperture and Feed GRIN Lenses for Low Scan-Loss Beam-steering
   - Principle investigator: Jonathan Chisum (sole PI)
   - Sponsor: ONR (Dept. of Navy)
   - Total budget: $622,825
   - Duration: 4/1/2020-3/31/2022
   - Allocation of credit: 100%
   - Role: Conceived of concept and method, wrote proposal, developed design method, solely responsible for management of program, oversee design and realization
3. Wide Field-of-view GRIN Lens Antenna
   - Principle investigator: Jonathan Chisum (sole PI)
   - Sponsor: Parry Labs (Dept. of Navy)
   - Total budget: $202,492
   - Duration: 9/30/2019-6/30/2020
   - Allocation of credit: 100%
   - Role: Conceived of concept and method, wrote proposal, developed design method, solely responsible for management of program, oversee design and realization
4. Let Spin-Wave Physics do the Computing
   - Principle investigators: Wolfgang Porod (lead), Gary Bernstein, Jonathan Chisum, Alexei Orlov
   - Sponsor: DARPA
   - Total budget: $290,885
   - Duration: 11/12/2019-8/11/2020
   - Allocation of credit: 25%
   - Role: Produced preliminary data and concepts in a previous program (with co-PIs) and serve an advising role with respect to the interface of spin-waves and microwave systems.
5. ALERT Center of Excellence in Explosives Research
   - Principle investigator: Scott Howard (lead), Vijay Gupta, Jonathan Chisum
   - Sponsor: U.S. Dept. Homeland Security
   - Total budget: $200,000
   - Duration: 10/3/2019-6/30/2020
   - Allocation of credit: 25%
   - Role: Co-developed hardware platform for complete sensor integration, over-see software and algorithm development for RF spectrum sensing effort within program.
6. UAV Spectrum Sensing
   - Principle investigators: Jonathan Chisum (lead), Bertrand Hochwald
   - Sponsor: ONR (funds via Dept. of Army CA)
   - Total budget: $83,160
   - Duration: 7/17/2019-7/16/2020
   - Allocation of credit: 50%
   - Role: Conceived of concept and method, co-developed hardware platform, over-see algorithm develop-

ment and hardware integration.

7. Improving STEM Retention through Hands-on Implementation and Red-teaming: A Pilot Curriculum for Congested Communications and Electronic Warfare
   - Principle investigators: Nick Laneman (lead), Jonathan Chisum, Bertrand Hochwald, Matt Kloser
   - Sponsor: Office of Naval Research (Dept. of Navy)
   - Budget: $532,164
   - Duration: 08/15/2018-08/14/2019 (first installment)
   - Allocation of credit: 25%
   - Role: Co-developed proposal and research plan, Co-developing course lecture and laboratory content.
8. BWAC: GRIN-lens Based Millimeter-wave Direction of Arrival Sensor
   - Principle investigator: Jonathan Chisum
   - Sponsor: National Science Foundation, BWAC I/UCRC
   - Total budget: $49,787
   - Duration: 07/09/2018-07/31/2019
   - Allocation of credit: 100% (note: not counted in funding totals above)
   - Role: Conceived of concept and method, wrote proposal, developed design method, solely responsible for management of program, oversee design and realization
9. Physical Layer Signature Discrimination of Transmitters
   - Principle investigators: Jonathan Chisum (lead), Bertrand Hochwald, Andrew Bolstad (Iowa State)
   - Sponsor: Office of Naval Research (Dept. of Navy)
   - Budget: $100,000
   - Duration: 03/30/2018-10/29/2019
   - Allocation of credit: 50%
   - Role: Designing and led the research plan, coordinated team at ND, Iowa State University, and the Army Research Laboratory. Solely responsible for reporting and quarterly sponsor visits.
10. High-contrast Gradient Index Lenses for Low-power Millimeter-wave Beam-steering
    - Principle investigators: Jonathan Chisum
    - Sponsor: Parry Labs, Inc.
    - Budget: $306,621
    - Duration: 04/16/2018-06/30/2019
    - Allocation of credit: 100%
    - Role: Solely responsible for research plan and execution, direction of two graduate students, hiring of a professional engineer, as well as interfacing with the sponsor.
11. SP-MIMO Radar Studies
    - Principle investigators: Thomas Pratt (lead), Jonathan Chisum
    - Sponsor: Office of Naval Research (Dept. of Navy)
    - Budget: $960.393
    - Duration: 03/01/2018-02/28/2021
    - Allocation of credit: 8.6%
    - Role: Oversee design and demonstration of dual polarization antennas and new concepts antenna concepts for high-performance polarization radar applications.
12. ND Wireless Institute REU: Advanced Wireless Research Experiences (AWaRE)
    - Principle investigators: Bertrand Hochwald (lead), Rick Billo
    - Key personnel: Jonathan Chisum
    - Sponsor: NSF
    - Budget: $376,637
    - Duration: 01/15/2018-12/31/2020
    - Allocation of credit: 0%
    - Role: Key participant–My role is to propose summer projects for undergraduate summer research, host and mentor them in my group, and oversee their research efforts every year.
    - Students: (2021) James Ernst, “Sparse-fed Lens Antennas for Low-cost and Low-power Beamscanning”, (2019) Muhammad Hussain, “Programmable Dipole Antennas with Electric-field Control”, (2018) Tristen Lewandowski, “Numerical Simulation of Metallic Inclusions in VO_2 Films for Reconfigurable RF Circuits.”
13. Data-gathering Plan for Radio-frequency Machine-Learning Systems (RFMLS)

- Principle investigators: Bertrand Hochwald (lead), Jonathan Chisum
- Sponsor: DARPA MTO
- Budget: $149,332
- Duration: 10/01/2017-06/01/2018
- Allocation of credit: 50%
- Role: Advised and provided assistance in measurement support. Advised in preliminary data analysis.

14. Wideband Wireless Communications with Low-Power Transceiver-Cell Circuits
    - Principle investigators: Bertrand Hochwald (lead), Jonathan Chisum, J. Nicholas Laneman
    - Sponsor: National Science Foundation, ECCS - SpecEES
    - Budget: $650,000
    - Duration: 08/15/2017-08/14/2020
    - Allocation of credit: 33%
    - Role: Conceived of low-power millimeter-wave transceiver designs, co-wrote proposal, responsible for concept, design, fabrication, and demonstration of highly efficient millimeter-wave transceiver integrated circuits in GaN for massive-MIMO transceivers, co-develop metrics and interfaces for optimizing power dissipation versus system performance
15. Chip-Scale Microwave Frequency Spectrum Analyzer Using Spin-Wave Diffraction and Interference
    - Principle investigators: Wolfgang Porod (lead), Jonathan Chisum, Gary Bernstein
    - Sponsor: National Science Foundation, ECCS - SpecEES
    - Total budget: $690,000
    - Duration: 09/01/2017-08/31/2020
    - Allocation of credit: 33%
    - Role: Co-conceived of microwave application of magnetic thin-film lenses, co-wrote proposal, oversee microwave modeling of magnetic structures, spin-wave launches, and detectors for interfacing with microwave systems
16. BWAC: Artificial Media for Low-cost Millimeter-wave Multi-beam Antennas - Phase II
    - Principle investigator: Jonathan Chisum
    - Sponsor: National Science Foundation, BWAC I/UCRC
    - Total budget: $40,000
    - Duration: 08/01/2017-07/31/2018
    - Allocation of credit: 100% (note: not counted in funding totals above)
    - Role: Conceived of concept and method, wrote proposal, developed design method, solely responsible for management of program, oversee design and realization of lenses
17. BWAC: Artificial Media for Low-cost Millimeter-wave Multi-beam Antennas - Phase I
    - Principle investigator: Jonathan Chisum
    - Sponsor: National Science Foundation, BWAC I/UCRC
    - Total budget: $40,000
    - Duration: 08/01/2016-07/31/2017
    - Allocation of credit: 100% (note: not counted in funding totals above)
    - Role: Conceived of concept and method, wrote proposal, developed fabrication technology, developed measurement method, solely responsible for management of program
18. DURIP: Wideband time-domain millimeter-wave device and channel characterization testbed
    - Principle investigators: Jonathan Chisum (lead), Bertrand Hochwald, Patrick Fay, Tom Pratt
    - Sponsor: Department of the Navy (ONR)
    - Total budget: $326,573
    - Duration: 07/15/2016-07/14/2017
    - Allocation of credit: 25%
    - Role: Conceived of concept, wrote proposal, executed development of testbed, operator of testbed, wrote reports to sponsor, solely managed ND effort and execution
19. Distributed Spectrum Sensing with Collaborative and Responsive Nodes
    - Principle investigator: Jonathan Chisum (lead)
    - Sponsor: Department of the Army (ARL)
    - Total budget: $764,787
    - Duration: 07/05/2016-07/04/2021

- Allocation of credit: 100%
- Role: Conceived of concept, wrote proposal, fully responsible for managing team and executing, report to sponsor

20. Distributed Electromagnetic Emitter Localization with Power Measurements
    - Principle investigators: Jonathan Chisum (lead), Bertrand Hochwald
    - Sponsor: Department of the Army (ARL)
    - Total budget: $65,375
    - Duration: 05/31/2016-07/31/2016
    - Allocation of credit: 50%
    - Role: Co-conceived of concept, wrote proposal, managed ND team, co-developed methods, co-wrote reports, represented team to Army sponsor

10.2 Student Institutional Fellowships

- 2021: Caitlyn Coverstone, ND Schmitt Fellowship
- 2020-present: Maxwell Robbins, ND Schmitt Fellowship
- 2018: Tristen Lewandowski, ND Wireless Institute AWaRE REU
- 2017-2018: Nicolas Garcia, ND Remick Fellowship
- 2017-2021: John Merritt, ND Schmitt Fellowship
- 2017-2021: Nicholas Estes, ND Schmitt Fellowship
- 2017: Nicolas Garcia, ND EE James L. Massey Award
- 2016: Nicolas Garcia, NDnano Undergraduate Research Fellowship

10.3 Student External Fellowships/Awards

- Nicholas Estes, IEEE MTT-S International Microwave Symposium 2017 Graduate Student Challenge, 1st prize
- *Travel grants - 2017 IEEE MTT-S Graduate Student Fellowship:* Nicholas Estes, David Connelly, John Merritt

11 Master's Theses Directed

N/A

12 Doctoral Dissertations Directed

12.1 Current Doctoral Advising

- Caitlyn Coverstone (incoming, Fall 2021, Ph.D)
- Jaihao Zhang (2^{st} year Ph.D)
- Maxwell Robbins (2^{st} year Ph.D)
- Wei Wang (3^{st} year Ph.D)
- Nicholas Garcia (5^{rd} year Ph.D.) - Passed candidacy exam September 4, 2020.
- Nicholas Estes (6^{th} year Ph.D.) - Passed candidacy exam April 21, 2020.
- David Connelly (6^{th} year Ph.D.) - Passed candidacy exam May 28, 2020.

12.2 Past Advising

- Hanxiang Zhang - M.S. 2021
- Wenlong Bai - M.S. 2019
- John Merritt IV - M.S. 2018, currently at Army Research Laboratory

12.3 Post-doctoral Advising

- Hassna Ouassal (2021-2022)

13 Professional Memberships

- Institute of Electrical and Electronics Engineers (IEEE), Member, #80610594
- American Physical Society (APS), Member, #61035863
- U.S. National Committee for the International Union for Radio Science (USNC-URSI)
  - Elected Member USNC-URSI Commission D: Electronics and Photonics (2017-present)
  - Vice-chair, USNC-URSI Commission D: Electronics and Photonics (2018-2020)

14 Other Notable Contributions

14.1 Service to the profession

- 2019-2022: USNC-URSI National Radio Science Meeting Tutorial Committee member
- 2018-2024: Vice-chair, USNC-URSI Commission D
- 2017: Secretary, USNC-URSI Commission D
- 2018-2020: TPC member, URSI National Radio Science Meeting
- 2018-2020: TPC member, International Symposium on Antennas and Propagation *&* USNC-URSI Radio Science Meeting
- 2018-2020: Session chair, URSI National Radio Science Meeting
- 2018-2020: Session chair, International Symposium on Antennas and Propagation *&* USNC-URSI Radio Science Meeting
- 2018-2020: Special session organizer, International Symposium on Antennas and Propagation *&* USNC-URSI Radio Science Meeting
  - 2018: "Reconfigurable RF Circuits for Wideband Antenna Systems"
- 2018-2020: Special session organizer, USNC-URSI National Radio Science Meeting (January meeting)
  -
  - 2018: "Active circuits from RF to THz"
- 2018: Reviewer for NSF panel, SpecEES program
- 2011-present: Reviewer for IEEE Transactions on Microwave Theory and Techniques, IEEE Microwave and Wireless Component Letters, IEEE Transactions on Antennas and Propagation, AIP Review of Scientific Instruments, IET Electronics Letters, and MDPI Sensors Journal
- 2015: TPC Member, IEEE Vehicular Technologies Conference September 2015
- 2015: Northern Indiana Science and Engineering Fair Judge

14.2 Service to the Department/University

- 2021: CoE Future Faculty Workshop panelist
- 2019: EE Department Graduate Admissions Committee
- 2019, 2021: Organized the EE Department Solid-state Seminar series.
- 2018-2021: Undergraduate class mentor, EE class of 2021
- 2017: EE Department Undergraduate Committee
- 2016: EE Department Graduate Admissions Committee
- 2015-2018: Undergraduate class mentor, EE class of 2018

14.3 Undergraduate Research Advising

- 2021: NSF REU: Jimmy Ernst, "Phased Arrays and Lenses for Low-Power 5G MMW Communications"
- 2020-2021: Senior design research advisor: Matthew Roddy, "Sparse-Array-fed GRIN Lenses for low-cost and low-power Millimeter-wave Beamscanning"
- 2021: MaryKate Drennan: Phase Noise Effects on Distributed Antennas Arrays
- 2021: Analysis of Phase Noise in Local Oscillators Intended for Use in Distributed Arrays
- 2019-2020: Senior design sponsor/advisor: NASA Student Launch Rocketry Competiation - Radio Telemetry Link Team (Michael Frye, Alex Filmer, Megan Finnan, Zachary Kowalczyk, Tristen Lewandowski)
- 2019-2020: Tristen Lewandowski: Antenna Design and Measurement
- 2019: NSF REU: Muhammad Hussain, "Programmable Dipole Antennas with Electric-field Control"

- 2019: NSF REU: Tristen Lewandowski, "Numerical Simulation of Metallic Inclusions in VO_2 Films for Reconfigurable RF Circuits."
- 2018-2019: Alex Filmer: Microfabrication of Silicon Gradient-index Lens Antennas for beyond 100 GHz
- 2018-2019: Jose Montalvo: Microfabrication of Silicon Gradient-index Lens Antennas for beyond 100 GHz
- 2018-2019: Tom Pollei: 1-bit Millimeter-wave Transmitters for 6G Communications, GRIN lens wideband impedance matching design
- 2018-2019: Rebecca Hoehne: RF Sources of Physical Layer Fingerprints in Machine Learning Classifiers
- 2017-2018: Senior design sponsor/advisor: Low-cost Spectrum Sensor (Andre Magill, Joey Pye, John Docalovitch, Zachary Bennett, Shane Ryan)
- 2017-2018: Kevin Conway: RF Spectrum Field Measurements for Machine Learning
- 2017-2018: Stephen Jackson: Emitter geolocation field measurements and algorithm validation
- 2016-2018: Andre Magill: High-power non-Foster circuits
- 2016-2017: Anthony Calvo: High-power non-Foster circuits
- 2016-2017: Nicolas Garcia: Silicon microfabrication DRIE process development, high-contrast gradient-index lens antennas (note: Nicolas transitioned to my group in 2017 to pursue his Ph.D.)
- 2016-2017: Senior design research advisor: Thibault Twahirwa, Silicon microfabrication DRIE process development, millimeter-wave lens antenna design, millimeter-wave passive feed circuits
- 2015-2016: Kenneth Harkenrider: Design and stabilization of non-Foster circuits

14.4 New Courses Developed

1. EE40453: Wireless Communications (Pilot)
   - *Description:* The Office of Naval Research has funded myself and two co-PIs (Prof. Laneman and Prof. Hochwald) to develop a wireless communications course which considers the challenging case of interference. This necessarily requires a hybrid hardware/algorithm treatment of wireless communications. The course includes approximately 10 "self-red-teaming" labs wherein students sequentially build a radio and wireless link then expose it's limitations. The first seven labs walk the students through wireline communications, over-the-air communications, and from dual-sideband homodyne radios to the superheterodyne radio. The final three labs explore various topics in wireless communications. My primary role has been overseeing the radio architecture portion of the course with a special emphasis on the lab. I have also supported Prof. Laneman in crafting concise lectures on antennas and radio architectures as well as on noise and linearity of circuits. All content is packaged in a digital format with online Python scripting of lab instruments and communications algorithms. This is to support the eventual deployment of this course to the Navy for internal education.
   - *Years taught:* The course pilot ran Spring 2020 (taught by Prof. Laneman) and will be offered a second time (with revised content) Spring 2022.
2. EE67056: Antenna Theory and Design
   - *Description:* This is a new course offered at Notre Dame. While it was primarily designed to support my own graduate students and help to recruit high quality graduate students in electromagnetics research, the course regularly draws students from across the EE department with healthy enrollment. The course covers principles of antenna theory for analysis, design, and measurement of classical antennas including linear dipoles, loops, arrays, broadband antennas, aperture antennas including horns, lenses, and dishes, as well as microstrip antennas. In addition to theoretical homework sets students perform design projects throughout the semester based upon their own Matlab codes and using industry-standard commercial numerical codes (Ansys HFSS). In the next offering (Fall 2021) students will also perform one lab on antenna measurement in which they will be able to use our new near-field antenna range.
   - *Years taught:* Fall 2018, Fall 2020, Fall 2021 (to be taught)
3. EE87031: Active Microwave Circuits for Wireless Applications
   - *Description:* Advanced microwave circuit design taught from the perspective of wireless communications. The first third of the course covers transceiver design and system analysis (gain, noise figure, linearity cascade analysis) in order to motivate performance requirements for circuit components. In the first lab, students perform system analysis on a complete superheterodyne transceiver based on a custom lab kit that I developed in collaboration with X-Microwave (https://www.xmicrowave.com/). This lab also teaches students advanced nonlinear microwave measurement methods. The second two-thirds

of the course systematically develops theory and design methods for the key circuit components of the transceiver (e.g., LNA, HPA, mixer, oscillator) and students design, fabricate, and measure each component. Successful completion of this course with an "A" letter grade results in nomination for the Keysight Industry Ready Certificate - Level 2.
- *Years taught:* Fall 2015, Fall 2016, Fall 2017, Fall 2019

4. Special Topics
   - *EE67598: Computational Electromagnetics, Spring 2021:* The course covered the Finite Different Time Domain method for solving Maxwell's equations in arbitrary media. Special focus was on the support of arbitrary polarization (TEz and TMz), perfectly matched layer (PML) boundary conditions, and anisotropic media. The content of this course was motivated by our research in GRIN lens antenna design. Students had regular homework sets and a final project and presentation. This course is a pilot for an eventual regular course in computational electromagnetism.
   - *EE67598: Microwave Calibration, Spring 2017:* The course began with a literature review of the history of microwave network calibration. Then students implemented (in Matlab) the most popular calibration methods used today including SOLT, TRL, and port/fixture de-embedding methods. Students also designed and fabricated their own calibration standards to validate their code.
   - *EE87034: Microwave Photonics, Fall 2016:* Co-developed and co-taught a reading and proposal writing course with Professor Anthony Hoffman focusing on the intersection of our two disciplines: microwaves (Chisum) and photonics (Hoffman).

Last updated: September 2, 2021