

# Kathryn L. Smith

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## Summary

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- **Experience:** Four years of engineering design-and-test experience with progressing responsibility in an electromagnetics research lab at UNC-Charlotte, focusing on broadband and multiband antennas and metamaterials
- **Publications:** Eighteen peer-reviewed journal and conference publications
- **Funding:** \$138,000 NSF fellowship, \$45,000 Research Grant from NSF Center for Metamaterials
- **Graduate Research:** Fractal antennas, Fractal metamaterials, Non-Foster loaded metamaterials

## Education

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PhD in Electrical Engineering,	UNC-Charlotte, Charlotte, N.C.	4.0/4.0	(May 2018)
MS in Electrical Engineering,	UNC-Charlotte, Charlotte, N.C.	4.0/4.0	(May 2015)
BS in Electrical Engineering,	UNC-Charlotte, Charlotte, N.C.	3.956/4.0	(May 2013)

## Relevant Experience

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### **Assistant Professor, UNC-Charlotte (Fall 2018 - Present)**

University of North Carolina at Charlotte, Charlotte, N.C.

### **National Science Foundation Graduate Fellow (Summer 2015 – Spring 2018)**

University of North Carolina at Charlotte, Charlotte, N.C.

- Received one of 2000 graduate research fellowships from NSF (Summer 2015 – Spring 2018), chosen from among 16,500 applicants nationwide in 2015
- Developed, fabricated, and tested a wideband negative spherical spiral metamaterial unit cell for negative permeability and negative permittivity
- Developed, fabricated, and tested a multi-resonance patch antenna utilizing fractal geometry
- Published five conference papers on fractal electromagnetic structures and non-Foster loading of transmission lines
- Guest-lectured in undergraduate and graduate electromagnetic waves and signal processing classes

### **NSF-Funded Graduate Research Assistantship as M.S. student (Fall 2013 – Spring 2015)**

University of North Carolina at Charlotte, Charlotte, N.C.

- Developed non-Foster loaded metamaterials, fractal metamaterials, and fractal antennas with the aid of HFSS and ADS simulation software
- Fabricated and tested non-Foster loaded microwave metamaterials, broadband fractal tree monopole antenna and a broadband metamaterial structure utilizing fractal geometries
- Co-authored six papers on non-Foster loading of metamaterials and two on fractal electromagnetics

### **DOE-funded Undergraduate Research Assistantship (Summer 2012)**

University of North Carolina at Charlotte, Charlotte, N.C.

- Developed Matlab scripts to organize data and detect patterns in power usage

### **NSF-funded Research Experience for Undergraduates (Summer 2011)**

West Virginia University, Morgantown, W.V.

- Simulated photonic crystal structures and fabricated designs in a clean room using e-beam lithography
- Won prize for best poster presentation at culminating undergraduate research poster symposium

## Achievements

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- 2016 IEEE AP-S Student Paper Competition Honorable Mention (Summer 2016)
- NSF Graduate Research Program Fellowship (Summer 2015)
- Outstanding Research Assistant Award (Spring 2014)
- UNCC Graduate Assistant Support Plan Award (Fall 2013 – Spring 2018)
- Passed FE in N.C. (October 2012)
- Fietchner scholarship (April 2012)

## Publications

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1. **Kathryn L. Smith** and Ryan S. Adams, "Spherical Spiral Metamaterial Unit Cell for Negative Permeability and Negative Permittivity," *IEEE Transactions on Antennas and Propagation*, Vol. 66, No. 11, 6425-6428, 2018.
2. **Kathryn L. Smith** and Ryan S. Adams, "A Broadband 3D Printed Fractal Tree Monopole Antenna," *Progress in Electromagnetics Research C*, Vol. 86, 17-28, 2018.
3. **Kathryn L. Smith** and Ryan S. Adams, "A Broadband Negative Epsilon Fractal Metamaterial Unit Cell for Coaxial Notch Filter Applications," *Progress in Electromagnetics Research C*, Vol. 86, 17-28, 2018.
4. **Kathryn L. Smith** and Ryan S. Adams, "A Nested-Spring Metamaterial Unit Cell for Broadband Mechanically-Tunable Effective  $\epsilon$ ," *2018 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, Boston, MA, 2018.
5. **Kathryn L. Smith** and Ryan S. Adams, "A Circularly-Polarized Horn Antenna with Tunable Handedness Using Chiral Metamaterial Loading," *2018 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, Boston, MA, 2018.
6. **Kathryn L. Smith** and Ryan S. Adams, "A Multiband Ringed Rectangular Patch Antenna," *2017 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, San Diego, CA, 2017.
7. **Kathryn L. Smith**, J. Luke Stuenkel, Ryan S. Adams, and Thomas P. Weldon, "A Digital Non-Foster Fast-Wave Line Using an Internet of Things Approach for Software Tuning of Multiple Digital Negative Capacitors," *IEEE SoutheastCon 2017 Proceedings*, Charlotte, NC, 2017.
8. **Kathryn L. Smith** and Ryan S. Adams, "A  $\lambda_0/60$  Spherical Spiral Metamaterial for Negative Permeability and Negative Permittivity," *2016 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, Fajardo, Puerto Rico, 719-720, 2016.
9. **Kathryn L. Smith**, Ryan S. Adams, and Thomas P. Weldon, "Measurement of a Fast-Wave Line Using Digital Non-Foster Circuits for Software-Adjustable Delay," *2016 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, Fajardo, Puerto Rico, 2016.
10. Thomas P. Weldon, John M. C. Covington III, **Kathryn L. Smith**, and Ryan S. Adams, "A Two-Port Digital Discrete-Time Non-Foster Circuit Designed for Negative Capacitance," *Ninth International Congress on Advanced Electromagnetic Materials in Microwaves and Optics – Metamaterials 2015*, Oxford, United Kingdom, 2015.
11. **Kathryn L. Smith**, Thomas P. Weldon, and Ryan S. Adams, "Measurement, Simulation, and Theory of a Non-Foster Metamaterial Unit Cell with Parasitic Resistance," *2015 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, Vancouver, BC, Canada, 2015.
12. **Kathryn L. Smith** and Ryan S. Adams, "A Novel Ultra-Wideband Fractal Monopole Antenna," *2015 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, Vancouver, BC, Canada, 2015.
13. Thomas P. Weldon, John M. C. Covington III, **Kathryn L. Smith**, and Ryan S. Adams, "Stability Conditions for a Digital Discrete-Time Non-Foster Circuit Element," *2015 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, Vancouver, BC, Canada, 2015.
14. Thomas P. Weldon, John M. C. Covington III, **Kathryn L. Smith**, and Ryan S. Adams "Performance of Digital Discrete-Time Implementations of Non-Foster Circuit Elements," *2015 IEEE International Symposium on Circuits and Systems (ISCAS 2015)*, Lisbon, Portugal, 2015.
15. **Kathryn L. Smith**, Ryan S. Adams, and Thomas P. Weldon, "A Novel Broadband Fractal Metamaterial Unit Cell," *2014 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting*, Memphis, TN, July 6–12, 2014.
16. Varun S. Kshatri, John M. C. Covington III, **Kathryn L. Smith**, Joshua W. Shehan, Thomas P. Weldon, and Ryan S. Adams "Measurement and Simulation of a CMOS Current Conveyor Negative Capacitor for Metamaterials," *IEEE SoutheastCon 2014 Proceedings*, pp. 1-4, Lexington, KY, 2014.
17. John M. C. Covington III, **Kathryn L. Smith**, Joshua W. Shehan, Varun S. Kshatri, Thomas P. Weldon, and Ryan S. Adams "Measurement of a CMOS Negative Inductor for Wideband Non-Foster Metamaterials," *IEEE SoutheastCon 2014 Proceedings*, pp. 1-4, Lexington, KY, 2014.
18. John M. C. Covington III, **Kathryn L. Smith**, Varun S. Kshatri, Joshua W. Shehan, Thomas P. Weldon, and Ryan S. Adams "A Cross-Coupled CMOS Negative Capacitor for Wideband Metamaterial Applications," *IEEE SoutheastCon 2014 Proceedings*, pp. 1-4, Lexington, KY, 2014.

## Professional Affiliations

IEEE, IEEE Antennas and Propagation Society, IEEE Women in Engineering, IEEE Education Society, IEEE Young Professionals

## Software Experience:

Matlab, HFSS, LaTeX, ADS, Word, Excel, Powerpoint, Mathcad, Java, C++, ETAP, PSpice, Netbeans