NICHOLAS W. CAIRA

nwcaira@gmail.com

EDUCATION

Duke University, Durham, NC — August 2014 - May 2019
Doctor of Engineering in Electrical and Computer Engineering (May 2019)
Thesis: Holographic Methods for Light Manipulation at Microwave and Terahertz Frequencies
Master of Engineering Management (December 2018)
Master of Science in Electrical and Computer Engineering (May 2017)

Boston College, Chestnut Hill, MA — September 2010 - May 2014
Bachelor of Science in Physics, Minor in Mathematics (May 2014)

RESEARCH EXPERIENCE

Postdoctoral Research Associate, *University of North Carolina at Chapel Hill* — May 2019 - Present
Department of Applied Physical Sciences. Advisor: Dr. Nicolas C. Pégard, Computational Biophotonics Lab
Developing advanced optical imaging systems, which implement holographic manipulation with machine learning algorithms for applications in neuroscience.

Graduate Research Assistant, *Duke University* — August 2014 - May 2019
Department of Electrical and Computer Engineering. Advisor: Dr. Willie J. Padilla, SMIE Lab
Researched and investigated microwave and terahertz metamaterials for imaging applications. Designed and measured novel metasurface holograms at W-band frequencies and published results. Coded with MATLAB to simulate experiments, optimize results, and process data. Presented results weekly in group meetings and collaborated with other students on their projects. Mentored new graduate students guiding them on projects and providing them with weekly feedback.

Graduate Student Intern, *Northrop Grumman, Manhattan Beach, CA* — May - September 2016
NG Next. Group Lead: Dr. Vesna Radisic, Engineered RF Materials group
Secured internship as an expert in metamaterial research and helped the company build and develop its new research division, NG Next. Researched novel ideas and reworked previous projects resulting in publications, assisted in troubleshooting and testing new equipment, helped create and expand collaborations between groups, and presented weekly in meetings as well as a seminar for all NG Next employees.

Undergraduate Research Assistant, *Boston College* — January 2011 - May 2014
Department of Physics. Advisor: Dr. Willie J. Padilla, SMIE Lab
Researched and assisted in several metamaterials studies including perfect absorbing materials, infrared imaging, electromagnetic wave propagation, and high-powered laser beam-splitter design. Studied extremely subwavelength MHz spiral metamaterials for magneto-inductive waves and compressive imaging in millimeter, submillimeter, and IR regimes using passive and dynamic metamaterial coded apertures and spatial light modulators (SLM). Collaborated with other students as well as companies and other universities.

PUBLICATIONS

Multispectral metasurface hologram at millimeter wavelengths — 2018
N.W. Caira, D.R. Smith — Applied Optics, **57** (1), A19-A25

V-band electronically reconfigurable metamaterial — 2017
V. Radisic, J.G. Hester, V.N. Nguyen, N.W. Caira, D. DiMarzio, T. Hilgeman, S. Larouche, E. Kaneshiro, A. Gutierrez-Aitken — Journal of Applied Physics, **121** (16), 164902

W-band InP transmission line metamaterial — 2017
V.N. Nguyen, N.W. Caira, J.G. Hester, D. DiMarzio, E. Kaneshiro, A. Gutierrez-Aitken, V. Radisic — Radio and Wireless Symposium, IEEE, 76-78

Phase and magnitude constrained metasurface holography at W-band frequencies — 2016
G. Lipworth, N.W. Caira, S. Larouche, D.R. Smith — Optics Express **24**, 19372-19387

Extremely subwavelength planar magnetic metamaterials — 2012
W.C. Chen, C.M. Bingham, K.M. Mak, N.W. Caira, W.J. Padilla — Physical Review B **85** (20), 201104

PRESENTATIONS

Frequency-dependent Metasurface Holography — April 14, 2017
Master's Research Presentation, Duke University, Durham, NC

Nanoparticle Aerosol Printing and Tunable Coplanar Waveguide Metamaterials — August 5, 2016
NG Next Seminar, Northrop Grumman, Manhattan Beach, CA

Lorentzian-Constrained Computer Generated Holograms — September 18, 2015
Duke ECE 4th Graduate Student Workshop, Rickhouse, Durham, NC

Lorentzian-Constrained Computer Generated Holograms — July 20-22, 2015
Metamaterials Science and Technology Workshop, UCSD, La Jolla, CA

Magneto Inductive Wave Propagation — September 5, 2011
URF Symposium, Boston College, Chestnut Hill, MA

TEACHING EXPERIENCE

Head Teaching Assistant for ECE 270 (Electromagnetic Fields) — Fall 2017
Teaching Assistant for ECE 270 (Electromagnetic Fields) — Fall 2016
Prepared and setup labs for Contemporary Electronics Lab (PH 409) — Summer 2011

TECHNICAL SKILLS

Software: MATLAB, CST, HFSS, ADS, Solidworks, BEAM4, LabVIEW, Cadence, LaTeX, Illustrator, Photoshop, Lightroom, Excel

Equipment: Agilent VNA, Bruker FTIR, Hubner TDS, OML and VDI mm-wave T/R, waveguides and antennas from X- to W-bands, LPKF milling, DMD, FLIR, Optomec aerosol printing, Cascade probe station, bolometer, vacuum pumps, high-power lasers from visible to IR, oscilloscopes, multimeters, power supplies, DAQ, lock-in amplifier, function generator, 3D printing, general machine shop

Optics: Building microscopy systems, constructing beam expanders and collimators, and alignment of mirrors, lenses, and filters for visible, IR, and THz imaging

Cleanroom: Photolithography, E-beam deposition, sputtering, RIE, PECVD, electroplating, profilometer, interferometer, microscopes

ACTIVITIES & OTHER EXPERIENCE

Duke University Cycling Team — 2016 - 2018
Head Coach of Mens Crew, Duke University, Durham, NC — 2015 - 2017
Assistant in the Physics Department, Boston College, Chestnut Hill, MA — Summer 2011
Boston College Mens Crew — 2010 - 2014
Boston College Society of Physics Students (Co-president 2012-2014) — 2010 - 2014
Student Trustee at South Shore Natural Science Center — 2008 - 2010
Norwell High School Ski Team (Co-captain 2008-2010) — 2006 - 2010
Boy Scouts of America (Eagle Scout) — 2003 - 2010