Mario Junior Mencagli

Citizen of Italy; US Permanent Resident (Greencard holder)

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Professional experience

From August 2023 to present

Employer: **Raytheon Technologies Research Center**, *Electromagnetics and Systems Team*, 411 Silver Lane, East Hartford, CT 06118, United States.

Position held: **Principal Engineer, Researcher**.

Main activities:
– Analysis, design, and experimental test of time-modulated circuits for broadband matching, **Beyond the Bode-Fano Bound**, of Electrically Small Antennas.
– Analysis and design of **Reflective Intelligent Surfaces** for relay networks for space applications.
– Analysis and design of low-profile high-gain antennas for **wireless communications beyond 100GHz**.

From August 2019 to present

Employer: **University of North Carolina at Charlotte**, *Department of Electrical and Computer Engineering*, 9201 University City Boulevard, Charlotte, NC 28202, United States.

Position held: **Assistant Professor 08/2019-08/2023**.
Adjunct Professor 08/2023 to present.

Main activities:
– **Teach undergraduate and graduate courses** on intermediate and advanced electromagnetism, metamaterials, and metasurfaces.
– **Lead a research group** that investigates - theoretically, numerically, and experimentally-innovative aspects of wave-matter interaction based on metamaterials, metasurfaces, time-varying media, and high-symmetry structures.
– Efficient and Fast Approach for the Analysis of Electrically Large Metalenses , contract with the **NSF-supported IUCRC Center for Metamaterials** at the University of North Carolina at Charlotte (*completed*).
– Metalenses with Application to Horn Multibeam and Beam Shaping, contract with the **NSF-supported IUCRC Center for Metamaterials** at the University of North Carolina at Charlotte (*completed*).
– Generating Electromagnetic Waves with Time-Varying Media, contract with the **Thomas Jefferson Fund** (*completed*).
– Reconfigurable leaky-wave antennas with tunable impedance surfaces, contract with the **NSF-supported IUCRC Center for Metamaterials** at the University of North Carolina at Charlotte (*completed*).
– Dual-frequency metasurface antennas, contract with the **NASA's Jet Propulsion Laboratory** (*completed*).
– Multi-frequency metasurface antennas for SATCOM applications, contract with the **NASA Earth Science and Technology Office** (*completed*).
– Co-Design for Efficient Multi-Band Radar Research, contract with the **Air Force Office of Scientific Research** (*completed*).

Achievements: – **7 peer-reviewed international journal papers**, 2 manuscripts are under review, and 1 manuscript is in preparation.
– **Provisional Patent Application** filed by the University of North Carolina at Charlotte and California Institute of Technology on Orthogonally Selected Multi-Band Metasurface Antenna for Next Generation Telecommunication and Remote Sensing Applications.
– Organized a **Convened Session at EuCAP 2020** on Controlling EM Waves with Low- and High-Dimensional Metamaterials.
– Elected **Senior Member of IEEE** on February 23, 2022.
– 20 papers in international peer-reviewed conferences.

From January 2017 to June 2019

Employer: **University of Pennsylvania**, *Department of Electrical and Systems Engineering*, 200 South 33rd Street, Philadelphia, PA 19104, United States.

Position held: **Postdoctoral Researcher (Supervisor Prof. Nader Engheta)**.

Main activities: – Analysis and design of metamaterial-based filters in the visible and ultraviolet regime, contract with **NASA's Jet Propulsion Laboratory**.
– Mathematical operations and solutions of integral equations by a wave platforms based on Mach-Zehnder interferometers, contract with US Air Force Office of Scientific Research.
– Analysis and design of wave-guiding metastructures based on time-varying permittivity.
– Analysis and design of electrically small superdirective apertures using metasurfaces.

Achievements: – **United States Patent** (no. 11,494,461) on metastructures-based integral-equation solvers.
– **1 book on Metasurfaces for surface-waves control.**
– Accepted in 2018 at the prestigious **Plasmonics and Nanophotonics - Gordon Research Conference**, only under invitation and held biannually.
– 11 papers in international peer-reviewed conferences.

From November 2013 to December 2016

Employer: **Università di Siena**, *Department of Information Engineering and Mathematics*, Via Roma, 56 – 53100 Siena, Italy.

Position held: **Research Assistant (Supervisor Prof. Stefano Maci)**.

Main activities: – Analysis and design of dynamically reconfigurable transmission lines and antennas using metasurfaces, contract with **Thales Group**.
– Analysis and design of metasurface antennas and beamforming devices based on transformation optics procedure, contract with the US International Technology Center Atlantic.
– Analysis and design of beam squinting metascreens and its application to horn antennas, contract with the **European Space Agency**.
– Analysis and design of scalable low-mass low-envelope high-to-very-high gain antennas, contract with the **European Space Agency**.

Achievements: – **7 peer-reviewed international journal papers, 4 of which in IEEE Transactions, 1 IEEE Letters, 1 in Philosophical Transactions of the Royal Society A, and 1 in Journal of Optics.**
– 15 papers in international conferences.
– Development of a set of entire domain basis functions for the **ultra-fast analysis method for metasurface antennas**, currently being **used in several European Space Agency projects**.
– Recipient of a Scholarship from the **Thales Group** for the development of optically reconfigurable transmission lines using metasurfaces.
– Recipient of the **Best Thesis Award** of XXIX cycle of the PhD Program in Information Engineering and Sciences at University of Siena by the renowned house like Springer.

From June 2014 to August 2014

Employer: **Thales Research and Technology**, Route Départementale – 91120 Palaiseau, Paris, France.

Position held: **Visiting Ph.D. Student**.

Main activities: – Characterization and testing of optically reconfigurable transmission lines based on checkerboard metasurfaces.

Achievements: – **1 peer-reviewed international journal paper**.
– 2 papers in international conferences.

Education

From November 2013 to December 2016

Title of qualification awarded: **Ph.D. in Information Engineering and Science**.

Organisation providing education: **Università degli Studi di Siena**, Siena, Italy.

Title of the thesis: *Manipulation of Surface Waves through Metasurfaces.*

Ph.D. advisor: Prof. Stefano Maci, IEEE Fellow.

Dissertation commitee: Prof. Giuseppe Vecchi, IEEE Fellow, Politecnico di Torino.
Prof. Giuliano Manara, IEEE Fellow, Università di Pisa.
Prof. Alessandro Galli, Sapienza Università di Roma.
Dr. Brigitte Loiseaux, Thales Research and Technology.

Topics of the Ph.D.: Electromagnetic fields with particular attention to electromagnetic theory, metasurface, metamaterials, surface impedance, transformation optics, and computational electromagnetics.

Achievements: – 8 peer-reviewed international journal papers and 20 international conferences papers among the ones in the Professional Experience above were direct result of this thesis.
– **Ph.D. degree awarded cum laude**.

From November 2008 to February 2013

Title awarded: **Master in Telecommunications Engineering**.

Organisation providing education: **Università degli Studi di Siena**, Siena, Italy.

Title of the thesis: *Analysis and Design of Metasurfaces for Controlling Surface Waves.*

Advisor: Prof. Stefano Maci, IEEE Fellow.

Topics of the thesis: Analysis and design of guiding devices using metasurfaces in the microwave range.

Achievements: – **Cum laude** (110/110 e lode), 15 classes with a **GPA of 29.14/30** (Italian acadamic grading system) and 6 lodi (additional honor points).

From November 2004 to January 2008

Title awarded: **B.Sc. in Electrical Engineering**.

Organisation providing education:	**Università degli Studi di Siena**, Siena, Italy.
Title of the thesis:	*Design of antennas in UHF and H band for passive RFID transponder.*
Advisor:	Prof. Alberto Toccafondi
Topics of the thesis:	Printed antennas, radio-frequency identification (RFID) technolgy.
Achievements:	– Average score of 97/110, including **3 *with honors* marks**.

Publications

In summary:

– **15 papers in peer-reviewed international journals**, 2 manuscripts are under review and 1 manuscript in preparation.
– **1 book,** published by the renowned house like Springer. This book deals with modulated metasurfaces for controlling surface waves.
– **1 book chapter,** published by the renowned house like Springer. This chapter deals with metasurface antennas and modulated metasurface antennas.
– **46 papers in peer-reviewed international conferences,** among which 9 invited, and in all cases the most important conferences in my field of activity.

Journal papers

JX. D. Sounas and **M. Jr. Mencagli**, "Beyond the Bode-Fano Bound with Aperiodic Time Modulation," in preparation.

JX. K. Hecht, N. Chahat, G. Chattopadhyay, E. Martini and **M. Jr. Mencagli**, "A New Strategy for Designing Dual-band Antennas Based on Double-layer Metasurfaces," *arXiv:2307.15999*, 2023.

JX. J. Feng, X. Weng, A. J. Perry, A. K. González-Alcalde, O. Arteaga, **M. Jr. Mencagli** and L. Vuong, "Polarimetric Compressed Sensing from Insect-inspired Meso-ordered Encoders," under review, since July 2023.

J15. K. Hecht, D. González-Ovejero, D. L. Sounas and **M. Jr. Mencagli**, "First-principles analysis of energy exchange in time-varying capacitors for energy trapping applications," *IEEE Access*, vol. 11, pp. 71494-71502, 2023.

J14. V. Nikkhah, **M. Jr. Mencagli** and N. Engheta, "Reconfigurable nonlinear optical element using tunable couplers and inverse-designed structure," *Nanophotonics*, vol. 12, no. 14, pp. 3019-3027, 2023.

J13. D. Tzarouchis, **M. Jr. Mencagli**, B. Edwards and N. Engheta, "Mathematical Operations and Equation Solving with Reconfigurable Metadevices," *Light Science & Applications*, vol. 11, pp. 263, 2022.

J12. **M. Jr. Mencagli**, D. L. Sounas, M. Fink and N. Engheta, "Static-to-dynamic field conversion with time-varying media," *Phys. Rev. B*, vol. 105, pp. 144301, 2022.

J11. E. Nahvi, **M. Jr. Mencagli** and N. Engheta, "Tunable radiation enhancement and suppression using a pair of photonically doped epsilon-near-zero (ENZ) slabs," *Opt. Let.*, vol. 47, pp. 1319-1322, 2022.

J10. S. Paković, N. Bartolomei, **M. Jr. Mencagli**, M. Ettorre, R. Sauleau and D. González-Ovejero, "A Fast and Accurate Method of Synthesizing X-Wave Launchers by Metallic Horns," *IEEE Access*, vol. 9, pp. 1996-2006, 2021.

J9. **M. Jr. Mencagli**, E. Martini, S. Maci and M. Albani, "A Physical Optics Approach to the Analysis of Metascreens," *IEEE Access*, vol. 8, pp. 162634–162641, 2020.

J8. **M. Jr. Mencagli**, C. Della Giovampaola, and S. Maci, "A Closed-form Representation of Isofrequency Dispersion Curve and Group Velocity for Surface Waves Supported by Anisotropic and Spatially Dispersive Metasurfaces," *IEEE Trans. Antennas Propag.*, vol. 64, no. 6, pp. 2319–2327, 2016.

J7. **M. Jr. Mencagli**, E. Martini, and S. Maci, "Transition Function for Closed-Form Representation of Metasurface Reactance," *IEEE Trans. Antennas Propag.*, vol. 64, no. 1, pp. 136–145, 2016.

J6. E. Martini, **M. Jr. Mencagli**, D. González-Ovejero and S. Maci, "Flat Optics for Surface Waves," *IEEE Trans. Antennas Propag.*, vol. 64, no. 1, pp. 155–166, 2016.

J5. E. Martini, **M. Jr. Mencagli** and S. Maci, "Metasurface Transformation for Surface Wave Control," *Phil. Trans. R. Soc. A*, vol. 373, no. 2049, 2015.

J4. D. González-Ovejero, E. Martini, B. Loiseaux, C. Tripon-Canseliet, **M. Jr. Mencagli**, J. Chazelas and S. Maci, "Basic Properties of Checkerboard Metasurfaces," *IEEE Antennas Wireless Propag. Lett.*, vol. 14, pp. 406–409, 2015.

J3. **M. Jr. Mencagli**, E. Martini and S. Maci, "Surface Wave Dispersion for Anisotropic Metasurfaces Constituted by Elliptical Patches," *IEEE Trans. Antennas Propag.*, vol. 63, no. 7, pp. 2992–3003, 2015.

J2. **M. Jr. Mencagli**, E. Martini, D. González-Ovejero and S. Maci, "Metasurfing by Transformation Electromagnetic," *IEEE Antennas Wireless Propag. Lett.*, vol. 13, pp. 1767–1770, 2014.

J1. **M. Jr. Mencagli**, E. Martini, D. González-Ovejero and S. Maci, "Metasurface Transformation Optics," *Journal of Optics*, vol. 16, pp. 125106–125114, 2014.

Book and Book chapters

B1. **M. Jr. Mencagli**, "Manipulation of Surface Waves through Metasurfaces," Springer, 2019.

B2. G. Minatti, M. Faenzi, **M. Jr. Mencagli**, F. Caminita, D. González-Ovejero, C. Della Giovampaola, A. Benini, E. Martini, M. Sabbadini and S. Maci, "Metasurface Antennas," in *Aperture for mm Wave and sub-mm Wave Applications*, Eds. A. Boriskin and R. Sauleau, Springer, 2017.

Patents

P1. N. Engheta, B. Edwards, N. Mohammadi Estakhri, and **M. Jr. Mencagli**, "Metastructures for solving equations with waves," U.S. Patent No. 11,494,461, August 11, 2018.

Conference proceedings

C46 K. Hecht, Md. Shohel Amin, D. Louisos, **M. Jr. Mencagli**, A. Willis, T. Hofmann, and J. E. Touma, "Radar Applications of a Prototype Dual-Band Metamaterial and Metasurface Antenna," *2023 IEEE Research and Applications of Photonics in Defense Conference (RAPID))*, Miramar Beach, FL, USA, 2023.

C45 D. Louisos, M. McLamb, J. Ginn, A. P. Warren, G. D. Boreman, **M. Jr. Mencagli**, A. Willis, T. Hofmann, and J. E. Touma, "Dielectric Function of VO2 determined by Spectroscopic Ellipsometry," *2023 IEEE Research and Applications of Photonics in Defense Conference (RAPID))*, Miramar Beach, FL, USA, 2023.

C44 K. Hecht, D. González Ovejero, and **M. Jr. Mencagli** "Funneling Electromagnetic Waves with PTD Symmetric Metastructures," *17th European Conference on Antennas and Propagation (EuCAP 2022)*, Florence, Italy, 2022.

C43 K. Hecht and **M. Jr. Mencagli** "Dispersion Characteristics of Additive-Manufactured Metasurfaces," *17th European Conference on Antennas and Propagation (EuCAP 2022)*, Florence, Italy, 2022.

C42 **M. Jr. Mencagli**, "Transformation of Electromagnetic Pulses to Electrostatic Field Distributions with Time-varying Media," *16th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics (Metamaterials 2022)*, Siena, Italy, 2022.*(invited)*

C41 K. Hecht and **M. Jr. Mencagli**, "PTD Symmetric Wideband Absorbers," *16th European Conference on Antennas and Propagation (EuCAP 2022)*, Madrid, Spain, 2022.

C40 D. Tzarouchis, **M. Jr. Mencagli**, B. Edwards and N. Engheta, "A Reconfigurable Metadevice for Solving Equations and Inverting Matrices at RF Frequencies," *2021 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting)*, Marina Bay Sands, Singapore, 2021.

C39 M. Fazeli, K. Moralic and **M. Jr. Mencagli**, "Squeezing Electromagnetic Waves with Reflectionless Metastructures," *2021 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting)*, Marina Bay Sands, Singapore, 2021.

C38 V. Nikkahah, **M. Jr. Mencagli** and N. Engheta, "Design of Nonlinear device for limiting optical intensity by topology optimization," *2021 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting)*, Marina Bay Sands, Singapore, 2021.

C37 M. J. Trusnovic, K. A. Hecht, J. T. Helms and **M. Jr. Mencagli**, "Gradient Metasurfaces for Dual-polarization Beam Steering," *2021 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting)*, Marina Bay Sands, Singapore, 2021.

C36 D. Tzarouchis, **M. Jr. Mencagli**, B. Edwards and N. Engheta, "Wave-Based Analog Computation with Collections of Metadevices," *15th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics (Metamaterials 2021)*, New York, USA, 2021. *(invited)*

C35 K. Moralic, D. L. Sounas and **M. Jr. Mencagli**, "Time-Varying Capacitance for Electromagnetic Energy Conversion," *15th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics (Metamaterials 2021)*, New York, USA, 2021

C34 D. Tzarouchis, **M. Jr. Mencagli**, B. Edwards and N. Engheta, "How Photonic Metadevices Can Perform Mathematical Operations and Analog Computation with Waves," *2021 Material Research Society (MRS) Fall Meeting*, Boston, MA, USA, 2021. *(invited)*

C33 D. Tzarouchis, B. Edwards, **M. Jr. Mencagli** and N. Engheta, "Design and implementation of tunable RF modules for reconfigurable metastructures that perform mathematical computations," *2021 XXXIVth General Assembly and Scientific Symposium of the International Union of Radio Science (URSI GASS), 2021*, Rome, Italy. *(invited)*

C32 K. Moralic, D. Languasco, W. Romeo and **M. Jr. Mencagli**, "Liquid Metasurface Antennas," *2020 IEEE 17th International Conference on Smart Communities: Improving Quality of Life Using ICT, IoT and AI (HONET)*, 2020.

C31 **M. Jr. Mencagli**, M. Fink, and N. Engheta, "Conversion of Electrostatic Fields to Radiation Fields by Time-Varying Media," *2020 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting)*, Montreal, Canada, 2020.

C30 **M. Jr. Mencagli**, and D. Sounas, "Static-to-Dynamic Electromagnetic Energy Conversion with Time-Varying Capacitive Loads," *2020 IEEE International Symposium on Antennas and Propagation*, Montreal, Canada, 2020.

C29 D. Sounas, and **M. Jr. Mencagli**, "Trapping electromagnetic signals in time modulated and non-linear cavities," *2020 IEEE International Symposium on Antennas and Propagation*, Montreal, Canada, 2020.

C28 N. Engheta, V. Pacheco-Pena, Y. Kiasat, **M. Jr. Mencagli**, E. Nahvi, and B. Edwards, "4D Metastructures: Merging Spatial and Temporal Metamaterials," *13th International Congress on Artificial Materials for Novel Wave Phenomena (Metamaterials 2019)*, Rome, Italy, 2019.*(invited)*

C27 **M. Jr. Mencagli**, A. Alù, and N. Engheta, "Metastructures and Superdirectivity," *Superoscillations: Theoretical Aspects and Applications*, Cetraro, CS, Italy, 2019.

C26 Q. Nguyen, M. Burnett, A. I. Zaghloul, **M. Jr. Mencagli**, and N. Engheta, "Impedance-Matched High-Index Ceramic Microwave Metamaterials at X-Band," *2019 International Applied Computational Electromagnetics Society (ACES) Symposium*, Miami, FL, USA, 2019.

C25 **M. Jr. Mencagli**, N. Mohammadi Estakhri, B. Edwards, and N. Engheta, "Solving Equations with Waves in Collections of Mach-Zehnder Interferometers," *CLEO 2018*, San Jose, CA, USA, 2018.

C24 Q. Nguyen, A. I. Zaghloul, **M. Jr. Mencagli**, and N. Engheta, "The constitutive effective parameters of two-dimensional multilayered dielectric grating slab," *2018 International Applied Computational Electromagnetics Society (ACES) Symposium*, Denver, CO, USA, 2018.

C23 N. Engheta, B. Edwards, N. Mohammadi Estakhri, and **M. Jr. Mencagli**, "Informatic Metamaterials," *12th International Congress on Artificial Materials for Novel Wave Phenomena (Metamaterials 2018)*, Espoo, Finland, 2018.*(invited)*

C22 **M. Jr. Mencagli**, N. Mohammadi Estakhri, B. Edwards, and N. Engheta, "Wave platforms for solving integral equations in spatial domain," *2018 SPIE Photonics West*, San Francisco, CA, USA, 2018.*(invited)*

C21 C. Della Giovampaola, **M. Jr. Mencagli**, G. Toso, and S. Maci, "Flat Lenses Design by Closed-Form Ray Tracing," *12th European Conference on Antennas and Propagation (EuCAP 2018)*, London, UK, 2018.

C20 **M. Jr. Mencagli**, F. Caminita, E. Martini, and S. Maci, "Metasurface-based Lens with Application to Horn Beam Squinting," *2017 IEEE International Symposium on Antennas and Propagation*, San Diego, CA, USA, 2017.*(invited)*

C19 C. Della Giovampaola, **M. Jr. Mencagli**, E. Martini, M. Albani, and S. Maci, "Surface-Wave Tracing by Flat Optics," *2017 IEEE International Symposium on Antennas and Propagation*, San Diego, CA, USA, 2017.

C18 **M. Jr. Mencagli**, F. Caminita, E. Martini, P. De Vita, V. Sozio, M. Sabbadini, and S. Maci, "Beam Squinting Metalens Design and Its Application to Multibeam Reflector Feeds," *11th European Conference on Antennas and Propagation (EuCAP 2017)*, Paris, France, 2017.

C17 C. Della Giovampaola, C. Tripon-Canseliet, J. Chazelas, **M. Jr. Mencagli**, G. Minatti, and S. Maci, "Digitizing Metasurface Antennas," *2016 IEEE International Symposium on Antennas and Propagation*, Puerto Rico, 2016.

C16 **M. Jr. Mencagli**, E. Martini, C. Della Giovampaola and S. Maci, "Ray-Optics and Transformation Optics for Surface Waves," *2016 IEEE International Symposium on Antennas and Propagation*, Puerto Rico, 2016.

C15 **M. Jr. Mencagli**, E. Martini, C. Della Giovampaola and S. Maci, "Transition Function for SW Metasurface-Dispersion," *2016 IEEE International Symposium on Antennas and Propagation*, Puerto Rico, 2016.

C14 **M. Jr. Mencagli**, E. Martini, and S. Maci, "Transition Function for Describing Metasurface Dispersion," *10th European Conference on Antennas and Propagation (EuCAP 2016)*, Davos, Switzerland, 2016.

C13 **M. Jr. Mencagli**, E. Martini, D. González-Ovejero and S. Maci, "Two-dimensional Optics for Surface Waves," *10th European Conference on Antennas and Propagation (EuCAP 2016)*, Davos, Switzerland, 2016.

C12 **M. Jr. Mencagli**, E. Martini, D. González-Ovejero and S. Maci, "Surface Wave Control by Transformation Optics," *2015 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting*, Vancouver, BC, 2015.

C11 **M. Jr. Mencagli**, D. González-Ovejero, E. Martini, B. Loiseaux, C. Tripon-Canseliet, J. Chazelas and S. Maci, "Optically Reconfigurable Metacheckerboard," *2015 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting*, Vancouver, BC, 2015.*(invited)*

C10 **M. Jr. Mencagli**, E. Martini, D. González-Ovejero and S. Maci, "Transformation Optics SW-Based Devices," *2015 9th European Conference on Antennas and Propagation (EuCAP)*, Lisbon, 2015.

C9 **M. Jr. Mencagli**, D. González-Ovejero, E. Martini, B. Loiseaux, C. Tripon-Canseliet, J. Chazelas and S. Maci, "Optically Reconfigurable Metacheckerboard," *2015 9th European Conference on Antennas and Propagation (EuCAP)*, Lisbon, 2015, pp. 1-3.

C8 M. Faenzi, **M. Jr. Mencagli**, E. Martini, D. González-Ovejero and S. Maci, "Design of Modulated Metasurface Antennas based on Elliptical Patches," *2015 9th European Conference on Antennas and Propagation (EuCAP)*, Lisbon, 2015.

C7 **M. Jr. Mencagli**, E. Martini, F. Caminita, M. Faenzi and S. Maci, "Fast approach to the design of planar devices and antennas based on elliptical patch metasurfaces," *8th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics (Metamaterials 2014)*, Copenhagen, 2014, pp. 379-381.*(invited)*

C6 **M. Jr. Mencagli**, E. Martini, D. González-Ovejero, F. Caminita and S. Maci, "Efficient design of Transformation Optics Devices based on Anisotropic Metasurfaces," *General Assembly and Scientific Symposium (URSI GASS), 2014 XXXIth URSI*, Beijing, 2014, pp. 1-1.

C5 **M. Jr. Mencagli**, M. Faenzi, E. Martini and S. Maci, "Efficient Design of Electromagnetic Devices Using Modulated Elliptical Patch Metasurfaces," *Radio Science Meeting (Joint with AP-S Symposium), 2014 USNC-URSI*, Memphis, TN, 2014, pp. 96-96.

C4 **M. Jr. Mencagli**, S. Sørensen, E. Martini, C. Cappellin, R. Jørgensen, M. Zhou, M. Sabbadini and S. Maci, "Metasurface Approach for Contoured Beam Reflectors," *The 8th European Conference on Antennas and Propagation (EuCAP 2014)*, The Hague, 2014, pp. 968-970.

C3 **M. Jr. Mencagli**, E. Martini, D. González-Ovejero and S. Maci, "Transformation Optics for Anisotropic Metasurfaces," *The 8th European Conference on Antennas and Propagation (EuCAP 2014)*, The Hague, 2014, pp. 1712–1716.

C2 **M. Jr. Mencagli**, D. González-Ovejero, E. Martini, F. Caminita and S. Maci, "Closed-form Characteristic Basis Functions for Metasurfaces," *Radio Science Meeting (Joint with AP-S Symposium), 2013 USNC-URSI*, Lake Buena Vista, FL, 2013, pp. 87-87

C1 E. Martini, **M. Jr. Mencagli** and S. Maci, "Addressing Surface Waves on Modulated Metasurfaces," *2013 IEEE Antennas and Propagation Society International Symposium (APSURSI)*, Orlando, FL, 2013, pp. 2345-2346. *(invited)*

Invited Talks in Highly Ranked Universities and Institutions

09/2019 **Low- and High-Dimensional Metamaterials.**
Place: Army Research Laboratory, Adelphi, MD, United States.

07/2018 **Molding Surface Waves with Metasurfaces.**
Place: Radiation Laboratory, University of Michigan, Ann Arbor, MI 48109, United States.

07/2014 **Optically Reconfigurable Transmission Lines based on Checkerboard Metasurfaces.**
Place: Thales Research and Technology, Route Départementale – 91120 Palaiseau, Paris, France.

06/2014 **Fast Approach to the Design of Planar Devices based on Elliptical Patch Metasurfaces.**
Place: Thales Systemes Aeroportes, 2 Avenue Gay Lussac – 78990 Elancourt, France.

Major Collaborations

- From 2013, I work with **Prof. Stefano Maci** (University of Siena, Siena, Italy) and **Prof. Enrica Martini** (University of Siena, Siena, Italy) on controlling source radiation and surface waves with metasurfaces and high symmetric structures.

- From 2013, I work with **Dr. David González Ovejero** (Inst. d'Électronique et de Télécommunications de Rennes, Rennes, France) on optically reconfigurable metasurfaces and additve manufactured metasurface antennas.

- From 2017, I work with **Prof. Nader Engheta** (University of Pennsylvania, Philadelphia, PA, USA) on metasurfaces analog computing and time-varying media.

- From 2018, I work with **Prof. Andrea Alù** (City University of New York, New York City, NY, USA) on super-oscillating electromagnetic fields, high symmetric structures and optical limiters.

- From 2019, I work with **Prof. Dimitrios Sounas** (Wayne State University, Detroit, MI, USA) on time-varying media.

Scholarships and Awards

- In 2013, I was granted a three-year **scholarship from Thales Research and Technology** for the development of optically reconfigurable transmission lines and antennas using checkerboard-patterned metasurfaces.

- In 2018, I was a recipient of the **Best thesis award in the XXIX cycle of the Ph.D. Program in Information Engineering and Sciences at the University of Siena**. This distinction is **awarded by Springer Theses**, which publishes a new book series with the selected Ph.D. theses.

- In 2022, I was elected **IEEE Senior Member**.

Teaching

FALL 2019/2020/2021 **Instructor** - ECGR 3121 "Introduction to Electromagnetic Fields"
University of North Carolina at Charlotte, Department of Electrical and Computer Engineering, Charlotte, NC, United States.
Undergraduate-level course on fundamental topics of electricity and magnetism. Topics include electrostatics, magnetostatics, interface conditions, boundary value problems, Gauss's, Ampere's, Faraday's laws, and Maxwell's equations intro.

SPRING 2021/FALL 2023 **Instructor** - ECGR 3122 "Electromagnetic Waves"
University of North Carolina at Charlotte, Department of Electrical and Computer Engineering, Charlotte, NC, United States.
Undergraduate-level course on fundamental topics in electromagnetism. Topics include Maxwell's equations, boundary conditions, plane waves, electromagnetic power, reflection and transmission of plane waves, transverse electric (TE) and transverse magnetic (TM) waves, transmission line theory, and impedance matching.

SPRING 2020/2023 **Instructor** - ECGR 4090/5090 "Metamaterials and Metasurfaces"
University of North Carolina at Charlotte, Department of Electrical and Computer Engineering, Charlotte, NC, United States.
New graduate-level course on electromagnetic metamaterials and metasurfaces. Topics include numerical and analytical modeling of these engineered media. The course also discusses applications of metamaterials and metasurfaces in various areas, including antennas, flat lenses, subwavelength imaging, energy tunneling and squeezing, electromagnetic cloaking and invisibility, guiding devices.

FALL 2021/2023 **Instructor** - ECGR 4121/5121 "Antennas"
University of North Carolina at Charlotte, Department of Electrical and Computer Engineering, Charlotte, NC, United States.
Graduate-level course on antennas and propagation. Topics include antenna parameters, basic antennas, frequency-independent antennas, aperture antennas, arrays, and reflector antennas.

Mentoring students

From Fall 2020 to present

Student: Kristy Hecht
Position: Ph. D. Student (**graduating in December 2023**)
University: University of North Carolina at Charlotte
Research topic: Metasurface antennas for space applications and time-varying media for manipulation of electromagnetic energy
Supervision: 100%
Next Position: From January 2024, **Postdoctoral Researcher at NASA's Jet Propulsion Laboratory**.

From Fall 2022 to present

Student: Md Shohel Amin
Position: Ph. D. Student
University: University of North Carolina at Charlotte
Research topic: Temporal metamaterials and reconfigurable metasurfaces
Supervision: 100%

From Fall 2022 to present

Student: Abdelrahman Omar
Position: Ph. D. Student
University: University of North Carolina at Charlotte
Research topic: Dual-frequency metasurface antennas
Supervision: 100%

From Fall 2021 to Fall 2022

Student: Ulysses Ungos
Position: Master Student

University: University of North Carolina at Charlotte
Research topic: Reconfigurable metasurface antennas
Supervision: 100%

From Fall 2021 to Spring 2022

Student: Zachary Matzinger
Position: B. Sc. Student
University: University of North Carolina at Charlotte
Research topic: Metasurface antennas with beam steering capabilities
Supervision: 100%

From Fall 2021 to Spring 2022

Student: Griffin Hanna
Position: B. Sc. Student
University: University of North Carolina at Charlotte
Research topic: Metasurface antennas with beam steering capabilities
Supervision: 100%

From Fall 2021 to Spring 2022

Student: Joshua Coley
Position: B. Sc. Student
University: University of North Carolina at Charlotte
Research topic: Metascreen for antenna applications
Supervision: 100%

From Fall 2021 to Spring 2022

Student: Giovanna Brioso Bueso
Position: B. Sc. Student
University: University of North Carolina at Charlotte
Research topic: Metascreen for antenna applications
Supervision: 100%

Languages

Italian **native speaker**
English **fluent**
French **basic**

Computer skills

OS: Gnu/Linux (Ubuntu), Windows
Programming languages: C, C++, Java, Pascal
Electromagnetic Simulation: CST Microwave Studio, HFSS, Microwave Office, FEKO, Comsol Multiphysics
IT skills: Microsoft Office and OpenOffice
Scientific programming: Matlab, Python, Mathematica
CAD: SolidWorks, AutoCAD

Electronic Simulation: Spice, Altium designer

Other skills

– Team work, problem solving, good verbal and written communication skills.

Professional memberships and services to the scientific community

– From 2020, I have been an **associate editor** for the Journal of Advanced Electromagnetics.
– IEEE member and IEEE Antennas and Propagation Society member.
– From 2015, I have been a **reviewer** for the following journals: IEEE Transactions on Antennas and Propagation, IEEE Antennas and Wireless Propagation Letters, and Scientific Reports.
– I also serve regularly as reviewer for international conferences, like the European Conference on Antennas and Propagation (EuCAP) and IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (APS).

Referees

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