Andrea Marini

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The research background and expertise of Prof Marini extend over the theoretical modelling of miniaturized photonic devices, where novel physical mechanisms can be exploited to achieve active functionalities at micro- and nano-scales. From 2008, Prof Marini has co-authored 55 papers in top-level international journals, one book chapter, and 35 conference abstracts/proceedings. In particular, Prof Marini has experience in the theoretical modelling of graphene plasmons, nonlinear dynamics in plasmonic waveguides and metamaterials, supercontinuum generation and dispersive waves in photonic crystal fibers.

Personal

Born in L'Aquila (Italy) on 11 August 1983.

Marital status: single.

Italian Citizen.

Employment

December 2020 - Present Professore Associato (Associate Professor) in Theoretical Condensed Matter Physics at The University of L'Aquila (Italy).

December 2017 - November 2020 Ricercatore Universitario di tipo B (Tenure-track Assistant Professor) in Theoretical Condensed Matter Physics at The University of L'Aquila (Italy).

October 2017 - November 2017 Ricercatore (Researcher) at the CNR Institute for Complex Systems, Rome (Italy).

September 2014 - September 2017 Postdoctoral fellow at ICFO - Institut de Ciencies Fotoniques, Castelldefels (Spain).

December 2011 - August 2014 Postdoctoral researcher at the Max Planck Institute for the Science of Light, Erlangen (Germany).

Education

7 March 2012 PhD in Physics, achieved at the Department of Physics of the University of Bath (United Kingdom), under the supervision of Prof. Dmitry Skryabin. I defended the thesis "Theory of nonlinear and amplified surface plasmon polaritons" in a *viva voce* exam with the advisors Prof. Tim Birks and Prof. Yuri Kivshar on 14 November 2011.

22 July 2008 Laurea Specialistica in Fisica, Curriculum Fisica della Materia (Master Degree in Physics of Condensed Matter), achieved at the University of L'Aquila (Italy) with a final mark of 110/110 cum laude, defending the thesis "Wiggling and bending-free soliton propagation in microstructured photorefractive ferroelectrics" supervised by Dr. Eugenio Del Re, Dr. Alessandro Ciattoni and Prof. Paolo Di Porto.

22 February 2006 Laurea Triennale in Fisica, Curriculum Generale (Bachelor Degree in Physics), achieved at the University of L'Aquila (Italy) with a final mark of 110/110 cum laude, defending the thesis "Coherent States of Quantum Electromagnetic Field" supervised by Dr. Alessandro Ciattoni and Prof. Paolo Di Porto.

9 July 2002 Diploma di maturità scientifica (High School Diploma), achieved at Liceo Scientifico "Andrea Bafile" of L'Aquila (Italy) with a final mark of 80/100.

Awards and Grants

June 2023 National coordinator of the MUR PRIN 2022 project TransientMeta (2 years, $\sim$ 190k euros total budget, 75k euros unit budget).

December 2021 Local Unit Head of the MUR PRIN 2020 project PHOTO (3 years, $\sim$ 120k euros unit budget).

November 2021 European coordinator of HE-EIC Pathfinder Open TwistedNano 101046424 (4 years, $\sim$ 4M euros, score of 100.00).

October 2021 PhD scholarship "Dottorati su tematiche dell'innovazione" awarded by PON Ricerca e Innovazione 2014-2020 "Istruzione e ricerca per il recupero REACT-EU" (3 years, $\sim$ 80k euros budget).

July 2020 ASN "Abilitazione Scientifica Nazionale" (National Habilitation) as Full Professor in Theoretical Condensed Matter Physics (sector 02/B2) - awarded by MUR - The Italian Ministry of University and Research.

October 2018 SGRIP - Shri Gopal Rajgarhia International Programme - Visiting Fellowship awarded by IIT Kharagpur ($\sim$ 3k euros).

December 2017 ASN "Abilitazione Scientifica Nazionale" (National Habilitation) as Associate Professor in Theoretical Condensed Matter Physics (sector 02/B2) - awarded by MIUR - The Italian Ministry of Education and Research.

November 2017 ASN "Abilitazione Scientifica Nazionale" (National Habilitation) as Associate Professor in Experimental Condensed Matter Physics (sector 02/B1) - awarded by MIUR - The Italian Ministry of Education and Research.

September 2017 "Rita Levi Montalcini" tenure-track assistant professorship funded by MIUR - The Italian Ministry of Education and Research (3 years, $\sim$ 200k euros, 5th classified over 24 awardees in all disciplines, success rate $\sim$ 9%).

February 2017 Intra-European Marie Curie Individual Fellowship OUTNANO 746774 (2 years, $\sim$ 170k euros, score of 96.60) at the Institute for Complex Systems, Consiglio Nazionale delle Ricerche, CNR-ISC Roma, Italy.

September 2016 - September 2017 Contract under the FET Flagship "Graphene-based Revolutions in ICT and Beyond" financed by The European Union (REF GA 604391) at ICFO- The Institute of Photonic Sciences, Castelldefels (Spain).

September 2014 ICFOnest+ (Marie Curie Cofund) Postdoctoral Fellowship (2 years, $\sim$ 90k euros), Nanophotonics Theory Group, ICFO - The Institute of Photonic Sciences, Spain.

September 2008 University of Bath PhD Scholarship (three years, $\sim$ 45k euros), Centre for Photonics and Photonic Materials, University of Bath, United Kingdom.

Scientific Interests

Electromagnetism and Optics: nanophotonics, nonlinear plasmonics, photonic crystal fibers, ultrafast photonics, ultrafast plasmonics, epsilon-near-zero metamaterials, graphene plasmonics, optical sensing, optical solitons, silicon-on-insulator waveguides, dissipative solitons, waveguide arrays, discrete and gap solitons.

Solid State Physics: physics of photorefractive materials, statistical mechanics of phase transitions in ferroelectric crystals, out-of-equilibrium statistical mechanics, ultrafast electron dynamics in noble metals and graphene, optical properties of two-dimensional materials.

Languages

Italian: Native language.

English: Excellent.

Spanish: Excellent.

German: Basic.

French: Basic.

Teaching experience

Lectures for the "Quantum Optics" class of the postgraduate programme in Condensed Matter Physics at the University of L'Aquila, Italy (56 hours, 6 cfu), academic year 2022/2023.

Tutorials for "Fisica 2" (Electromagnetism) of the undergraduate programme in Mathematics at the University of L'Aquila, Italy (36 hours, 4 cfu), academic year 2022/2023.

Tutorials for "Elettromagnetismo" (Electromagnetism) of the undergraduate programme in Physics at the University of L'Aquila, Italy (36 hours, 4 cfu), academic year 2022/2023.

Lectures for the "Advanced Methods in Condensed Matter Physics" class of the postgraduate programme in Condensed Matter Physics at the University of L'Aquila, Italy (28 hours, 3 cfu), academic year 2022/2023.

Lectures for the "Advanced Simulation Techniques" class of the postgraduate programme in Condensed Matter Physics at the University of L'Aquila, Italy (18 hours, 2 cfu), academic year 2021/2022.

Lectures for the "Advanced Methods in Condensed Matter Physics" class of the postgraduate programme in Condensed Matter Physics at the University of L'Aquila, Italy (28 hours, 3 cfu), academic year 2021/2022.

Tutorials for "Fisica 2" (Electromagnetism) of the undergraduate programme in Mathematics at the University of L'Aquila, Italy (36 hours, 4 cfu), academic year 2021/2022.

Tutorials for "Elettromagnetismo" (Electromagnetism) of the undergraduate programme in Physics at the University of L'Aquila, Italy (36 hours, 4 cfu), academic year 2021/2022.

Full teaching "Fisica 2" (Electromagnetism) of the undergraduate programme in Industrial Engineering at the University of L'Aquila, Italy (60 hours, 6 cfu), academic year 2021/2022.

Lectures for the "Advanced Simulation Techniques" class of the postgraduate programme in Condensed Matter Physics at the University of L'Aquila, Italy (18 hours, 2 cfu), academic year 2020/2021.

Tutorials for "Fisica 1" (Mechanics and Thermodynamics) of the undergraduate programme in Industrial Engineering at the University of L'Aquila, Italy (30 hours, 3 cfu), academic year 2020/2021.

Full teaching "Fisica 2" (Electromagnetism) of the undergraduate programme in Industrial Engineering at the University of L'Aquila, Italy (60 hours, 6 cfu), academic year 2020/2021.

Tutorials for "Fisica 2" (Electromagnetism) of the undergraduate programme in Industrial Engineering at the University of L'Aquila, Italy (30 hours, 3 cfu), academic year 2020/2021.

Lectures for the "Advanced Methods in Condensed Matter Physics" class of the postgraduate programme in Condensed Matter Physics at the University of L'Aquila, Italy (28 hours, 3 cfu), academic year 2019/2020.

Full teaching "Fisica 2" (Electromagnetism) of the undergraduate programme in Industrial Engineering at the University of L'Aquila, Italy (60 hours, 6 cfu), academic year 2019/2020.

Lectures for the "Spettroscopia" class (Spectroscopy) of the postgraduate programme in Condensed Matter Physics at the University of L'Aquila, Italy (28 hours, 3 cfu), academic year 2018/2019.

Full teaching "Fisica 2" (Electromagnetism) of the undergraduate programme in Industrial Engineering at the University of L'Aquila, Italy (60 hours, 6 cfu), academic year 2018/2019.

Seminar "Ultrafast Plasmonics" at the IMPRS Doctoral School, Erlangen, Germany, academic year 2014/2015.

Tutorials for the "EV-1 Vertiefung Experimentalphysik: Atom- , Molekülphysik und Quantenoptik" class (Advanced Experimental Physics: Atomic, Molecular Physics and Quantum Optics) of the master programme in Physics at the Friedrich Alexander University of Erlangen-Nuremberg, academic year 2013/2014.

Tutorials for the "EV-1 Vertiefung Experimentalphysik: Atom- , Molekülphysik und Quantenoptik" class (Advanced Experimental Physics: Atomic, Molecular Physics and Quantum Optics) of the master programme in Physics at the Friedrich Alexander University of Erlangen-Nuremberg, academic year 2012/2013.

Tutorials for the "Electricity and Magnetism" class of the undergraduate programme in Physics at the University of Bath, academic year 2008/2009.

Tutorials for the "Thermodynamics and Statistical Mechanics" class of the undergraduate programme in Physics at the University of Bath, academic year 2008/2009.

Editorial activity and Peer Review

Review Editor for the Editorial Board of Nonlinear Optics, specialty section of Frontiers in Photonics (from 2020).
Editor of the MDPI - Applied Sciences Special Issue *"Ultrafast Nonlinear Properties of Near-Zero Index Media and Metamaterials Out of Equilibrium"* (2019-2020).
Referee for the Optical Society of America - Optics Express, Optics Letters, and JOSAB.
Referee for Nature Publishing Group - Scientific Reports, Light: Science & Applications.

Referee for Elsevier - Optics Communications.
Referee for the Institute of Physics - New Journal of Physics, Journal of Optics and Journal of Physics D: Applied Physics.

Roles of Responsibility

2018 - Present Board member of the PhD Program in Physical and Chemical Sciences of The University of L'Aquila, Italy.

2020 - Present Member of the Technical Committee of Advanced Photonics IPR "Integrated nonlinear & quantum optics" conference.

2023 Member of the Committee for "ASSEGNO DI RICERCA RELATIVO AL PROGRAMMA DAL TITOLO Modellazione fisico-chimica di molecole di interesse farmacologico (gas-phase ed interagenti con proteine) e di dispositivi optofluidici integrati per drug safety" at the Department of Physical and Chemical Sciences.

2023 Member of the Committee for "ASSEGNO DI RICERCA RELATIVO AL PROGRAMMA DAL TITOLO Ottica nonlineare in materiali topologici" at the Department of Physical and Chemical Sciences.

2022 Member of the Committee for "ASSEGNO DI RICERCA RELATIVO AL PROGRAMMA DAL TITOLO Modelling of twisted nanophotonic devices for integrated chiroptical sensing of drugs" at the Department of Physical and Chemical Sciences.

2022 Member of the Committee for "CONCORSO DI AMMISSIONE AL CORSO DI DOTTORATO DI RICERCA IN SCIENZE FISICHE E CHIMICHE FINANZIATO DAL PROGETTO EUROPEO TwistedNano Twisted nanophotonic technology for integrated chiroptical sensing of drugs on a chip Grant Agreement n. 101046424".

2021 Member of the Committee for the selection of PhD students for the Doctoral Programme in Physical and Chemical Sciences - XXXVII ciclo - A.A. 2021/2022.

2021 Member of the Committee for "ASSEGNO DI RICERCA RELATIVO AL PROGRAMMA DAL TITOLO Sistema multi-core per lo scambio di chiavi quantistiche" at the Department of Physical and Chemical Sciences.

2021 Member of the Committee for "1 BORSA DI STUDIO PER ATTIVITA' DI RICERCA DAL TITOLO Effetti di polarizzazione nella distribuzione dell'entanglement in reti ottiche, Rep. n. 68/2021 del 18.032021 Prot. n. 373/2021 del 18.03.2021 Tit. III Cl. 12 Fasc. 2" at the Department of Physical and Chemical Sciences.

2020 Member of the Committee for the selection of PhD students for the Doctoral Programme in Physical and Chemical Sciences - XXXVI ciclo - A.A. 2020/2021.

2020 External advisor of the committee evaluating the PhD Defense of Dr. Sandra De Vega at ICFO - The Institute of Photonic Sciences, Castelldefels, Spain.

2019 Examiner of the Bachelor Degree in Physics of Ms. Carola Ciaramelletti at The University of L'Aquila, Italy.

Participation in Professional Societies

2018 - Present Member of the Optical Society of America (OSA).

2018 - Present Member of the European Physical Society (EPS).

2018 - Present Member of the Optics and Photonics Society of Italy (SIOF).

2009 - Present Member of the Italian Physical Society (SIF).

Conferences, Seminars and Schools

CMD30 FisMat 2023,
Milano - Italy 2023. (*invited speaker*)

META'23, the 13th International Conference on Metamaterials, Photonic Crystals and Plasmonics,
Paris - France 2023. (*invited speaker*)

META'22, the 12th International Conference on Metamaterials, Photonic Crystals and Plasmonics,
Malaga - Spain 2022. (*invited speaker*)

MRS Fall Meeting,
Boston - USA 2021. (*invited speaker*)

OSA Advanced Photonics,
Montreal - Canada 2021. (*invited speaker*)

META'20, the 11th International Conference on Metamaterials, Photonic Crystals and Plasmonics,
Warsaw - Poland 2021. (*invited speaker*)

Complex Materials for Nonlinear Optics Workshop,
ETH Zurich - Switzerland 2020. (*invited speaker*)

SuperFOx2020 Conference,
Santa Margherita Ligure - Italy 2020. (*oral presentation*)

CNISM FisMat2019 Conference,
Catania - Italy 2019. (*oral presentation*)

SIF - 105 Congresso Nazionale,
L'Aquila - Italy 2019. (*oral presentation*)

META'19, the 10th International Conference on Metamaterials, Photonic Crystals and Plasmonics,
Lisboa - Portugal 2019. (*invited speaker*)

OSA Nonlinear Optics Conference,
Kona - United States 2019. (*oral presentation*)

28th Annual International Laser Physics Workshop,
Gyeongju - South Korea 2019. (*invited speaker*)

Workshop on Progress in Nonlinear Photonics,
Helsinki - Finland 2019. (*invited speaker*)

Faraday Discussions on Hot-electron science and microscopic processes in plasmonics and catalysis,
London - United Kingdom 2019. (*invited speaker*)

IIT Kharagpur Doctoral School seminar,
Kharagpur - India 2019. (*invited seminar*)

NANOP, Nanophotonics and Micro/Nano Optics International Conference,
Rome - Italy 2018. (*oral presentation, session chair*)

SPIE, Photonics Europe,
Strasbourg - France 2018. (*oral presentation*)

ETNO Emerging trends in nonlinear optics,
Iseo - Italy 2018. (*invited speaker*)

OSA Advanced Photonics,
Zurich - Switzerland 2018. (*oral presentation*)

META'18, the 9th International Conference on Metamaterials, Photonic Crystals and Plasmonics,
Marseille - France 2018. (*invited speaker*)

NANOP, Nanophotonics and Micro/Nano Optics International Conference,
Barcelona - Spain 2017. (*oral presentation*)

CLEO PR-OECC&PGC, Conference on Lasers & Electro-Optics: QELS Fundamental Science, Pacific Rim Conference,
Singapore 2017. (*invited speaker*)

CLEO Europe-EQEC, Lasers and Electro-Optics Europe & European Quantum Electronics Conference,
Munich - Germany 2017. (*oral presentation*)

SPP8, the 8th International Conference on Surface Plasmon Photonics,
Taipei - Taiwan 2017. (*oral presentation*)

NANOMETA, The 6th International Topical Meeting on Nanophotonics and Metamaterials,
Seefeld - Austria. (*poster contribution*)

The 14th International Conference of Near-Field Optics, Nanophotonics and Related Techniques (NFO14),
Hamamatsu - Japan 2016. (*oral presentation*)

OSA Latin America Optics & Photonics Conference (LAOP),
Medellin - Colombia 2016. (*invited speaker*)

SPIE, Optics + Photonics,
San Diego - United States of America 2016. (*invited speaker*)

META'16, the 7th International Conference on Metamaterials, Photonic Crystals and Plasmonics,
Torremolinos - Spain 2016. (*invited speaker*)

Nanolight 2016,
Benasque - Spain 2016. (*poster contribution*)

SPIE, Optics + Photonics,
San Diego - United States of America 2015. (*invited speaker*)

META'15, the 6th International Conference on Metamaterials, Photonic Crystals and Plasmonics,
New York City - United States of America 2015. (*invited speaker*)

SPP7, the 7th International Conference on Surface Plasmon Photonics,
Jerusalem - Israel 2015. (*poster contribution*)

Imagine Nano - Bringing together Nanoscience & Nanotechnology,
Bilbao - Spain 2015. (*oral presentation*)

IMPRS Doctoral School Seminar,
Erlangen - Germany 2015. (*invited seminar*)

Meeting of the DFG priority program 1391 "Ultrafast Nano-optics",
Bad Durkheim - Germany 2014. (*oral presentation*)

Spatio-Temporal Complexity in Optical Fibers,
Como - Italy 2013. (*poster contribution*)

Conference on Lasers & Electro-Optics: QELS Fundamental Science,
San Jose - United States of America 2013. (*oral presentation*)

SPP6, the 6th International Conference on Surface Plasmon Photonics,
Ottawa - Canada 2013. (*oral presentation*)

META'13, the 4th International Conference on Metamaterials, Photonic Crystals and Plasmonics,
University of Sharjah, Sharjah - United Arab Emirates 2013. (*oral presentation*)

Workshop on Nonlinear Optics and Complexity in photonic crystal fibers and nanostructures,
Ettore Majorana Centre, Erice - Italy 2011. (*poster contribution*)

Conference on Lasers & Electro-Optics Europe & 12th European Quantum Electronics Conference CLEO EUROPE/EQEC, Munich - Germany 2011. (*poster contribution*)

I Jornadas Valencianas de Fotonica Computacional,
Valencia - Spain 2010. (*invited speaker*)

International Workshop on Complexity in Periodically Structured Systems,
Max-Planck-Institut fur Physik Komplexer Systeme, Dresden - Germany 2010. (*poster contribution*)

Summer school on Nonlinear Nanophotonics,
Ettore Majorana Centre, Erice - Italy 2010. (*poster contribution*)

IOP Nonlinear photonics in micro- and nano-structures,
Institute of Physics, London - United Kingdom 2009. (*poster contribution*)

COST MP0702 Training School on Nonlinear Nanophotonics,
Supelec, Metz - France 2009. (*poster contribution*)

SIAM Conference on Nonlinear Waves and Coherent Structures,
Università La Sapienza, Rome - Italy 2008.

Publications

Journal Articles

55 - A. Paul, **A. Marini**, and S. Roy, *"Spatial dissipative solitons in graphene-based active random metamaterials"*, Physical Review Applied 17, 044036 (2022).

54 - M. H. Ebrahim, **A. Marini**, V. Bruno, N. Kinsey, J. B. Khurgin, D. Faccio, and M. Clerici, *"Temporal dynamics of strongly coupled epsilon near-zero plasmonic systems"*, Applied Physics Letters 119, 221101 (2021).

53 - A. Sahoo, **A. Marini**, and S. Roy, *"Free-carrier-induced nonlinear dynamics in hybrid graphene-based photonic waveguides"*, Physical Review A 104, 063501 (2021).

52 - A. Ciattoni, C. Conti, and **A. Marini**, *"Electric Directional Steering of Cathodoluminescence From Graphene-Based Hybrid Nanostructures"*, Physical Review Applied 15, 054016 (2021).

51 - C. Ferrante, E. Principi, **A. Marini**, G. Batignani, G. Fumero, A. Virga, L. Foglia, R. Mincigrucci, A. Simoncig, C. Spezzani, C. Masciovecchio, and T. Scopigno, *"Non-linear self-driven spectral tuning of Extreme Ultraviolet Femtosecond Pulses in monoatomic materials"* Light: Science & Applications 10, 1 - 7 (2021).

50 - G. R. Sherwood, D. Chronopoulos, **A. Marini**, and F. Ciampa, *"3D-printed phononic crystal waveguide transducers for nonlinear ultrasonic damage detection"* NDT & E International 121, 102456 (2021).

49 - C. Trovatello, **A. Marini**, X. Xu, C. Lee, F. Liu, N. Curreli, C. Manzoni, S. Dal Conte, K. Yao, A. Ciattoni, J. Hone, X. Zhu, P. J. Schuck, and G. Cerullo, *"Broadband optical parametric amplification by two-dimensional semiconductors"*, Nature Photonics 15, 6 - 10 (2021).

48 - A. Ciattoni, C. Conti, A. Zayats, and **A. Marini**, *"Electric control of spin orbit coupling in graphene-based nanostructures with broken rotational symmetry"* Laser & Photonics Reviews 14, 2000214 (2020).

47 - A. Nieminen, **A. Marini**, and M. Ornigotti, *"Goos-Hänchen and Imbert-Fedorov shifts for epsilon-near-zero materials"* Journal of Optics 22, 0356012 (2020).

46 -A. Ciattoni, C. Conti, and **A. Marini**, *"Multipolar terahertz absorption spectroscopy ignited by graphene plasmons"* Communications Physics 2, 1-6 (2019).

45 -A. Sahoo, **A. Marini**, and S. Roy, *"Heat-induced soliton self-frequency redshift in the ultrafast nonlinear dynamics of active plasmonic waveguides"* Physical Review A 100, 013848 (2019).

44 -F. Floris, L. Fornasari, V. Bellani, **A. Marini**, F. Banfi, F. Marabelli, F. Beltram, D. Ercolani, S. Battiato, L. Sorba, and F. Rossella, *"Strong Modulations of Optical Reflectance in Tapered Core-Shell Nanowires"* Materials 12, 3572 (2019).

43 - A. Ciattoni, C. Rizza, H. W. H. Lee, C. Conti, and **A. Marini**, *"Plasmon-enhanced spin-orbit interaction of light in graphene"* Laser & Photonics Reviews 12, 1800140 (2018).

42 - A. Ciattoni, **A. Marini**, C. Rizza, and C. Conti, *"Phase-matching-free parametric oscillators based on two-dimensional semiconductors"* Light: Science & Applications 7, 5 (2018).

41 - M. Baudisch, **A. Marini**, J. D. Cox, T. Zhu, F. Silva, S. Teichmann, M. Massicotte, F. Koppens, L. S. Levitov, F J. Garcia de Abajo, and J. Biegert, *"Ultrafast nonlinear optical response of Dirac fermions in graphene"* Nature Communications 9, 1018 (2018).

40 - V. Mkhitaryan, L. Meng, **A. Marini**, and F J. Garcia de Abajo, *"Lasing and amplification from two-dimensional atom arrays"* Physical Review Letters 121, 163602 (2018).

39 - A. Autere, H. Jussila, **A. Marini**, J. R. M. Saavedra, Y. Dai, A. Saynatjoki, L. Karvonen, H. Yang, B. Amirsolaimani, R. A. Norwood, N. Peyghambarian, H. Lipsanen, K. Kieu, F. J. Garcia de Abajo, and Z. Sun, *"Optical harmonic generation in monolayer group-VI transition metal dichalcogenides"* Physical Review B 98, 115426 (2018).

38 - C. Rizza, X. Li, A. Di Falco, E. Palange, **A. Marini**, and A. Ciattoni, *"Enhanced asymmetric transmission in hyperbolic epsilon-near-zero slabs"* Journal of Optics 20, 085001 (2018).

37 - D. N. Carvalho, F. Biancalana, and **A. Marini**, *"Nonlinear optical effects of opening a gap in graphene"* Physical Review B 97, 195123 (2018).

36 - F. Floris, L. Fornasari, **A. Marini**, V. Bellani, F. Banfi, S. Roddaro, D. Ercolani, M. Rocci, F. Beltram, M. Cecchini, L. Sorba, and F. Rossella, *"Self-Assembled InAs Nanowires as Optical Reflectors"* Nanomaterials 7, 400 (2017).

35 - F. Ciampa, A. Mankar, and **A. Marini**, *"Phononic Crystal Waveguide Transducers for Nonlinear Elastic Wave Sensing"* Scientific Reports 7, 14712 (2017).

34 - D. N. Carvalho, F. Biancalana, and **A. Marini**, *"Monolayer Graphene Can Emit SHG Waves"*, Optical Data Processing and Storage 3, 47 - 53 (2017).

33 - D. N. Carvalho, **A. Marini**, and F. Biancalana, *"Dynamical centrosymmetry breaking - A novel mechanism for second harmonic generation in graphene"*, Annals of Physics 378, 24 - 32 (2017).

32 - A. Ciattoni, **A. Marini**, and C. Rizza, *"Efficient Vortex Generation in Subwavelength Epsilon-Near-Zero Slabs"*, Physical Review Letters 118, 104301 (2017).

31 - A. Marini, J. D. Cox, and F. J. Garcia de Abajo, *"Theory of graphene saturable absorption"*, Physical Review B 95, 125408 (2017).

30 - J. D. Cox, **A. Marini**, and F. J. Garcia de Abajo, *"Plasmon-assisted high-harmonic generation in graphene"*, Nature Communications 8, 14380 (2017).

29 - A. Ciattoni, **A. Marini**, and C. Rizza, *"All-optical modulation in wavelength-sized epsilon-near-zero media"*, Optics Letters 41, 3102 - 3105 (2016).

28 - A. Marini and J. F. Garcia de Abajo, *"Graphene-Based Active Random Metamaterials for Cavity-Free Lasing"*, Physical Review Letters 116, 217401 (2016). (**Highlighted in the Cover of PRL Volume 116, Number 21**)

27 - A. Ciattoni, C. Rizza, **A. Marini**, A. Di Falco, D. Faccio, and M. Scalora , *"Enhanced nonlinear effects in pulse propagation through epsilon-near-zero media"*, Laser & Photonics Reviews 10, 517-525 (2016).

26 - A. Marini and J. F. Garcia de Abajo, *"Self-organization of frozen light in near-zero-index media with cubic nonlinearity"*, Scientific Reports 6, 20088 (2016).

25 - M. F. Saleh, A. Armaroli, **A. Marini**, and F. Biancalana *"Strong Raman-induced noninstantaneous soliton interactions in gas-filled photonic crystal fibers"*, Optics Letters 40, 4058 (2015).

24 - A. Marini, I. Silveiro, and J. F. Garcia de Abajo, *"Molecular sensing with tunable graphene plasmons"*, ACS Photonics 2, 876 (2015).

23 - M. F. Saleh, A. Armaroli, Tr. X. Tran, **A. Marini**, F. Belli, A. Abdolvand, and F. Biancalana *"Raman-induced temporal condensed matter physics in gas-filled photonic crystal fibers"*, Optics Express 23, 11879 (2015).

22 - A. Marini, S. Roy, A. Kumar, and F. Biancalana, *"Loss-compensated nonlinear modes and symmetry breaking in amplifying metal-dielectric-metal plasmonic couplers"*, Physical Review A 91, 043815 (2015).

21 - A. Marini, S. Longhi, and F. Biancalana, *"Optical simulation of neutrino oscillations in binary waveguide arrays"*, Physical Review Letters 113, 150401 (2014).

20 - S. Roy, **A. Marini** and F. Biancalana, *"Free-carrier driven spatio-temporal dynamics in amplifying silicon waveguides"*, Physical Review A 89, 053827 (2014).

19 - A. Marini, Tr. X. Tran, S. Roy, S. Longhi, and F. Biancalana, *"Optical analog of spontaneous symmetry breaking induced by tachyon condensation in amplifying plasmonic arrays"*, Physical Review A 89, 023840 (2014).

18 - M. F. Saleh, **A. Marini**, and F. Biancalana, *"Shock-induced PT-symmetric potentials in gas-filled photonic crystal fibers"*, Physical Review A 89, 023801 (2014).

17 - M. Conforti, **A. Marini**, Tr. X. Tran, D. Faccio, and F. Biancalana, *"Interaction between optical fields and their conjugates in nonlinear media"*, Optics Express 21, 31239 (2013).

16 - A. V. Gorbach, **A. Marini**, and D. V. Skryabin, *"Graphene-clad tapered fibre: effective nonlinearity and propagation losses"*, Optics Letters 38, 5244 (2013).

15 - A. Marini and F. Biancalana, *"Ultrashort Self-Induced Transparency Plasmon Solitons"*, Physical Review Letters 110, 243901 (2013).

14 - A. Ciattoni, **A. Marini**, C. Rizza, M. Scalora, and F. Biancalana, *"Polariton excitation in epsilon-near-zero slabs: transient trapping of slow light"*, Physical Review A 87, 053853 (2013).

13 - S. Roy, **A. Marini**, and F. Biancalana, *"Self-frequency blueshift of dissipative solitons in silicon based waveguides"*, Physical Review A 87, 065803 (2013).

12 - H. Dong, C. Conti, **A. Marini**, and F. Biancalana, *"Terahertz relativistic spatial solitons in doped graphene metamaterials"*, Journal of Physics B: Atomic, Molecular and Optical Physics 46, 155401 (2013).

11 - A. Marini, M. Conforti, G. Della Valle, H. W. Lee, Tr. X. Tran, W. Chang, M. A. Schmidt, S. Longhi, P. St.J. Russell, and F. Biancalana, *"Ultrafast nonlinear dynamics of surface plasmon polaritons in gold nanowires due to the intrinsic nonlinearity of metals"*, New Journal of Physics 15, 013033 (2013).

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35 - M. H. Ebrahim, **A. Marini**, V. Bruno, N. Kinsey, J. B. Khurgin, D. Faccio, and M. Clerici, *"Temporal Dynamics of Strongly Coupled Epsilon-Near-Zero Modes"*, Integrated Photonics Research, Silicon and Nanophotonics, ITu1C. 3 (2022).

34 - C. Ferrante, E. Principi, **A. Marini**, G. Batignani, G. Fumero, A. Virga, L. Foglia, R. Mincigrucci, A. Simoncig, C. Spezzani, C. Masciovecchio, and T. Scopigno, *"Spectral tuning of Extreme Ultraviolet Femtosecond Pulses driven by ultrafast nonlinear light-matter interactions"*, International Conference on Ultrafast Phenomena, W3A. 3 (2022).

33 - F. Tonelli, A. Ciattoni, and **A. Marini**, *"Nonlinear wave mixing in two-dimensional semiconductors"*, Integrated Photonics Research, Silicon and Nanophotonics (OSA), ITh2A. 4 (2021).

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12 - A. Marini, I. Silveiro, and F. J. Garcia de Abajo, *"Infrared spectroscopy with tunable graphene plasmons"*, SPIE Nanoscience+ Engineering (2015).

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Citation Metrics

Total articles in publication list: 91.

Sum of the times cited: 2002.

Average citations per article: 22.

h-index: 25.

i10-index: 39.

From Google Scholar Citations.

Summary of Research Achievements

My main research interests are focused on nanophotonics, nonlinear optics, photonic crystal fibers and light-matter interactions in nanophotonic materials. In such research fields I delivered internationally recognized contributions testified by my research outputs comprising 55 papers published on the leading scientific journals in the field, one book chapter, and 35 contributed/invited abstracts/proceedings in international conferences. I am referee of several journals in the fields of optics, photonics and applied physics (Optics Letters, Optics Express, Journal of the Optical Society of America B, Scientific Reports, Light: Science & Applications, Applied Sciences, Optics Communications, New Journal of Physics, Journal of Optics, Journal of Physics D: Applied Physics). Since 2020 I am Review Editor for the Editorial Board of the Nonlinear Optics specialty section of Frontiers in Photonics and I am a member of the "Integrated Nonlinear & Quantum Optics" committee of the Integrated Photonics Research conference (Optica Advanced Photonics Congress). My research achievements can be summarized as follows.

Nonlinear optics

Description of new types of spatial and temporal solitons in diverse nonlinear optical systems, including nanophotonic waveguides, metamaterials, photonic crystal fibers and waveguide arrays;

Development of new models for high-harmonic generation in solid-state systems;

Description of surface second-order nonlinear interactions bypassing phase-matching requirements.

Plasmonics

Modelling of nonlinear dynamics and amplification in plasmonic waveguides;

Understanding of light-induced heating in metals and its effect on nonlinear dynamics;

Prediction of self-induced transparency plasmon-solitons in gold-based plasmonic waveguides.

Metamaterials

Transient trapping of slow light in epsilon-near-zero metamaterials;

Self-organization and three-dimensional self-trapping of frozen light in epsilon-near-zero media;

Cavity-free lasing in graphene-based random metamaterials.

Nanophotonics in two-dimensional materials

Spectrometry-free sensing with tunable graphene plasmons;

Modelling of saturable absorption of graphene, with applications in mode-locking and cavity-free lasing;

Enhancement of high-harmonic generation by means of graphene plasmons;

Development of theoretical models for second- an third-harmonic generation in monolayer transition metal dichalcogenides;

Prediction of phase-matching free parametric oscillation in micro-cavities embedding monolayer transition metal dichalcogenides;

Observation of parametric amplification by monolayer transition metal dichalcogenides.