

# Nicolò Maccaferri

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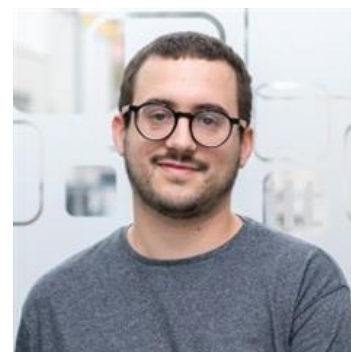
University of Luxembourg, Campus Limpertsberg 162a avenue de la Faïencerie

L-1511 Luxembourg

Phone: + 352 46 66 44 6412 – Email: [nicolo.maccaferri@uni.lu](mailto:nicolo.maccaferri@uni.lu)

**ORCID ID** 0000-0002-0143-1510 – **Researcher ID** N-2087-2014 – **Scopus ID**  
55675389500

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## Summary

I started my research activity in 2010 at the Department of Physics of the University of Ferrara as Undergraduate Research Assistant (Bachelor's student intern) working on exchange bias in magnetic materials. From November 2012 to December 2016, I was Pre-doctoral Researcher at the Nanoscience Research Center CIC nanoGUNE (Donostia-San Sebastian, Spain), where I studied the physical properties of plasmonic magnetic nanostructures and their application to molecular sensing. My contributions in the field of magneto-plasmonics were recognized by the Piero Brovetto Award of the Italian Physical Society. In 2014, I was Visiting Researcher in the NanoSpin Group at the Department of Applied Physics of Aalto University (Espoo, Finland) to work on hybrid plasmonic nanostructures with magneto-optical functionalities. In 2015 I was also Visiting Scientist at the Department of Physics at Chalmers University of Technology (Gothenburg, Sweden), where I co-devised an optical bio-sensing scheme based on polarization conversion analysis, and co-developed a new class of magneto-active meta-surfaces. From 2017 to 2018 I was Postdoctoral Research Associate at the Italian Institute of Technology (Genoa, Italy) in the Plasmon Nanotechnologies Group, where my main activities were devoted to the design and conceptual realization of photo-reactive nanostructures interfacing with biological matter for intracellular delivery of single nanoparticles and molecules, and cell membrane and nucleus investigations through surface enhanced spectroscopy techniques. I contributed also to the design and the implementation of solid state plasmonic nanopores for single protein and genomic material sequencing, as well as for the enhancement of resonance-mediated energy transfer mechanisms. Since January 2019 I am a Research Associate at the University of Luxembourg at the Chair of Ultrafast Phenomena in Condensed Matter Group led by Prof. Daniele Brida, and since January 2020 I am a Junior Group Leader in the same group, leading the FNR-CORE project ULTRON. The main objective of my research is to develop novel concepts in materials science by investigating the physical properties of multi-functional nanoscale metamaterials of high technological interest, in particular for information processing and biomedical applications, using light-based frequency- and time-resolved spectroscopy techniques, and multi-physics numerical methods. Since 2013, I have co-authored more than 30 articles, including research reports, reviews and editorials, in several peer-reviewed journals such as *Physical Review Letters*, *Nature Communications*, *Applied Physics Letters*, *Nanoscale* and *Nano Letters*. I have also contributed to more than 60 presentations, including invited talks, orals and posters, at international scientific conferences, workshops and academic institutions in Europe and US.

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## Education

- 2012-2016: Ph. D. in Physics of Nanostructures and Advanced Materials – University of the Basque Country (thesis work carried out at CIC nanoGUNE, San Sebastian, Spain). Final evaluation: Outstanding Cum Laude.
  - 2010-2012: M. Sc. In Physics (Condensed Matter) – University of Ferrara (thesis work carried out at CIC nanoGUNE, San Sebastian, Spain). Final evaluation: 110/110 Cum Laude.
  - 2007-2010: B. Sc. In Physics and Astrophysics – University of Ferrara. Final evaluation: 110/110.
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## Research experience

- 01/2020-present: Principal Investigator and Team Leader of the FNR-CORE Junior project ULTRON at the University of Luxembourg (Luxembourg), Department of Physics and Materials Science, Ultrafast Phenomena in Condensed Matter Group (Prof. Daniele Brida).
  - 06/2019-present: Visiting Researcher at the University of Konstanz (Germany), Department of Physics, Ultrafast Dynamics Research Group (Prof. Daniele Brida).
  - 01/2019-present: Research Associate and Lecturer at the University of Luxembourg (Luxembourg), Department of Physics and Materials Science, Ultrafast Phenomena in Condensed Matter Group (Prof. Daniele Brida).
  - 12/2016-12/2018: Research Associate at Italian Institute of Technology – IIT (Genoa, Italy), Plasmon Nanotechnologies Unit. Advisor: Dr. Francesco De Angelis.
  - 10/2012-12/2016: Predoctoral Researcher at CIC nanoGUNE (Donostia-San Sebastian, Spain), Nanomagnetism Group. Supervisor: Prof. Paolo Vavassori.
  - 09/2015-11/2015: Visiting Scientist at Chalmers University of Technology (Gothenburg, Sweden), Department of Applied Physics, Nanobiophotonics Division. Advisor: Prof. Alexandre Dmitriev.
  - 06/2014-07/2014: Visiting Scientist at Aalto University – School of Science (Espoo, Finland), Department of Applied Physics, NanoSpin Group. Advisor: Prof. Sebastiaan van Dijken.
  - 03/2012-10/2012: Graduate Research Assistant at CIC nanoGUNE (Donostia-San Sebastián, Spain) in the Nanomagnetism group. Supervisor: Prof. Paolo Vavassori.
  - 05/2010-09/2010: Undergraduate Research Assistant at Physics Department of University of Ferrara (Italy). Supervisor: Dr. Federico Spizzo.
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## Supervising experience

- 01/2019-present: Co-supervision of 5 PhD students (5 on-going) at the University of Luxembourg carrying out their research activity in the Ultrafast Phenomena in Condensed Matter Group (Official Supervisor: Prof. Daniele Brida).

- 06/2019-present: Co-supervision of a Master student at the University of Konstanz (Department of Physics) working on ultrafast nanophotonics (Official Supervisors: Prof. Daniele Brida and Prof. Alfred Leitenstorfer).
- 03/2018-06/2018: Supervision of an Undergraduate student in Economics (University of Genova) to develop a business plan related to the opening of a spin-off on optical nanotechnologies for theranostic applications at Italian Institute of Technology.
- 11/2017-12/2018: Co-supervision of a PhD student at Italian Institute of Technology working on hyperbolic metamaterials (Official Supervisor: Dr. Francesco De Angelis).
- 09/2015-09/2016: Co-supervision of a Master student at CIC nanoGUNE working on the chiral properties of magnetoplasmonic nanostructures (Official Supervisor: Prof. Paolo Vavassori).
- 06/2015-08/2015: Co-supervision of an Undergraduate student at CIC nanoGUNE working on the study of the magneto-optical properties of stretchable periodic arrays of nanostructured ferromagnets (Official Supervisor: Prof. Paolo Vavassori).
- 06/2014-08/2014: Co-supervision of an Undergraduate student at CIC nanoGUNE working on propagating plasmons and magneto-optical activity in sub-wavelength holes films arrays (Official Supervisor: Prof. Paolo Vavassori).

## Teaching experience

- 2019-2020: Co-lecturer of the course “Optical Physics” (Bachelor’s course in Physics) at the University of Luxembourg (Responsible of the course: Prof. Daniele Brida).
- 2019-2020: Teaching assistant (substitute Lecturer) for the course “Laser Physics” (Master’s course in Physics) at the University of Luxembourg (Responsible of the course: Prof. Daniele Brida).
- 2019-2020: Teaching assistant (substitute Lecturer) for the course “Thermodynamics” (Bachelor’s course in Physics) at the University of Luxembourg (Responsible of the course: Prof. Daniele Brida).
- 2013-2014: Teaching assistant for “Magnetic properties of matter and laboratory” (Master’s course in Physics) at the University of Ferrara (Responsible of the course: Prof. Paolo Vavassori).

## List of Publications

### Pre-prints

1. “Ultrafast all-optical switching enabled by epsilon-near-zero modes in metal-insulator nanocavities” J. Kuttruff, D. Garoli, J. Allerbeck, R. Krahné, A. De Luca, D. Brida, V. Caligiuri\*, and **N. Maccaferri\*** – arXiv: 2002.10299 (2020). [Research Article](#).
2. “Switchable two-state plasmonic tweezers for dynamic manipulation of nano-objects” G. C. Messina\*, X. Zambrana-Puyalto, **N. Maccaferri**, D. Garoli, and F. De Angelis\* – arXiv:1903.03865 (2019). [Research Article](#).

## Research articles/reviews/editorials published/in press

3. “Magnetoplasmonics in nanocavities: Dark plasmons enhance magneto-optics beyond the intrinsic limit of magnetoplasmonic nanoantennas” A. López-Ortega\*, M. Zapata-Herrera, **N. Maccaferri**, M. Pancaldi, M. Garcia, A. Chuvilin, and P. Vavassori\* – *Light: Science & Applications*, in press (2020). [Research Article](#).
4. “Nanoparticles manipulation in 3D nanotips excited with plasmonic vortex” Y. Shen, **N. Maccaferri**, K. Liu, X. Li, R. Proietti Zaccaria, X. J. Zhang\*, Y. Gorodetski\*, and D. Garoli\* – *Optics Letters*, **45**(4), 823-826 (2020). [Research Article](#).
5. “Machine learning in nanoscience: big data at small scales” K. A. Brown\*, S. Brittman, **N. Maccaferri**, D. Jariwala, and U. Celano – *Nano Letters*, **20**(1), 2-10 (2020). [Invited Mini Review](#).
6. “Bio-assisted tailored synthesis of plasmonic silver nanorings and site-selective deposition on graphene arrays” G. Giovannini, M. Ardini, **N. Maccaferri**, X. Zambrana-Puyalto, G. Panella, F. Angelucci, R. Ippoliti, D. Garoli\*, and F. De Angelis\* – *Advanced Optical Materials*, **8**(4), 1901583 (2020). [Research article](#).
7. “Nanoscale magnetophotonics” **N. Maccaferri**, I. Zubritskaya, I. Razdolski, I.-A. Chioar, V. Belotelov, V. Kapaklis, P. M. Oppeneer, and A. Dmitriev – *Journal of Applied Physics*, **127**(8), 080903 (2020). [Invited Perspective](#).
8. “Intracellular recording of human cardiac action potentials on market-available multielectrode array platforms” G. Melle, G. Bruno, N. Maccaferri, G. Iachetta, N. Colistra, A. Barbaglia, M. Dipalo, F. De Angelis – *Frontiers in Bioengineering and Biotechnology*, **8**, 66 (2020). [Research Article](#).
9. “Chasing plasmons in flatland” U. Celano\* and **N. Maccaferri\*** – *Nano Letters*, **19**(11), 7549-7552 (2019). [Editorial](#).
10. “Plasmonic nanopores for single-molecule detection and manipulation: towards sequencing applications” D. Garoli\*, H. Yamazaki, **N. Maccaferri**, and M. Wanunu\* – *Nano Letters*, **19**(11), 7553-7562 (2019). [Invited Mini Review](#).
11. “Electrophoretic deposition of WS<sub>2</sub> flakes on nanoholes arrays - Role of used suspension medium” D. Mosconi, G. Giovannini, **N. Maccaferri**, M. Serri, S. Agnoli, and D. Garoli\* – *Materials* **12** (20), 3286 (2019). [Research article](#).
12. “Hybrid metal-dielectric plasmonic zero mode waveguide for enhanced single molecule detection” X. Zambrana-Puyalto, P. Ponzellini, **N. Maccaferri**, E. Tessarolo, M. G. Pelizzo, W. Zhang, G. Barbillon, G. Lu, and D. Garoli\* – *Chemical Communications*, **55**, 9725-9728 (2019). [Research article](#).
13. “Tunable magnetoplasmonics in lattices of Ni/SiO<sub>2</sub>/Au dimers” S. Pourjamal, M. Kataja, **N. Maccaferri**, P. Vavassori, and S. van Dijken\* – *Scientific Reports*, **9**, 9907 (2019). [Research article](#).
14. Coupling phenomena and collective effects in resonant meta-atoms supporting both plasmonic and (opto-)magnetic functionalities: an overview on properties and applications” **N. Maccaferri\*** – *Journal of the Optical Society of America B*, **36**(7), E112-E131 (2019). [Invited Review in “Collective effects and coupling phenomena in resonant optical metasurfaces” Feature Issue](#).

15. “Site-selective functionalization of plasmonic nanopores for enhanced fluorescence and Förster Resonance Energy Transfer” X. Zambrana-Puyalto\*, **N. Maccaferri**, P. Ponzellini, G. Giovannini, F. De Angelis, and D. Garoli\* – *Nanoscale Advances*, **1**(6), 2454-2461 (2019). [Research article](#).
16. “Site-selective integration of MoS<sub>2</sub> flakes on nanopores by means of electrophoretic deposition” D. Mosconi, G. Giovannini, A. Jacassi, P. Ponzellini, **N. Maccaferri**, P. Vavassori, M. Serri, M. Dipalo, F. De Angelis, S. Agnoli, and D. Garoli\* – *ACS Omega* **4**(5), 9294-9300 (2019). [Research article](#).
17. “Hyperbolic meta-antennas enable full control of scattering and absorption of light” **N. Maccaferri**§\*, Y. Zhao§, T. Isoniemi, M. Iarossi, A. Parracino, G. Strangi, and F. De Angelis\* *Nano Letters* **19**(3), 1851–1859 (2019). [Research article](#).
18. “On-Demand Intracellular Delivery of Single Particles in Single Cells by 3D Hollow Nanoelectrodes” J.-A. Huang, V. Caprettini, Y. Zhao, G. Melle, **N. Maccaferri**, L. Deleye, X. Zambrana-Puyalto, M. Ardini, F. Tantussi, M. Dipalo, and F. De Angelis\* *Nano Letters* **19**(2), 722–731 (2019). [Research article](#).
19. “Enhanced Raman investigation of cell membrane and intracellular compounds by 3D plasmonic nanoelectrode arrays” V. Caprettini, J. A. Huang, F. Moia, A. Jacassi, C. A. Gonano, **N. Maccaferri**, R. Capozza, M. Dipalo, and F. De Angelis\* *Advanced Science* **5**(12), 1800560 (2018). [Research article](#).
20. “Plasmonic zero mode waveguide for enhanced confined fluorescence emission” P. Ponzellini§, X. Zambrana-Puyalto§, **N. Maccaferri**, L. Lanzanò, F. De Angelis, and D. Garoli\* – *Nanoscale* **10**, 17362-17369 (2018). [Research article](#).
21. “Hybrid plasmonic nanostructures based on controlled integration of MoS<sub>2</sub> flakes on metallic nanoholes” D. Garoli, D. Mosconi, E. Miele, **N. Maccaferri**, M. Ardini, G. Giovannini, M. Dipalo, S. Agnoli, and F. De Angelis – *Nanoscale* **10**, 17105-17111 (2018). [Research article](#).
22. “Live intracellular biorthogonal imaging by surface enhanced Raman spectroscopy using alkyne-silver nanoparticles clusters” M. Ardini, J.-A. Huang, C. Sánchez Sánchez, M. Z. Mousavi, V. Caprettini, **N. Maccaferri**, G. Melle, G. Bruno, L. Pasquale, D. Garoli\*, and F. De Angelis\* – *Scientific Reports* **8**, 12652 (2018). [Research article](#).
23. “Hybrid Ni/SiO<sub>2</sub>/Au dimer arrays for high-resolution refractive index sensing” S. Pourjamal, M. Kataja, **N. Maccaferri**, P. Vavassori, and S. van Dijken\* – *Nanophotonics* **7**(5), 905-912 (2018). [Research article](#).
24. “Magnetic control of the chiroptical plasmonic surfaces” I. Zubritskaya§\*, **N. Maccaferri**§, X. Inchausti Ezeiza, P. Vavassori\*, and A. Dmitriev\* – *Nano Letters* **18**(1), 302-307 (2018). [Research article](#).
25. “Magnetoplasmonic control of plasmonic vortices” **N. Maccaferri**\*, Y. Gorodetski\*, A. Toma, P. Zilio, F. De Angelis, and D. Garoli\* – *Applied Physics Letters* **111**(20) 201104 (2017). [Research article](#).
26. “Scanning probe nanojet lithography”, A. Jacassi, F. Tantussi, M. Dipalo, C. Biagini, **N. Maccaferri**, A. Bozzola, and F. De Angelis\* – *ACS Applied Materials and Interfaces* **9**(37), 32386-32393 (2017). [Research article](#).
27. “Polarization conversion-based sensing scheme using anisotropic plasmonic metasurfaces” R. Verre\*, **N. Maccaferri**, K. Fleischer, M. Svedendahl, N. O. Länk, A. Dmitriev, P. Vavassori, I.V. Shvets and M. Käll\* *Nanoscale* **8**, 10576-10581 (2016). [Research article](#).

28. “Anisotropic nanoantenna-based magnetoplasmonic crystals for highly enhanced and tunable magneto-optical activity” **N. Maccaferri**§\*, L. Bergamini§, M. Pancaldi§, M. K. Schmidt, M. Kataja, S. van Dijken, N. Zabala, J. Aizpurua, and P. Vavassori\* *Nano Letters* **16**(4), 2533-2542 (2016). [Research article](#).
29. “Hybrid plasmonic lattices with tunable magneto-optical activity” M. Kataja, S. Pourjamal, **N. Maccaferri**, P. Vavassori, T. K. Hakala, M. J. Huttunen, P. Törmä, and S. van Dijken\* *Optics Express*, **24**(4), 3652-3662 (2016). [Research article](#).
30. “Resonant enhancement of magneto-optical activity induced by surface plasmon polariton modes in 2D magnetoplasmonic crystals” **N. Maccaferri**, A. Garcia-Martin, J. C. Cuevas, X. Inchausti, D. Tripathy, A. Adeyeye, and P. Vavassori\* *ACS Photonics* **2**(12), 1769-1779 (2015). [Research article](#).
31. “Active magnetoplasmonic ruler” Zubritskaya\*, K. Lodewijks, **N. Maccaferri**\*, A. Mekonnen, R. Dumas, J. Åkerman, P. Vavassori, and A. Dmitriev\* *Nano Letters*, **15**(5), 3207-3211 (2015). [Research article](#).
32. “Ultrasensitive and label-free molecular level detection enabled by light phase control in magnetoplasmonic nanoantennas” **N. Maccaferri**, K. Gregorczyk, T. V. A. G. De Oliveira, M. Kataja, S. van Dijken, Z. Pirzadeh, A. Dmitriev, J. Åkerman, M. Knez, and P. Vavassori\* *Nature Communications* **6**, 6150 (2015). [Research article](#).
33. “Magnetoplasmonic design rules for active magneto-optics” K. Lodewijks§\*, **N. Maccaferri**§\*, T. Pakizeh, R. Dumas, I. Zubritskaya, J. Åkerman, P. Vavassori, and A. Dmitriev\* *Nano Letters* **14**(12), 7207-7214 (2014). [Research article](#).
34. “Effects of a non-absorbing substrate on magneto-optical Kerr response of plasmonic ferromagnetic nanodisks” **N. Maccaferri**, M. Kataja, V. Bonanni, S. Bonetti, , Z. Pirzadeh, A. Dmitriev, S. van Dijken, J. Åkerman, and P. Vavassori\* *Physica Status Solidi (A)*, **211**(5), 1067-1075 (2014). [Invited article in “Nanoscaled Magnetism and Applications” Topical Section](#).
35. “Tuning the magneto-optical response of nanosize ferromagnetic Ni disks using the phase of localized plasmons” **N. Maccaferri**, A. Berger, S. Bonetti, V. Bonanni, M. Kataja, Q.-H. Qin, S. van Dijken, Z. Pirzadeh, A. Dmitriev, J. Nogués, J. Åkerman, and P. Vavassori\* *Physical Review Letters* **111**(16), 167401 (2013). [Research article](#).
36. “Polarizability and magnetoplasmonic properties of magnetic generalized nanoellipsoids” **N. Maccaferri**\*, J. B. González-Díaz, S. Bonetti, A. Berger, M. Kataja, S. van Dijken, J. Nogués, V. Bonanni, Z. Pirzadeh, A. Dmitriev, J. Åkerman, and P. Vavassori\* *Optics Express* **21**(8), 9875-9889 (2013). [Research article](#).

\* Corresponding author.

§ These authors share first authorship.

## Patents

1. “HYPERBOLIC METAMATERIAL-BASED NANOPARTICLES FOR PLASMONIC APPLICATIONS” F. De Angelis, **N. Maccaferri**, A. Parracino, Y. Zhao, Tommi Juhani Isoniemi – PCT International Application No. PCT/IB2019/055630, July 2, 2019.
  2. “HYPERBOLIC METAMATERIAL-BASED NANOPARTICLES FOR PLASMONIC APPLICATIONS” F. De Angelis, **N. Maccaferri**, A. Parracino, Y. Zhao, Tommi Isoniemi – Italian Patent Application No. 102018000006880, July 3, 2018.
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## Conference Contributions

### Upcoming

1. “The 22nd International Conference on Ultrafast Phenomena” (November 15-20 2020, Shanghai, China) “Field-resolved response of plasmonic antennas” (Oral).
2. “30th Anniversary World Congress on Biosensors” (10-13 November 2020, Busan, South Korea) “Electrode-based Sensing of DNA topology for clinical diagnosis: a proof of concept” (Poster).
3. **“Biennial meeting of the Condensed Matter Divisions of the Spanish Royal Physics Society (RSEF-GEFES) and of the European Physical Society” (August 31 – September 4 2020, Madrid, Spain) “Nanoscale magnetophotonics: current advances and future perspectives” (Invited Talk – Mini Colloquium).**
4. **“META20 – 11th International Conference on Metamaterials, Photonic Crystals and Plasmonics” (July 20-23 2020, Warwaw, Poland) “Time- and Field-Resolved Response of Plasmonic Nanostructures and Their Applications to Single-Molecule Detection and Manipulation” (Invited Talk to the Special Session “Plasmonics for single molecule detection and manipulation”).**
5. “META20 – 11th International Conference on Metamaterials, Photonic Crystals and Plasmonics” (July 20-23 2020, Warwaw, Poland) “Ultrafast reflectanceswitching based on artificialepsilon-near-zero modes in a metal-insulator-metal nanocavity” (Oral).
6. “45th FEBS Congress, entitled *Molecules of Life: Towards New Horizons*” (July 4-9 2020, Ljubljana, Slovenia) hosted by the Slovenian Biochemical Society together with the Croatian Society of Biochemistry and Molecular Biology. “Bio-assisted tailored synthesis of plasmonic silver nanorings and site-selective deposition on graphene arrays” (Oral).
7. **“Moscow International Symposium on Magnetism” (June 27 – July 2 2020, Moscow, Russia) “Nanoscale magnetophotonics: current advances and future perspectives” (Invited Talk).**

## 2019

8. “MRS Fall Meeting” (December 1-6 2019, Boston, USA) “Hyperbolic Meta-Antennas – Arbitrary Control of Light Scattering and Absorption towards Thermo-Plasmonic Bio-Medical Applications” (Oral).
9. **“The 37th International Symposium on Dynamical Properties of Solids - DyProSo 2019” (September 8-12 2019, Ferrara, Italy) “Time-resolved investigations and biotechnological applications of plasmonic nanostructures” (Invited Talk).**
10. “Nanophotonics and Micro/Nano Optics International Conference 2019” (September 4-6, Munich, Germany) “Hyperbolic Metamaterial Nanostructures for Arbitrary Control of Scattering and Absorption of Light” (Oral). Contributed.
11. **“META19 – 10th International Conference on Metamaterials, Photonic Crystals and Plasmonics” (July 23-26 2019, Lisbon, Portugal) “Hyperbolic nanostructures: a new way to manipulate absorption and scattering of light and their thermo-plasmonic bio-medical applications” (Invited Talk to the Special Symposium “New trends in nanophotonics and advanced materials”).**
12. “META19 – 10th International Conference on Metamaterials, Photonic Crystals and Plasmonics” (July 23-26 2019, Lisbon, Portugal) “Designer hyperbolic nanostructures for thermo-plasmonic bio-medical applications using finite element and finite difference time domain approaches” (Poster).
13. “META19 – 10th International Conference on Metamaterials, Photonic Crystals and Plasmonics” (July 23-26 2019, Lisbon, Portugal) “Hybrid plasmonic nanostructures based on controlled deposition of MoS<sub>2</sub> flakes on plasmonic nanostructures” (Invited Talk to the Special Symposium “New trends in nanophotonics and advanced materials”). Contributed.
14. “META19 – 10th International Conference on Metamaterials, Photonic Crystals and Plasmonics” (July 23-26 2019, Lisbon, Portugal) “Lighting up magneto-optics to its limit with dark plasmons” (Poster). Contributed.
15. “CLEO Europe” (June 23-27 2019, Munich, Germany) “Field-resolved response of plasmonic antennas” (Oral). Contributed.
16. “CLEO Europe” (June 23-27 2019, Munich, Germany) “All-dielectric and magnetoplasmonic nanoantenna surfaces for the dynamic chiroptics” (Oral). Contributed.
17. “Plasmonica 2019” (June 19-21, Naples, Italy) “Probing resonant modes in hyperbolic metamaterial nanostructures with electron energy loss spectroscopy” (Oral). Contributed.
18. **“PIERS 2019” (June 17-20 2019, Rome, Italy). “Hyperbolic meta-antennas: arbitrary control of light scattering and absorption towards thermo-plasmonic bio-medical applications” (Invited talk to the Special Session “Thermoplasmonics and Photo-thermal Applications”).**
19. “Surface Plasmon Photonics 9 – SPP9” (May 26-31 2019, Copenhagen, Denmark) “All-dielectric and magnetoplasmonic nanoantenna surfaces for the dynamic chiroptics and structural color” (Oral). Contributed.
20. “Surface Plasmon Photonics 9 – SPP9” (May 26-31 2019, Copenhagen, Denmark) “Magneto-optics with hybrid bright/dark plasmons” (Oral). Contributed.



21. “SPIE Photonics WEST” (February 2-7 2019, San Francisco, USA) “Hyperbolic meta-antennas enable arbitrary control of absorption vs scattering” (Oral). Contributed.
22. “SPIE Photonics WEST” (February 2-7 2019, San Francisco, USA) “Plasmonic nanopore prepared on MoS<sub>2</sub> membrane: towards application in sequencing” (Oral). Contributed.
23. “SPIE Photonics WEST” (February 2-7 2019, San Francisco, USA) “FRET characterization of hollow plasmonic nanoantennas” (Oral). Contributed.

## 2018

24. “MRS Fall Meeting 2018” (November 25-30 2018, Boston, USA) “Magnetoplasmonic Sub-Nanometer-Multilayer Nanoantennas for the Dynamic Magnetic Chiroptics and Structural Color” (Oral). Contributed.
25. “TNT2018 – 19th International Conference on Trends in NanoTechnology” (September 3-7 2018, Lecce, Italy) “Plasmonic zero mode waveguide for highly confined and enhanced fluorescence emission” (Oral). Contributed.
26. “SPIE Optics + Photonics 2018” (August 19-23 2018, San Diego, USA) “Plasmonic zero mode waveguide for highly confined and enhanced fluorescence emission” (Oral). Contributed
27. “SPIE Optics + Photonics 2018” (August 19-23 2018, San Diego, USA) “Hybrid plasmonic nanostructures based on controlled integration of MoS<sub>2</sub> flakes on plasmonic nanostructures” (Oral). Contributed.
28. “15th International Conference on Near-Field Optics, Nanophotonics and Related Techniques” (August 26-31 2018, Troyes, France) “Probing plasmon polaritons in hyperbolic metamaterials with electron energy loss spectroscopy” (Poster). Contributed.
29. “ICN+T 2018” (July 22-27 2018, Brno, Czech Republic) “Single-Particle Intracellular Delivery by 3D Plasmonic Hollow Nanoelectrodes” (Oral). Contributed.
30. **“META18 – 9th International Conference on Metamaterials, Photonic Crystals and Plasmonics” (June 24-July 1 2018, Marseille, France) “Nanostructured magnetoplasmonic metamaterials: from extreme bio-sensing to active control of light polarization states at the nanoscale” (Invited Talk to the Special Session “Extraordinary topological effects and singular plasmonics”.**
31. “Plasmonica 2018” (July 4-6 2018, Florence, Italy) “Designer plasmonic losses in nanostructured hyperbolic metamaterials” (Oral).
32. “Plasmonica 2018” (July 4-6 2018, Florence, Italy) “Probing plasmon polaritons in hyperbolic metamaterials with electron energy loss spectroscopy” (Poster). Contributed.
33. “Plasmonica 2018” (July 4-6 2018, Florence, Italy) “Synthesis of Peroxiredoxin protein-templated plasmonic silver nanorings” (Oral). Contributed.

## 2017

34. “2017 MRS Fall Meeting” (November 26-December 1 2017, Boston, USA) “Magnetic Control of the Chiroptical Plasmonic Surfaces” (Oral). Contributed.
35. “43rd International Conference on Micro and NanoEngineering” (September 18-22 2017, Braga, Portugal) “Designer bulk plasmon polaritons modes in grating-coupled artificial hyperbolic metamaterials” (Poster). Contributed.
36. “Nanophotonics and Micro/Nano Optics International Conference 2017” (September 13-15 2017, Barcelona, Spain) “Helical light emission from plasmonic vortices via adiabatically tapered magnetoplasmonic tip” (Oral).
37. “Nanophotonics and Micro/Nano Optics International Conference 2017” (September 13-15 2017, Barcelona, Spain) “Designer bulk plasmon polariton modes in hyperbolic metamaterials for sensing applications” (Oral). Contributed.
38. “SPIE Optics + Photonics 2017” (August 6-10 2017, San Diego, USA) “Nanoporous gold decorated with silver nanoparticle as large area efficient SERS substrate” (Oral). Contributed.
39. “META17 – 8th International Conference on Metamaterials, Photonic Crystals and Plasmonics” (July 25-28 2017, Seoul, South Korea) “Magneto-Plasmonics of Checkerboard Au-Ni Nanoparticle Arrays” (Oral). Contributed.
40. “Plasmonica 2017” (July 5-7 2017, Lecce, Italy) “Plasmonic silver-alkyne nanoclusters as putative intracellular SERS-active probes” (Oral). Contributed.
41. “Plasmonica 2017” (July 5-7 2017, Lecce, Italy) “Grating-coupled hyperbolic metamaterials” (Poster).
42. “PIERS2017” (May 22-25 2017, St. Petersburg, Russia) “Magnetoplasmonic Crystals Based on Anisotropic Nanoantennas” (Oral). Contributed.

## 2016

43. “14th International Conference on Near-Field Optics, Nanophotonics and Related Techniques” (September 4-8 2016, Hamamatsu, Japan) “Enhanced and Tunable Magneto-optics via Fano Lattice Surface Modes in Arrays of Anisotropic Magnetic Nanoantennas,” (Poster). Contributed.
44. “School of Photonics 2016: Plasmonics and Nano-Optics” (July 10-14 2016, Cortona, Italy) “Polarization conversion-based biosensing schemes using plasmonic and magnetoplasmonic metasurfaces” (Oral).
45. “CEN2014 (Spanish Conference on Nanophotonics)” (June 20-22 2016, Valencia, Spain) “Enhanced and tunable magneto-optical activity in magnetoplasmonic crystals” (Oral).
46. “Conference on Lasers and Electro-Optics 2016” (June 5-10 2016 2016, San Jose, USA) “Magnetoplasmonic crystals based on anisotropic nanoantennas” (Oral). Contributed.
47. ”NanoSpain 2016” (March 15-18 2016, Logroño, Spain) “Enhanced and Tunable Magneto-Optics via Fano Lattice Surface Modes in Arrays of Anisotropic Magnetic Nanoantennas” (Oral). Contributed.

48. “APS March Meeting 2016” (March 14–18 2016, Baltimore, USA) “Combining magneto-optics with plasmonics in gold-nickel nanoparticle arrays” (Oral). Contributed.

## 2015

49. “CECAM Computational plasmonics: an ab initio and multiscale perspective” (November 2-4 2015, Lausanne, Switzerland) “Highly tunable optical and magneto-optical properties of arrays of anisotropic nanoantennas” (Poster). Contributed.

50. “International Conference on Magnetism ICM 2015” (July 10-13 2015, Barcelona, Spain) “Magneto-optical mediated coupling of surface plasmon polaritons in 2D magnetoplasmonic crystals” (Oral). Contributed.

51. “Plasmonica 2015” (July 1-3 2015, Padua, Italy) “Magneto-plasmonic nanoantennas: theory and applications” (Oral).

52. “ImagineNano 2015 – PPM Conference” (March 10-13 2015, Bilbao, Spain) “Magnetoplasmonic design rules for active magneto-optics” (Oral). Contributed.

53. “NanoGUNE 6th Anniversary Workshop” (January 30 2015, Donostia-San Sebastián, Spain) “Magnetoplasmonic nanoantennas: theory and applications” (Poster).

## 2014

54. “13th International Conference on Near-Field Optics, Nanophotonics and Related Techniques” (August 31-September 4 2014, Salt Lake City, USA) “Plasmonic nanoferrromagnets as ultra-sensitive molecular-level detectors” (Oral).

55. “CEN2014 (Spanish Conference on Nanophotonics)” (May 14-16 2014, Santander, Spain) “High-sensitive magnetoplasmonic label-free sensing using Ni nanodisks” (Oral).

56. “CEN2014 (Spanish Conference on Nanophotonics)” (May 14-16 2014, Santander, Spain) “Tuning the magneto-optical activity of nanosize ferromagnetic nanostructures using the phase of localized plasmons” (Poster).

57. “IEEE International Magnetism Conference (Intermag Europe)” (May 4-8 2014, Dresden, Germany), “From 2D to 3D magnetic anisotropy engineering towards highly tunable magnetoplasmonic polarization control in Ni nanoparticles” (Oral). Contributed.

58. “SPIE Photonics Europe Meeting” (April 13-17 2014, Brussels, Belgium) “Magnetoplasmonics going 3D” (Oral). Contributed.

59. “NanoPortugal 2014 (NanoPT 2014)” (February 12-14 2014, Oporto, Portugal) “Plasmonic phase tuning of magneto-optics in ferromagnetic nanostructures” (Oral).

60. “NanoGUNE 5th Anniversary Workshop” (January 30 2014, Donostia-San Sebastián, Spain) “Plasmonic phase tuning of magneto-optics in ferromagnetic nanostructures” (Poster).

## 2013

61. “Nanoscience Days 2013” (October 23–24 2013, Jyväskylä, Finland), “Fabrication and magneto-optical characterization of Nickel nanoparticles” (Poster). Contributed.
62. “Plasmonica 2013”, National Workshop on Plasmonics (July 1-3 2013, Milan, Italy), “Anisotropic polarizability and magnetoplasmonics of magnetic general nanoellipsoids” (Oral).
63. “Plasmonica 2013”, National Workshop on Plasmonics (July 1-3 2013, Milan, Italy), “Magnetoplasmonics in ferromagnetic nanostructures” (Oral). Contributed.
64. “Collaborative Conference on 3D & Materials Research (CC3DMR)” (June 24-28 2013, Ramada Jeju, South Korea), “Magnetoplasmonic Effects in Tailored Pure Ferromagnetic Nanostructures” (Oral). Contributed.
65. ‘Physics Days 2013 Workshop’ (May 14-16 2013, Dipoli, Espoo, Finland), “Magnetoplasmonic effects in Ni nanostructures” (Poster). Contributed.

## 2012

66. “Nanoscience Days 2012 Workshop” (October 8–9 2012, Jyväskylä, Finland), “Magnetoplasmonic effects in Ni nanostructures” (Poster). Contributed.
  67. “JEMS 2012” (September 9-14 2012, Parma, Italy), “Magneto-plasmonic Kerr effect” (Oral). Contributed.
  68. “Magnet 2011” (February 23-25 2011, Turin, Italy), “Influence of the anti-ferromagnet magnetic structure on the exchange bias in the Fe<sub>50</sub>Mn<sub>50</sub>/Fe<sub>50</sub>Co<sub>50</sub> system” (Poster). Contributed.
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## Conference Proceedings

1. **N. Maccaferri\*** “Time-resolved investigations and biotechnological applications of plasmonic nanostructures” MDPI Proceedings 26, 24 (2019).
2. M. P. Fischer; **N. Maccaferri**, K. Gallacher, J. Frigerio, G. Pellegrini, G. Isella, A. Leitenstorfer, D. J. Paul, P. Biagioni, and D. Brida\* “Field-resolved response of plasmonic antenna” CLEO Europe EQEC paper EG1.4 (2019).
3. M. Iarossi\*, D. Darvill, T. Isoniemi, A. Parracino, Y. Zhao\*, and **N. Maccaferri\*** “Fabrication and optical characterization of hyperbolic nanoparticles on a transparent substrate” Proc. SPIE – Photonic and Phononic Properties of Engineered Nanostructures IX 1092713 (2019).
4. **N. Maccaferri**, P. Ponzellini, G. Giovannini, and X. Zambrana-Puyalto\* “FRET characterization of hollow plasmonic nanoantennas” Proc. SPIE – Plasmonics in Biology and Medicine XVI 10894, 108941L (2019).

5. D. Mosconi, E. Miele, G. Giovannini, A. Jacassi, **N. Maccaferri**, and D. Garoli\* “Plasmonic nanopore prepared on MoS<sub>2</sub> membrane-hybrid nanostructures based on site selective deposition” Proc. SPIE – Plasmonics in Biology and Medicine XVI 10894, 1089417 (2019).
  6. **N. Maccaferri**\*, Y. Gorodetski, and D. Garoli “Helical light emission from plasmonic vortices via adiabatically tapered magnetoplasmonic tip” J. Phys.: Conf. Ser., 961, 012001 (2018).
  7. M. Ardini, J.-A. Huang, C. Sanchez-Sanchez, P. Ponzellini, **N. Maccaferri**, A. Jacassi, S. Cattarin, E. Calandrini, and D. Garoli\* “Nanoporous gold decorated with silver nanoparticle as large area efficient SERS substrate” Proc. SPIE – Plasmonics: Design, Materials, Fabrication, Characterization, and Applications XV 10346, 103460E (2017)
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## Seminars

1. Invited Seminar at University of Le Mans (November 21 2019, Le Mans, France) “Time-resolved response and biotechnological applications of nanoscale plasmonic architectures”. Host: Prof. Vasily Temnov.
  2. Invited Seminar at Dortmund Technical University – Department of Physics (July 12 2017, Dortmund, Germany) “Nanostructured plasmonic and magnetoplasmonic metamaterials: from extreme bio-sensing to active control of light polarization states at the nanoscale”. Host: Prof. Mirko Cinchetti.
  3. Invited Seminar at Stockholm University – Department of Physics and Astronomy, (November 20 2015, Stockholm, Sweden) “Magnetoplasmonic metasurfaces for active control of light at the nanoscale”. Host: Prof. Stefano Bonetti.
  4. Invited Seminar at Uppsala University – Angstrom Laboratories, (November 19 2015, Uppsala, Sweden) “Magnetoplasmonic metasurfaces for active control of light at the nanoscale” Host: Prof. Vassilios Kaplakis.
  5. Seminar at Chalmers University of Technology (November 16 2015, Gothenburg, Sweden) “Magnetoplasmonic oligomers for active control of circular dichroism at the nanoscale”. Host: Prof. Alexandre Dmitriev.
  6. Seminar at CIC nanoGUNE (June 30 2015, San Sebastian, Spain) “Magnetoplasmonic nanoantennas: theory and applications”
  7. Seminar at CIC NanoGUNE (September 26 2013, Donostia-San Sebastián, Spain) “Magneto-optical activity and plasmonic resonances in pure ferromagnetic nanostructures”
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## Organization of Schools, Conferences, Workshops

- Chair of the Special Session “Light-matter interactions in new materials and meta-architectures” at “META20 – 11th International Conference on Metamaterials, Photonic Crystals and Plasmonics” (July 20-23 2020, Warsaw, Poland) in collaboration with Vincenzo Caligiuri (University of Calabria and Italian Institute of Technology, Italy) and Mario Miscuglio (George Washington University, USA).

- Host of the Online Hub (live streaming platform) at the University of Luxembourg for the first Photonics Online Meeting (January 13 2020) – <https://sites.usc.edu/pom/>
  - Chair of the Special Session “Dynamic Metamaterials” at “META19 – 10th International Conference on Metamaterials, Photonic Crystals and Plasmonics” (July 23-26 2019, Lisbon, Portugal) in collaboration with Alexandre Dmitriev (University of Gothenburg, Sweden) and Paolo Vavassori (CIC nanoGUNE, Spain).
  - Co-organizer of the first edition of the “PHYMS Workshop of the Physics and Materials Science Research Unit” (Luxembourg, June 13 2019, Luxembourg).
  - Member of the Scientific Committee of the “School of Photonics: Plasmonics and Nano-Optics” (Cortona, July 10-14 2016, Italy), organized by the Italian Community on Plasmonics.
  - Member of the Scientific Committee of the first edition of the “NanoGUNE PhD Workshop” (San Sebastian, January 29 2016, Spain).
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## Grants, Fellowships and Awards

- March 2020: RISE grant to support the writing of a H2020-FET-OPEN-2020 proposal. **Funding Organization:** University of Luxembourg. Total funding: 10 k€.
- January 2020: Appointed Chair of the Early Career Editorial Board Member of Nano Letters (American Chemical Society).
- October 2019: FNR CORE Junior grant to start a team at my host group (Prof. Daniele Brida) studying ultrafast magneto-optical effects in nanoscale materials in the mid-infrared spectral range. **Funding Organization:** Luxembourg National Research Fund (FNR). Total funding for 3 years: 430 k€
- September 2019: RISE grant to support the purchase of a marketing analysis for the writing of a H2020-EIC-FETPROACT-2019 proposal. **Funding Organization:** University of Luxembourg. Total funding: 10 k€.
- January 2019: Appointed Co-Chair of the Early Career Editorial Board Member of Nano Letters (American Chemical Society).
- May 2018: Appointed Early Career Editorial Board Member of Nano Letters (American Chemical Society).
- January 2017: Basque Government Award for International PhD Thesis. The Award was assigned for defending a PhD Thesis with International mention and a final grade of "Outstanding Cum Laude".
- September 2015: “Piero Broveto” Award for young laureate in Physics by the Italian Society of Physics (SIF). The award was given for my contributions in the field of nanomagnetism and nanooptics and the study of the physical properties of magnetoplasmonic nanoantennas and their application in bio-sensing.
- January 2015: Basque Government Grant mobility Fellowship (January 2015) for three months stay in Prof. Dmitriev’s Group at Chalmers University of Technology (Gothenburg, Sweden) (September-November 2015). Role: (supervised) Principal Investigator.
- 2014: Student grant to attend the conference “CEN2014 (Spanish Conference on Nanophotonics) (Santander May 14-16 2014, Spain).

- 2014: Student grant to attend the conference “NanoPortugal 2014 (NanoPT 2014)” (Oporto February 12-14 2014, Portugal).
  - December 2013: Basque Government Pre-doctoral Fellowship (Plan de Formacion de Personal Investigador (PFPI) no doctor) (accepted by the candidate). Role: (supervised) Principal Investigator.
  - December 2013: Spanish Government Pre-doctoral Fellowship (Subprograma de Formacion de Personal Investigador (FPI) no doctor) (gratefully declined).
  - 2013: Student grant for the “IEEE Magnetics Summer School” 9-16 June 2013, Assisi, Italy.
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## Attended schools

- “School of Photonics 2016: Plasmonics and Nano-Optics”, July 10-14 2016, Cortona, Italy.
  - “NFO 13th School” September 31 2014, University of Utah, Salt Lake City, USA.
  - “IEEE Magnetics Summer School” June 9-16 2013, Assisi, Italy.
  - “Italian School on Magnetism”, February 5-10 2012, Pavia, Italy.
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## Participation in funded projects (as PI or staff scientist)

1. **Title:** ULTRON. **Funding Organization:** Luxembourg National Research Fund (FNR). **Principal Investigator:** Nicolò Maccaferri. Date: 2020-2022. Total funding: 430 k€.
2. **Title:** UpTEMPO. **Funding Organization:** European Union under the H2020-EU.1.2.1 Consolidator Grant (CoG), PE2, ERC-2018-COG. **Principal Investigator:** Daniele Brida. Date: 2019-2024.
3. **Title:** Lux-Ultrafast. **Funding Organization:** Fonds Européen de Développement Régional (FEDER). **Principal Investigator:** Daniele Brida. Date: 2018-2023.
4. **Title:** ProseqO. **Funding Organization:** European Union under the H2020-EU.1.2.1. FET Open call (Project ID 687089). **Coordinator:** Italian Institute of Technology. Date: 2016-2019.
5. **Title:** Neuroplasmonics. **Funding Organization:** European Union under the FP7-IDEAS-ERC call (Project ID 616213) **Principal Investigator:** Francesco De Angelis. Date: 2014-2018.
6. **Title:** Magneto-optical activity in spatially confined geometries. **Funding Organization:** Basque Government (PRE\_2013\_1\_975/PRE\_2014\_2\_171/PRE\_2015\_2\_0113). **Principal Investigator:** Nicolò Maccaferri. Date: 2014-2016 (3-years PhD project re-funded every year upon evaluation of the research results and outputs). Total funding: 45 k€.
7. **Title:** Nanofabrication of plasmonic heterostructures for nanoscale light polarization manipulation. **Funding Organization:** Basque Government (EP2015-1-44). **Principal Investigator:** Nicolò Maccaferri. Date: 2015 (3-months project to visit Chalmers University of Technology, Gothenburg, Sweden). Total funding: 3 k€.

8. **Title:** Metamateriales nanoestructurados para dispositivos magneto-opticos sintonizables. **Funding Organization:** Spanish Government (MAT2012-36844). **Principal Investigator:** Paolo Vavassori. Date: 2012-2015.
9. **Title:** Materiales nanoestructurados para la manipulación de la propaganda de la luz. **Funding Organization:** Basque Government (PI2012-47). **Principal Investigator:** Paolo Vavassori. Date: 2012-2014.
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## Other activities

- February 2020 – present: Inter-academic staff (post)docs representative in the Faculty Council (Faculty of Science, Technology and Medicine, University of Luxembourg).
  - January 2020 – present: Review Editor for the journal Frontiers in Nanotechnology (Nanomaterials Division).
  - December 2019 – present: Review Editor for the journal Frontiers in Physics (Condensed Matter Physics Division).
  - October 2019: Speaker at TEDxUniversityofLuxembourg (25 October 2019) – title of the talk: “Metamaterials matter: new possibilities with the smart material of the future”. Outreach activity.
  - September 2019 – February 2020: Inter-academic staff (post)docs representative in the Faculty Council (Faculty of Science, Technology and Communication, University of Luxembourg).
  - March 2019: “Open Day at the University of Luxembourg”, whose aim is to show to the general public our laboratories and research activities at the Department of Physics and Materials Science. Outreach activity.
  - January 2019 – present: Research Coach – Luxembourg Agency of Research Integrity (LARI).
  - January 2020 – December 2020: Chair of the Early Career Editorial Board of Nano Letters (ACS).
  - January 2019 – December 2019: Co-chair of the Early Career Editorial Board of Nano Letters (ACS).
  - May 2018 – present: Member of the Early Career Editorial Board of Nano Letters (ACS).
  - January 2018 – present: Member of the American Chemical Society (ACS).
  - Referee for Physical Review Letters, Physical Review B, Advanced Functional Materials, Physical Review Applied, ACS Photonics, Small, ACS Applied Materials and Interfaces, Nanoscale, Applied Physics Letters, Materials, Nanophotonics, Journal of Applied Physics, Optics Express, Optical Materials Express, Journal of Optics, Photonics Research, Journal of Modern Optics, Scientific Reports, Nanomaterials, OSA Continuum, JOSA B, JOSA A.
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## References available for contact

References (advisors, international collaborators, friendly competitors and/or non-academic profiles) available upon request.