

Europass Curriculum Vitae



Personal information

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| Name / Surname | Andrea MACCHI |
| Personal Email | andrea.macchi@ino.cnr.it |
| Nationality | Italian |
| Date of birth | September 05, 1970 |

Professional information

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| Present position | Senior research scientist , permanent (<i>primo ricercatore, secondo livello, TI</i>), Consiglio Nazionale delle Ricerche, Istituto Nazionale di Ottica (CNR/INO), Pisa, Italy. |
| Personal web page | www.andreamacchi.eu |
| ORCID | 0000-0002-1835-2544 |
| Web of Science ResearcherID | B-1900-2009 |
| Scopus ID | 7006542747 |

Degrees

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| Degree | Habilitation |
| Qualification awarded | National Scientific Habilitation (" <i>Abilitazione scientifica nazionale</i> ") as 1st level Professor (<i>Professore di prima fascia</i>) in Italian Universities |
| Awarding organization | Italian Ministry for University and Research (MIUR) |
| Attainment date | May 2019 |

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| Degree | Ph.D. (Dottorato di Ricerca) |
| Qualification awarded | Ph.D degree in Physics (<i>Diploma di Perfezionamento in Fisica</i> , equipollente al Dottorato di Ricerca, legge n. 308/1986) |
| Awarding Organization | Scuola Normale Superiore, Pisa, Italy |
| Thesis | "Superintense Laser-Solid Interaction" (in English) |
| Classification | With honors (70/70 <i>summa cum laude</i>) |
| Attainment date | November 05, 1999 |

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| Degree | M.Sc. (Laurea) |
| Qualification awarded | M.Sc. degree in Physics |
| Awarding organization | Università di Pisa, Pisa, Italy |
| Thesis | "Spettroscopia di riga dell'emissione X dei plasmi prodotti da laser" (in Italian) |
| Classification | With honors (110/110 <i>summa cum laude</i>) |
| Attainment date | March 17, 1995 |

Positions held

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| 01/11/2019– to date Employer | Senior research staff scientist (<i>primo ricercatore, livello II</i>) Consiglio Nazionale delle Ricerche, Istituto Nazionale di Ottica, (CNR/INO) |
| 01/02/2010–31/10/2019 Employer | Research staff scientist (<i>ricercatore, livello III</i>) Consiglio Nazionale delle Ricerche, Istituto Nazionale di Ottica, (CNR/INO) |
| 01/08/2003–31/01/2010 Employer | Research staff scientist (<i>ricercatore</i>) INFN (the National Institute for the Physics of Matter, part of CNR since 2005). (Affiliated to the regional laboratory polyLAB of CNR/INFN at the Department of Physics, University of Pisa, from 2005 to 2009) |
| 01/06/2000–31/07/2003 Employer | Postdoctoral Researcher Department of Physics, University of Pisa, Italy (advisor: Prof. Fulvio Cornolti) |
| 01/09/1998–31/05/2000 Employer | Postdoctoral Researcher Group of Theoretical Quantum Electronics, Institute for Advanced Physics, Darmstadt University of Technology, Darmstadt, Germany (advisor: Prof. Peter Mulser), supported by the European TMR Network SILASI (No.ERBFMRX-CT96-0043) |
| 01/01/1996–31/12/1998 Employer | Ph.D. studentship Scuola Normale Superiore, Pisa, Italy (advisors: Prof. Fulvio Cornolti, Prof. Francesco Pegoraro) |

Visiting positions

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| 01/05/2008–31/08/2008 Host | International Research Fellow School of Mathematics and Physics, Queen's University of Belfast, UK. |
| 01/08/2015–31/08/2015 Host | Visiting Researcher Nuclear Engineering & Applied Physics Dept., Chalmers University of Technology, Gothenburg, Sweden. |

Several short visits to Universities and Research centers including: Max Planck Institute for Nuclear Physics, Heidelberg, Germany; Institute of Physics, Rostock University, Germany; Université Pierre et Marie Curie–La Sorbonne, Paris, France.

Awards

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| Award | Predhiman Kaw legacy award for plasma physics and fusion studies (www.predhimankaw.in), received on June 21, 2021 |
| Award | CNR award (“incentivazioni al personale anno 2005”) for the work (published in 2005) on the use of circularly polarized laser pulses to accelerate ions (date awarded: 09/10/2009, prot. 0071013) |

Editorial roles

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| Date | May 2024–to date |
| Role | Divisional Associate Editor , Physical Review Letters (published by American Physical Society–APS): in charge for adjudicating manuscripts and providing advice to editorial staff. |
| Date | June 2020–to date |
| Role | Member of Editorial Board , New Journal of Physics (published by Institute of Physics–IoP and German Research Foundation–DFG): in charge for selecting reviewers and provide recommendations on manuscripts. |

Date September 2018–to date
 Role Member of **Editorial Board**, The European Physical Journal Plus (published by Springer Nature & Italian Physical Society–SIF): in charge for selecting reviewers, taking final editorial decisions on manuscripts, promoting and managing special issues [see A. Macchi & O. M. Maragò, The European Physical Journal Plus **136**, 1-3 (2021)].

Services

Date 2023–2024
 Role **Scientific Coordinator** of the Ph.D. Academy “Intense Lasers for Societal Applications”, Venice International University, May 13-17, 2024.

Date May 2024–to date
 Role Member of **Scientific Committee** (*Consiglio Scientifico*), Festival della Scienza, Genova: in charge for the review of proposals of outreach events.

Date 2013–2016
 Role Member of **Scientific Advisory Committee**, CILEX-APOLLON project (France): participation to periodic meetings to monitor and report on the project development.

Date 2010-2013
 Role Elected member of the **Council** (*Consiglio d’Istituto*) of **CNR/INO**.

Date 2009-2015
 Role Participation to conference committees:
Program committee (“beam plasma” section), 36th European Physical Society Conference in Plasma Physics, 2009;
international advisory board, COULOMB09 workshop “Ions Acceleration with High Power Lasers: Physics and Applications” (Senigallia, Italy), June 2009;
international advisory board for ALPA 2015 - Applications of Laser-driven Particle Acceleration international symposium, Venezia, Italy, November 19-21, 2015.

Date 1999–
 Role **Referee/Reviewer** for about 40 international peer reviewed journals, including Physical Review Letters, Physical Review (A, B, E, ST-AB, X, Applied), Nature Physics, Nature Communications, New Journal of Physics, Applied Physics Letters, Communications Physics, Journal of the Optical Society of America B, Journal of Physics (A, B, D), Medical Physics, Nuclear Fusion, Optics Express, Physics of Plasmas, Plasma Physics and Controlled Fusion, Proceedings of the Royal Society A, Scientific Reports.

See the Web of Science profile for full list of journals and reviews

Recognized as

- **Top Reviewer in Physics** by Web of Science (2019)
 - **Outstanding Referee** of the American Physical Society (2015)
- plus several yearly recognitions by specific journals.

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| Date | 2014–to date |
| Role | <p>Ph.D. Thesis Referee</p> <ul style="list-style-type: none"> - Ph.D. Dissertation Award Selection Committee member, American Physical Society, Division of Physics of Beams (APS-DPB), 2019. - referee of Ph.D theses (either anonymous or not) for the Indian Institute of Technology – Delhi (2024), Chalmers University of Technology – Gothenburg (2022), Homi Bhabha National Institute – Mumbai (2022), Hebrew University of Jerusalem (2019), Université de Bordeaux(2018), Università di Roma 1 La Sapienza (2018), Université Paris-Sud (2014). |
| Date | 2009-2020 |
| Role | <p>Reviewer/Panel member for the evaluation of research proposals/applications:</p> <ul style="list-style-type: none"> - European Commission (EC): Horizon 2020 Research Infrastructure calls, proposal evaluation for H2020-INFRADEV-2019-3 (2019) & HORIZON-INFRA-2022-DEV-01 (2022), project reporting for H2020-INFRADEV-2019-2 (2022–2023). - European Research Council (ERC) : ERCEA.B.4 Physical Sciences and Engineering, Consolidator Grant Call (2019); panel “Fundamental Constituents of Matter”; Starting Grant (2022). - Swiss National Science Foundation: proposal evaluation (2022). - Ministry of Education and Science of the Russian Federation (MESRF): Mega-grants Program (2019, 2020). - Multi-Organization Institute for Cancer (ITMO Cancer) of the French National Alliance for Life and Health Sciences (AVIESAN) & French National Cancer Institute (INCa) – France: Initiative “Plan Cancer” (2019, 2020). - Foundation for the Advancement of Theoretical Physics (BASIS), Russia: “Leader” & “Junior Leader” competitions (2017, 2019). - Czech Science Foundation (CSF), Czech Republic: Junior Research projects (2009, 2011), generic projects (2019) - Deutsche Forschungsgemeinschaft (DFG), Germany: generic projects (2018, 2021, 2023). - Italian Ministry of University and Research (MIUR), Italy: PRIN projects (2009,2011), FARE projects (2016), “Rita Levi Montalcini” projects (2017, 2018) - Agence Nationale de la Recherche (ANR), France: Appel à projet Retour Post-Doctorants (2011) & Appel à projets générique (2015, 2016, 2023) - Executive Agency for Higher Education, Research, Development and Innovation Funding – UEFISCDI, Romania: generic projects (2012, 2016, 2020, 2021, 2023); - Helmholtz Association, Germany: Helmholtz Young Investigator Groups (2013). - Shota Rustaveli National Science Foundation, Georgia: generic projects (2011). - U.S. Department Of Energy (DOE), USA: “High Energy Density Plasmas” program (2009) |
| Date | 2012 & 2016 |
| Role | <p>Evaluator for the National Agency for the eValuation of University and Research (AN-VUR), Italy (2012 & 2016).</p> |

Research activity

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| Theme | <p>Radiation pressure acceleration</p> <p>With my group in Pisa I have shown in 2005 that the use of circularly polarized pulses may lead to a laser-plasma interaction regime dominated by radiation pressure acceleration (RPA), characterized by high conversion efficiency in multi-MeV ions; this highly cited paper [A. Macchi et al, Phys. Rev. Lett. 94, 165003 (2005); recognized by CNR with a research award in 2009] has stimulated much theoretical and experimental work (on my side I proposed a scheme for a sub-femtosecond source of fusion neutrons based on RPA [A. Macchi, Appl. Phys. B: Laser & Optics 82, 337 (2006)]). When using ultrathin foil targets (“light sail” scheme), RPA has the potential to drive ions up to hundreds of MeV energy as required for advanced applications, e.g. in ion beam therapy; I have contributed to this topic by another highly cited paper unfolding key aspect of the physics of the light sail at ultra-high intensities [A. Macchi et al, Phys. Rev. Lett. 103, 085003 (2009)]. I have also participated to the design, modeling and interpretation of experiments on RPA [S. Kar et al, Phys. Rev. Lett. 100, 225004 (2008); 109, 185006 (2012); C Scullion et al, Phys. Rev. Lett. 119, 054801 (2017)]. The most recent work which I contributed to [A. McIlvenny et al, Phys. Rev. Lett. 127, 194801 (2021)] was covered in Physics Today, Physics (APS magazine), Physics World and mentioned on several newspapers for its possible relevance to FLASH therapy.</p> |
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| Theme | <p>High field and ultrafast plasmonics</p> <p>I have coordinated two experiments (sponsored by LASERLAB-EUROPE) at the CEA/SLIC facility in Saclay (France) which provided experimental evidence of laser excitation of relativistic surface plasmons (SP) at optical frequencies in grating targets via related enhanced absorption [T. Ceccotti et al, Phys. Rev. Lett. 111, 185001 (2013)] and electron acceleration [L. Fedeli et al, Phys. Rev. Lett. 116, 015001 (2016)]. More recently we showed that high harmonic emission in the XUV region can be also enhanced by SPs [G. Cantono et al, Phys. Rev. Lett. 120, 264803 (2018)]. This pioneering work suggests that concept and schemes of plasmonics may be extended in a nonlinear regime of ultrahigh laser fields and relativistic electron dynamics. Stimulated by the above described work on SP driven by femtosecond laser pulses, we proposed a concept to obtain surface polaritons with near-single cycle duration [F. Pisani et al, ACS Photonics 5, 1068 (2018)] which was recently extended to the high field regime [S. Marini et al, Phys. Rev. E 103, L021201 (2021)].</p> |
| Theme | <p>Giant unipolar pulses on metal surfaces</p> <p>Within my collaboration since 2005 with the Queen's University of Belfast (QUB), I have contributed to the interpretation and modelization of giant current pulses, of k-Ampere intensity and picosecond duration, observed after the high-intensity irradiation of metal targets. We showed that such pulses are generated due to the rapid escape of a large amount of charge in vacuum [K. Quinn et al, Phys. Rev. Lett. 102, 194801 (2009); highlighted as Editor's suggestion]. Within the same collaboration, recently such unipolar pulses have been exploited to develop a novel concept of a compact, all-optical scheme for the manipulation of a laser-accelerated proton pulse [S. Kar et al, Nature Communications 7, 10792 (2016)]. Other groups are exploiting the concept for the generation of intense pulses in the THz domain.</p> |
| Theme | <p>Radiation friction</p> <p>Within a collaboration with the Max-Planck Institute of Nuclear Physics, my group has been amongst the first to explore radiation friction (RF) effects in ultraintense laser-plasma interactions, in particular proposing a simple method to implement RF in laser-plasma simulations [M. Tamburini et al, New J. Phys. 12, 123005 (2010)] which has been later used by several groups, including some active in plasma astrophysics. More recently I have shown how RF may lead to a peculiar form of the Inverse Faraday Effect [T. Liseykina et al, New J. Phys. 18, 072001 (2016)]; fast track communication highlighted as news on Physics World and other scientific magazines online] providing both a test bed of RF physics and a way to generate ultra-intense (Gigagauss) magnetic fields in forthcoming experiments on laser facilities such as the Extreme Light Infrastructure (ELI), APOLLON, XCELS or VULCAN-10 PW, all in an advanced development stage.</p> |
| Theme | <p>Ion acceleration and proton probing investigations</p> <p>In addition to my work on RPA, I have promoted and participated to several theoretical and experimental investigations on laser-driven acceleration of ions: my leading role in this field has been recognized by an invited review paper on Review of Modern Physics [A. Macchi et al, Rev. Mod. Phys. 85, 751-793 (2013)], other short reviews in journals and books, and several invited overview talks and lectures. In addition, within my collaboration with QUB I have contributed to the modelization and interpretation of several laser-plasma phenomena (e.g. laser beam self-channeling, magnetic field generation, coherent electromagnetic structures) observed thanks to the use of laser-driven proton beams as a time- and space resolved probe of EM fields [L. Romagnani et al, Phys. Rev. Lett. 95, 195001 (2005); 105, 175002 (2010); S. Kar et al, New J. Phys. 9, 402 (2007); K. Quinn et al, Phys. Rev. Lett. 108, 135001 (2012); G. Sarri et al, Phys. Rev. Lett. 109, 205002 (2012)].</p> |
| Theme | <p>Ultrafast ionization</p> <p>During my Ph.D. and post-doctoral period I have been interested in the modeling of phenomena related to ultrafast field ionization of many-electron systems (from heavy atoms to macromolecules, clusters and plasmas). Examples from this activity are the study of the generation of steady magnetic fields as the result of transient ionization [A. Macchi et al, Phys. Rev. E 59 (R) 36 (1999)] and the unfolding of the collective mechanism of "ionization ignition" in clusters [D. Bauer & A. Macchi, Phys. Rev. A 68, 033201 (2003)].</p> |

Theme

Absorption and fast electron generation in laser-solid interactions

The other main activity of my Ph.D. and post-doctoral period has been devoted to the study of the mechanism of laser absorption and generation of “fast” relativistic electrons in the interaction with solid-density targets. Using for the first time in this context Vlasov-Euler simulations, we evidenced the effect of large scale surface deformations [H. Ruhl, A. Macchi et al, Phys. Rev. Lett. **82**, 2095 (1999)]; later, using PIC simulations we showed that small scale deformations appear as the result of a parametric process involving surface waves [A. Macchi et al, Phys. Rev. Lett. **87**, 205004 (2001); Phys. Plasmas **9**, 1704 (2002)]. This work was also relevant to the “fast ignition” concept in inertial confinement fusion and was presented by myself, along with an overview of the Italian activity in this field in an invited talk and paper at the IAEA conference [A. Macchi et al, Nucl. Fusion **43**, 362 (2003)].

Research grants

This list includes projects for which I received substantial funding and I was either the (principal investigator (PI) or the local coordinator of a research unit within collaborative project. Not included are several other projects as PI awarding access to experimental and supercomputing facilities, providing e.g. beamtime, computing time, and support fundings for participants.

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| Project Acronym | LaShoWa |
| Project name | “Laser-Driven Shock Waves” |
| Project type | PRIN (“research program of national interest”) – collaborative project between Italian research institutions |
| Time period | 04/02/2014-03/02/2017 |
| Awarding organization | Italian Ministry of University and Research (MIUR) |
| Project ID | MIUR 2012AY5LEL |
| Role | Local coordinator of one of the two research units |
| Budget | total 214.884 Euros, local 107.441 Euros |
| Project Acronym | SULDIS |
| Project name | “Superintense Laser-Driven Ion Sources” |
| Project type | FIRB “Futuro in Ricerca” – collaborative project between Italian research institutions, reserved to early stage researchers |
| Time period | 01/12/2010-01/12/2014 |
| Awarding organization | Italian Ministry of University and Research (MIUR) |
| Project ID | FIRB_RBFR08T5UN_003 |
| Role | Local coordinator of one of the two research units |
| Budget | total 439.000 Euros, local 67.200 Euros |
| Project Acronym | SWILAP |
| Project name | “Surface Wave Induced Laser Absorption in Plasmas” |
| Project type | CNR-CNRS bilateral project for scientific collaboration and exchange of researchers |
| Time period | 01/01/2010-01/01/2012 |
| Awarding organization | CNR (Italy) and CNRS (France) |
| Project ID | MD.P03.034/MD.P03.034.001 (CNR identifier) |
| Role | Italian partner unit coordinator |
| Budget | total 8000 Euros, local 5.904,65 Euros |
| Project Acronym | SION |
| Project name | “Laser-driven pulsed sources of ions and neutrons” |
| Project type | CNR “Ricerca Spontanea a Tema Libero” project for “curiosity-driven” research |
| Awarding organization | CNR (Italy) |
| Project ID | 535 |
| Date awarded | 29/11/2007 |
| Role | Principal Investigator |
| Budget | 9000 Euros |

Other projects as PI

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| | <p>This list includes projects of which I was the Principal Investigator (PI) awarding access to experimental and supercomputing facilities, providing e.g. beamtime, computing time, support fundings for participants, etc.</p> |
| Project Acronym | PULPICS |
| Project name | “Plasmas driven by Ultraintense Lasers: Particle-In-Cell Simulations” |
| Project type | ISCRA (Italian SuperComputing Resource Allocation) “Class B” award for access to supercomputing resources |
| Awarding organization | CINECA, Italy |
| Project ID | HP10BPGG4D |
| Resource awarded | 500.000 CPU hours on MARCONI (Cineca, Italy) |
| Time period | 17/12/2016-17/12/2017 |
| Project Acronym | SWERE-GT |
| Project name | “Surface-Wave Enhanced Radiation Emission from Grating Targets” |
| Project type | Access to European Laboratories |
| Awarding organization | LASERLAB-EUROPE |
| Project ID | SLIC002004 |
| Resource awarded | 5 experimental weeks at SLIC facility (CEA Saclay, France), with full financial support for 15 week/person |
| Time period | 22/09/2014-17/10/2015 |
| Project Acronym | PICCANTE |
| Project name | “Particle-In-Cell Code for Advanced simulations on TiEr-0 systems” |
| Project type | “Preparatory” award for code development on supercomputing facilities, including specialistic support |
| Awarding organization | PRACE (Partnership for Advanced Computing in Europe) |
| Project ID | 2010PA2458 - PRPC18 |
| Resource awarded | 250.000 core-hours on JUQUEEN (Juelich Supercomputing Centre, Germany) |
| Time period | 15/07/2014-15/01/2015 |
| Project Acronym | UCLIST |
| Project name | “Ultrahigh Contrast Laser Interaction with Structured Targets” |
| Project type | Access to European Laboratories |
| Awarding organization | LASERLAB-EUROPE |
| Project ID | SLIC001693 |
| Resource awarded | 4 experimental weeks at SLIC facility (CEA Saclay, France), with full financial support for 12 week/person |
| Time period | 18/06/2012-06/07/2012 |
| Project Acronym | LSAIL |
| Project name | “Large Scale Acceleration of Ions by Laser” |
| Project type | Award for access to supercomputing resources |
| Awarding organization | PRACE (Partnership for Advanced Computing in Europe) |
| Project ID | HP10AOP6MO |
| Resource awarded | 10.000.000 core-hours on Fermi (Cineca, Italy) |
| Time period | 01/11/2012-31/10/2013 |
| Project Acronym | TOFUSEX |
| Project name | “Towards Full-Scale Simulations of Laser-Plasma Interaction Experiments” |
| Project type | ISCRA (Italian SuperComputing Resource Allocation) “Class A” award for access to supercomputing resources |
| Awarding organization | CINECA, Italy |
| Project ID | HP10A25JKT |

Resource awarded
Time period

300.000 CPU hours on IBM SP6 (Cineca, Italy)
19/07/2010-19/07/2011

Publications

Complete lists of peer reviewed publications and citation data available at:
<https://www.webofscience.com/wos/author/record/172255> (Web of Science) ,
<http://www.scopus.com/authid/detail.url?authorId=7006542747> (SCOPUS),
<http://scholar.google.it/citations?user=P5RtCW4AAAAJ> (Google Scholar).
(at 26/09/2024)

Metrics

ISI Web of Science
SCOPUS

H-index=35, Hc-index=19, total publications=124, total citations=5365

H-index=36, total publications=115, total citations=5684 (without self-citations: **H-index=36, total citations=5275**)

Google Scholar

H-index=42, i10-index=78, total citations=7923 (since 2019: **H-index=27, i10-index=54, total citations=3168**)

Six most cited publications

ISI-Wos data with **total citations** (the second number excludes **self-citations** defined as citations from papers of which I am a coauthor) including the **Impact Factor** (IF) of the journal.
1130* (**1102**): Andrea Macchi, Marco Borghesi, Matteo Passoni, *Ion acceleration by superintense laser-plasma interaction*, Reviews of Modern Physics **85**, 751-793 (2013). IF=**42.860**
493 (**449**): A. Macchi, F. Cattani, T. V. Liseikina, F. Cornolti, *Laser acceleration of ion bunches at the front surface of overdense plasmas*, Physical Review Letters **94**, 165003 (2005). IF=**7.489**
296(**280**): Andrea Macchi, Silvia Veghini, Francesco Pegoraro, *Light Sail Acceleration Reexamined*, Physical Review Letters **103**, 085003 (2009). IF=**7.328**
258 (**246**): L. Romagnani, J. Fuchs, M. Borghesi, P. Antici, P. Audebert, F. Ceccherini, T. Cowan, T. Grismayer, S. Kar, A. Macchi, P. Mora, G. Pretzler, A. Schiavi, T. Toncian, O. Willi, *Dynamics of electric fields driving laser acceleration of multi-MeV protons*, Physical Review Letters **95**, 195001 (2005). IF=**7.489**
243 (**30**): S. Kar, K. F. Kakolee, B. Qiao, A. Macchi, M. Cerchez, D. Doria, M. Geissler, P. McKenna, D. Neely, J. Osterholz, R. Prasad, K. Quinn, B. Ramakrishna, G. Sarri, O. Willi, X. Y. Yuan, M. Zepf, M. Borghesi, *Ion acceleration in multispecies targets driven by intense laser radiation pressure*, Physical Review Letters **109**, 185006 (2012). IF=**7.943**
208 (**201**): M. Tamburini, F. Pegoraro, A. Di Piazza, C. H. Keitel, A. Macchi, *Radiation Reaction Effects on Radiation Pressure Acceleration*, New Journal of Physics **12**, 123005 (2010). IF=**3.849**

Recent articles

Selected articles of the **last four years**:

- P. Martin, H. Ahmed, D. Doria, M. Cerchez, F. Hanton, D. Gwynne, A. Alejo, J. Fernandez-Tobias, J. Green, A. Macchi, D. MacLellan, P. McKenna, J. Alvarez Ruiz, M. Swantusch, O. Willi, S. Zhai, M. Borghesi, S. Kar, *Narrow-band acceleration of gold ions to GeV energies from ultra-thin foils*, Communications Physics **7**, 3 (2024)
- A. Macchi, *Comment on: "Interacting quantum and classical waves: Resonant and non-resonant energy transfer to electrons immersed in an intense electromagnetic wave"*, Physics of Plasmas **30**, 084701 (2023)
- J. Sarma, A. McIlvenny, N. Das, M. Borghesi, A. Macchi, *Surface Plasmon-Driven Electron and Proton Acceleration without Grating Coupling*, New Journal of Physics **24**, 073023 (2022)
- A. McIlvenny, D. Doria, L. Romagnani, H. Ahmed, N. Booth, E. J. Ditter, O. C. Ettlinger, G. S. Hicks, P. Martin, G. G. Scott, S. D. R. Williamson, A. Macchi, P. McKenna, Z. Najmudin, D. Neely, S. Kar, and M. Borghesi, *Selective Ion Acceleration by Intense Radiation Pressure*, Physical Review Letters **127**, 194801 (2021).
- S. Marini, P. S. Kleij, F. Pisani, F. Amiranoff, M. Grech, A. Macchi, M. Raynaud, C. Riconda, *Ultrashort high energy electron bunches from tunable surface plasma waves driven with laser wavefront rotation* Physical Review E **103**, L021201 (2021)
- T. V. Liseykina, A. Macchi, S. V. Popruzhenko, *Quantum effects on radiation friction driven magnetic field generation*, EPJP - The European Physical Journal Plus **136**, 170 (2021)

Books

This list only includes books of I am author or co-author of the whole content: it does not include chapters in books or collections.

A. Macchi, G. Moruzzi, F. Pegoraro, *Problems in Classical Electromagnetism* (Springer, 2023), 2nd Edition, ISBN 978-3-031-22234-4 (hardcopy), ISBN 978-3-031-22235-1 (e-book), doi:10.1007/978-3-031-22235-1 [1st edition 2017, ISBN 978-3-319-63132-5 (hardcopy), ISBN 978-3-319-63133-2 (e-book).]

A. Macchi, *A Superintense Laser-Plasma Interaction Primer* (Springer, 2013), ISBN 978-94-007-6124-7 (print), 978-94-007-6125-4 (e-book), doi:10.1007/978-94-007-6125-4 .

A. Macchi, G. Moruzzi, F. Pegoraro, *Problemi di Elettromagnetismo Classico* (Pisa University Press, 2012) ISBN 88-8492-414-6 [in Italian].

Other publications

This list includes “overview” or commentary papers upon invitation, usually reviewed by the Editors. Not included are several tens of conference proceedings.

- Andrea Macchi and Francesco Pegoraro, *Lighting Up a Nest for X-Ray Emission*, Nature Photonics **17**, 129-130 (2023)

- Andrea Macchi and Francesco Pegoraro, *Instability yields bright gamma emission*, Nature Photonics **12**, 314-315 (2018)

- Andrea Macchi, *Viewpoint: Intense Laser Sheds Light on Radiation Reaction*, Physics **11**, 13 (2018).

- D. Giulietti, A. Macchi, *Laser superintensi per tutti*, Il Nuovo Saggiatore **23**, n.3-4, 76-84 (2007).

Invited Talks & Seminars

This list only includes a selection of **invited talks** to international conferences and scientific events, **lectures** in schools, and **seminars** in research institutions **in the last three years**. In total, I have given **26 invited talks/lectures** and **>50 contributed talks and seminars** in several universities and research institutions worldwide. Full list available at <http://www.df.unipi.it/~macchi/talks.html>

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| Date | 13/05/2024 |
| Title | <i>Intense Laser-Matter Interaction & Principles of Laser-Plasma Acceleration</i> |
| School | PhD Academy “Intense Lasers for Societal Applications”, Venice International University, May 13-17, 2024. |
| Date | 29/12/2022 |
| Title | <i>Surfin’ the Surface Wave: a New Approach to Plasma-based Acceleration</i> |
| Conference | International Conference on Plasma Science and Applications (ICPSA22) E-conference |
| Date | 11/10/2022 |
| Title | <i>Coherent Laser-Plasma Acceleration: Examples and Recent Results</i> |
| Conference | AAPPS-DPP2022 E-conference |
| Date | 05/10/2022 |
| Title | <i>Laser-Plasma Ion Acceleration</i> |
| School | ELI-NP Autumn School 2022, Extreme Light Infrastructure - Nuclear Physics, Magurele, Romania. |
| Date | 20/06/2022 |
| Title | <i>Advanced Concepts of Laser-Driven Ion Acceleration & Basic Phenomena of Superintense Laser-Plasma Optics</i> |
| School | 47th International Nathiagali Summer College, Islamabad, Pakistan. |

Supervisions

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|---------------|---|
| Post-doctoral | - Matteo Tamburini (14/02/2012-14/08/2012, supported by FIRB project “SULDIS”); - Andrea Sgattoni (01/10/2014-30/09/2015, supported by PRIN project “LaShoWa”); - Stefano Sinigardi (02/01/2014-01/03/2014, supported by FIRB project “SULDIS”) |
|---------------|---|

Ph.D. (*Dottorato*)

5 supervisions/co-supervisions completed since 2010

- Matteo Tamburini (2008-2010, University of Pisa), co-supervision with Prof. Francesco Pegoraro, thesis: *Radiation reaction effects in superintense laser-plasma interactions*, defended on November 23, 2011;

- Amritpal Singh Nindrayog (2010-2013, University of Pisa), co-supervision with Prof. Francesco Pegoraro, thesis: *Ion Acceleration by Solitary and Shock Waves Driven by Laser- Plasma Interactions*, defended on January 7, 2013;

- Luca Fedeli (2013-2015, University of Pisa), thesis: *High Field Plasmonics*, defended on December 14, 2015;

- Anna Grassi (2015-2017, Université Pierre et Marie Curie, Paris, France, in *co-tutelle* with the University of Pisa), co-supervision with Prof. Caterina Riconda (UPMC and Ecole Polytechnique/LULI, France), thesis: *Collisionless shocks in the context of laboratory astrophysics*, defended on October 26, 2017;

- Giada Cantono (2015-2017, Université Paris Sud, France, in *co-tutelle* with the University of Pisa), co-supervision with Dr. Tiberio Ceccotti (CEA, Saclay, France), thesis: *Relativistic plasmonics for ultrashort radiation sources*, defended on October 27, 2017.

M.Sc. (*Laurea Magistrale*)

18 completed, all at the Department of Physics, University of Pisa.

B.Sc. (*Laurea Triennale*)

supervision of 17 “short thesis” projects (2003–2011), all at the Department of Physics, University of Pisa

Teaching

| | |
|-------------|---|
| Date | 2024 |
| Institution | Fondazione “I Lincei per la Scuola” (sponsor) & Scuola Normale Superiore, Pisa (host) |
| Program | Continuing education program for high school teachers |
| Course | “A vela con la luce, dal nanomondo alle stelle” (in Italian), 6 hours |
| Date | 2011 |
| Institution | University of Salamanca, Spain |
| Program | Master Program in “Laser Physics and Technology” |
| Course | “An Introduction to Ultraintense Laser-Plasma Interactions”, 10 hours |
| Date | 2009– |
| Institution | Department of Physics Enrico Fermi, University of Pisa |
| Program | graduate (<i>Laurea specialistica/magistrale</i>) and Ph.D. programs in Physics |
| Course(s) | Electrodynamics of continuum media (36 hours, 2019–); Plasma Physics C (36 hours, 2013-2019); Low-Temperature Plasmas (24 hours, 2009-2012); Relativistic Plasmas (36 hours, 2009-2013) |
| Date | 2002– |
| Institution | Department of Physics Enrico Fermi, University of Pisa |
| Program | undergraduate (<i>Laurea/laurea triennale</i>) program in Physics |
| Course(s) | Physics 2 – introductory classical electrodynamics, theory classes (40 hours) |

Outreach

Since 2015 I have presented a dozen of **talks** in popularization events in Italy, including those in an international framework (*Night of the Researchers, Pint of Science*) and specific initiatives oriented to high school students. I have also (co-)authored several **papers** (in Italian) for scientific magazines (full list or papers and presentations available at <http://www.df.unipi.it/~macchi/outreach.html>):

- A. Fioretti, F. Baffigi, A. Macchi, O. Morsch, E. Tognoni, P. Andronico, "Let's play with quantum cryptography - Giochiamo con la crittografia quantistica", *Il Nuovo Saggiatore* 37, n.5-8, pp.53-59, Novembre/Dicembre 2021.
- A. Macchi, "Vele laser, viaggi interstellari e civiltà extraterrestri", *Sapere* (Edizioni Dedalo) n.3, Maggio-Giugno 2020.
- A. Macchi, "La Fisica del Tempo e il Tempo in Fisica", *In Pensiero* (Squilibri Editore) n.9, 2015
- A. Macchi, "Il difficile cammino della fusione nucleare controllata", *Sapere* (Edizioni Dedalo) n.5, Settembre-Ottobre 2014.

Date and Signature

September 26, 2024

