Institut des NanoSciences de Paris

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Martino Trassinelli

Curriculum Vitæ

Nationality Italian and French

Current Researcher at the Centre National de la Recherche Scientifique (CNRS, France) in the group "Clusters position" and Surfaces under Intense Excitation" at the Institut des NanoSciences de Paris

Scientific interests

- Structure of highly charged ions and exotic atoms for studies on quantum electrodynamics, strong and weak interactions.
- Dynamics of highly charged ion interaction with atoms, surfaces and clusters.
- Modifications of structural and magnetic properties of thin films irradiated with ions.
- High-resolution X-ray spectroscopy based on Bragg diffraction.
- Bayesian statistics and applications to data analysis.
- Foundations and interpretations of quantum mechanics.

Professional experiences

- March 2021 Visiting professor at the ExtreMe Matter Institute, GSI/FAIR, Darmstadt, Germany.
- Sept. 2017 **Habilitation à diriger des recherches (French habilitation)**, Structure and dynamics of highly charged ions, Université Pierre et Marie Curie, Paris, France.
- April 2017 Abilitazione Scientifica Nazionale (Italian habilitation), Fisica Sperimentale delle Interazioni Fondamentali (Fascia II, SC 02/A1) and Fisica Sperimentale della Materia (Fascia II, SC 02/B1).
- Since 2011 Chargé de recherche de 1^{ère} classe, CNRS, Institut des NanoSciences de Paris, Paris.
- 2007–2011 Chargé de recherche de 2ème classe, CNRS, Institut des NanoSciences de Paris, Paris.
- 2006–2007 **Post-doc**, Accurate measurement of intra-shell transitions and Balmer lines in heliumlike uranium, GSI Helmholtzzentrum and Alexander von Humboldt-Stiftung, Darmstadt, Germany.

Formation

- 2002–2005 **Ph.D. thesis**, Quantum Electrodynamics Tests and X-rays Standards using Pionic Atoms and Highly Charged Ions, Laboratoire Kastler Brossel, Paris, France.
- 2001–2002 2nd year of Master's degree in Particle and Nuclear Physics (DEA Champs, Particules et Matières), University Pierre et Marie Curie and E.N.S., Paris, France.
- 2000–2001 1st year of Master's degree in Physics (Maîtrise de Physique), Université Pierre et Marie Curie and E.N.S., Paris, France.
- 1999–2000 Licence de Physique, Université Pierre et Marie Curie and E.N.S., Paris, France.
- 1999–2002 Magistère Inter-universitaire de Physique, Université Pierre et Marie Curie and E.N.S., Paris, France.
- 1997–1999 Bachelor's degree in Physics (first two years), University of Florence, Italy.
 - 1996 Maturità Artistica, Liceo Leon Battista Alberti, Firenze, Italia.

Awards and recognitions

- 2013 CNRS Scientific Excellence award, (formal version of CNRS Prime d'Encadrement Doctoral et de Recherche).
- $2006\hbox{--}2007 \quad \textbf{Postdoctoral Humboldt Research Fellowships}.$
- 1999–2003 Élève fonctionnaire stagiaire, École Normale Supérieure de Paris.

Foreign languages

- Italian Mother tongue
- French Fluent
- English Fluent

Teaching experience

- 2018-pres. Class on Theory of Classic Field (part, 26h/year), Research Master of Physics, Sorbonne Université, Paris, France.
- 2016-pres. Class on Atoms and Molecules in Strong Field (part, 8h/year), Research Master Light, Matter and Interactions, Sorbonne Université, Paris, France.
- Since 2020 Lecture and tutoring in *Bayesian statistics methods for data analysis* (3h/year), Summer School on High Performance Computing in Astrophysics and Atomic Physics, NOVA School of Science and Technology, Lisbon, Portugal.
 - 2006 Lecture on *Exotic atoms* in the class Structure and Dynamics of Ions and Atoms (1h), Research Master of Physics, Goethe University Frankfurt, Germany.
 - 2005 Physics tutoring in *Thermodynamics* (36h of tutorial classes plus 40h of practical work), University Pierre et Marie Curie, Paris, France, 2nd year undergraduate class.
 - 2003 Physics tutoring in *Mechanics and Fluido-dynamics* (48h of tutorial classes plus 24h of practical work), *University Pierre et Marie Curie*, *Paris*, *France*, 1st year undergraduate class.

Supervision of students and postdocs (S: supervision, CS: co-supervision)

Post-docs: 1 (1 S)

Master students M1 and eq.: 2 (2 S)

Ph.D. students: 6 (3 S, 3 CS)

3th year univ. students: 8 (4 S, 4 CS)

Engineering school students: 2 (1 S, 1 CS)

Scientific production

Articles: 59 (12 letters)

Book chapters: 4

Invited talks in conf. and seminars: 19
Oral contrib. to conf. and workshops: 45

Proceedings with referee: 49

Master students M2 and eq.: 8 (7 S, 1 CS)

Patents

April 2017 Process for obtaining a giant magnetocaloric effect material by irradiation of ions, French patent n. 1753170, US Patent App. 16/604,761

Codes

- 2014 pres. Nested_fit: A versatile data analysis program based on Bayesian statistics for the evaluation of model probabilities and parameter posterior probability distributions. Written in Fortran with a Python library for post-analysis and plots. https://github.com/martinit18/nested_fit
- 2007 pres. Minuit_fit: A versatile χ^2 minimization program based on MINUIT CERN library with different choices of χ^2 -statistics and profile functions. Written in Fortran.

Positions in the administration of research

- 2018 pres. Nominated member of the scientific council of the Institut des NanoSciences de Paris
- 2013 pres. Member of the international board of the Stored Particles Atomic Research Collab. (SPARC)
- 2011 pres. Coordinator of the group Photon and X-Ray Spectrometers of SPARC
- 2013-2018 Elected member of the laboratory council of the Institut des NanoSciences de Paris

Expert and referee activity

Referee in the international journals:

Nature, Nature Reviews Methods Primers, New Journal of Physics, Nanoscale, Astrophysical Journal, Quantum Science and Technology, AVS Quantum Science, Annals of Physics, Foundation of Physics, Entropy, Spectroscopy Letters, X-ray Spectroscopy, Nuclear Physics A, Journal of Physics, Journal of Chemical Physics, Journal of Magnetism and Magnetic Materials, Nuclear Instruments and Methods A and B, Journal of Instrumentation, Physica Scripta

- 2022 Invited editor of the special issue MaxEnt 2022 of Entorpy journal
- 2022 Editor of the volume MaxEnt 2022 of Physical Sciences Forum journal
- 2019 Referee of Habilitation à diriger des recherches (French habilitation), Grenoble University
- 2018 2019 Member of 3 Ph.D. Thesis committees, (2 at Sorbonne Université, 1 at Université Paris-Saclay)
- 2014 2015 Member of the expert committee of Université Pierre et Marie Curie (atomic physics section)
 - 2013 Referee of a Ph.D. Thesis of Oulu University (Finland)
 - 2012 Member of the selection committee for an assistant professor position at the University Paris 13

Organization of seminars and conferences

- 2022 Co-chair of the international conference MAXENT 2022
- 2019 pres. Member of the international advisory board of the international conference HCI
- 2019 pres. Member of Les Atelier du LKB seminar committee
- 2016 pres. Member of the seminar committee of the Institut des NanoSciences de Paris
 - 2019 Member of the local organizing committee of the international conference ICPEAC 2019
 - 2019 Member of the local organizing committee of the international symposium ISIAC 2019
 - 2017 Member of the local organizing committee of the workshop MPBT platform scientific day
 - 2017 Member of the local organizing committee of the workshop SPARC 2017
 - 2017 Member of the international advisory board of the conference *Precision Physics, Quantum Electrody-namics and Fundamental Interactions 2017*

Research projects

- 2022 Principal investigator of the project for GSI/FAIR 2023-4 Towards testing three-loop effects of boundstate QED in heliumlike uranium (proposal G-22-00068 accepted with A- rank)
- 2021 pres. Principal investigator of the international ANR project *Dynamics of ionmagnetized surface interaction* probed by integrated x-ray and ion spectroscopy (DIMAS), international ANR/DFG founding
- 2018 2022 Participation to the ANR project *High-Performance Thermo-Magnetic Micro-Harvester*, ANR-18-CE05-0019, (PI: M. Lo Bue)
- 2017 pres. Principal investigator of the project for FAIR phase-0 High-resolution differential Measurements Between Two-and Three-Electron Uranium Ions for High-Precision Tests of Strong-Field QED (proposal n. E125, accepted with A- rank)
- 2019 2021 Principal investigator of the project X-ray spectroscopy of He-like U and measurement of the boundstate beta decay of bare ²⁰⁵Tl ions in the program ENSAR2 No. 654002 Transnational Access to GSI, Horizon 2020 EU Framework Programme for Research and Innovation Integrated Activity, Germany
- 2011 2021 Member of the collaboration FISIC (Fast Ion Slow Ion Collisions), part of the EQUIPEX S3 until 2021, founding from ANR, France
- 2016 2017 Principal investigator of the project Detector development for atomic physics at FAIR in the program ENSAR2 No. 654002 Transnational Access to GSI, Horizon 2020 EU Framework Programme for Research and Innovation Integrated Activity, Germany
- 2013 2018 Participation to the international ANR project Fit-FISIC: First steps Towards atomic physics of Fast Ion Slow Ion Collision, international ANR/DFG founding, ANR-13-IS04-0007, (PI: E. Lamour)
- 2014-2015 Principal investigator of the project Measurement of the bound-state beta decay of bare ^{205}Tl ions in the program ENSAR No. 262010 Transnational Access to GSI, FP7 Structuring the ERA Integrated Activity, Germany
 - 2007 Principal investigator of the project Test of Strong-Field-QED: High Resolution Detection Systems for Spectroscopy in Atomic Physics Experiments at GSI and FAIR and for Precision X-Ray Imaging, non-recurring financing from the Helmholtz association for the promotion of young researchers, Germany
- 2006 2010 Participation to the ANR project *La Spectroscopie X: Métrologie et Sonde de l'Interaction avec les Ions de SIMPA*, ANR-06-BLAN-0223, France

Current and recent collaborations

- 2011 pres. Member of the collaboration FISIC (Fast Ion Slow Ion Collisions)
- 2008 pres. Member of the ExtreMe Matter Institute EMMI, institute of the Helmholtz Alliance Cosmic Matter in the Laboratory
- 2005 pres. Member of the collaboration SPARC (Stored Particles Atomic Research Collaboration) for atomic physics at FAIR (Facility for antiproton and ion research), Darmstadt, Germany
- 2002 2021 Member of the collaboration *Pionic Hydrogen et Pion Mass* for the study of strong interaction force in light pionic atoms and the measurement of the negatively charged pion mass
- 2012 2019 Member of Labex PLAS@PAR (PLASma à PAris)
- 2011 2019 Member of Labex MATISSE (MATériaux InterfaceS Surface Environnement)
- 2003 2019 Member of the collaboration FOCAL (FOcusing Compensated Asymmetric Laue spectrometer) for the measurement of the Lamb shift in heavy hydrogenlike ions, Darmstadt, Germani