LUCA TOMARCHIO

I am an experimental condensed matter physicist with a research interest in the light-matter interaction in quantum materials. I have studied topological crystals, like Weyl semimetals and topological insulators, vdW magnetic insulators, high-temperature superconductors, plasmonic and disordered materials. During my career, I have used THz and IR radiation in linear, nonlinear, and time-resolved spectroscopic experiments. I have studied and applied novel techniques for the generation and detection of THz waves in a time-domain setup. I have also worked on projects regarding the creation of superconductors-based Van der Waals heterostructures, acquiring the material science know-how to exfoliate, stack and measure 2D crystals.

WORK EXPERIENCE

[11/2022 – Current] **PostDoc Researcher**

Sapienza University

City: Rome
Country: Italy

[09/2021 – 07/2022] **Guest Researcher**

Leibniz Institute for Solid State and Materials Research

City: Dresden **Country:**
Germany
Guest researcher in collaboration with IFW-Dresden for the project: "THz Spectroscopy of hightemperature superconductors-based Van der Waals heterostructures".

The project has been funded by the DAAD institution.

EDUCATION AND TRAINING

[10/2019 – 10/2022] **Ph.D. in Physics**

Sapienza University

Address: Piazzale Aldo Moro, 00185, Roma, Italy
Field(s) of study: Physics | Optical Spectroscopy | Material Science
Level in EQF: EQF level 8
Research in condensed matter physics and optical spectroscopy at the THz Sapienza Laboratory under the supervision of prof. Stefano Lupi.

[09/2017 – 10/2019] **Master's Degree in Physics**

Sapienza University of Rome

Field(s) of study: Condensed Matter Physics
Final grade: 110/110 cum laude **Level in EQF:** EQF level 7
Thesis: Terahertz Optical Response of a Type-II Weyl Semimetal: WTe2

[09/2014 – 09/2017] **Bachelor's Degree in Physics**

Sapienza University of Rome

Field(s) of study: Physics
Final grade: 110/110 cum laude **Level in EQF:** EQF level 6
Thesis: Utilizzo di Metalli Liquidi in Frascati Tokamak Upgrade (FTU)

[08/2020 – 10/2020] **Certified Personal Trainer (CPT)**

Scuola Nazionale di Personal Trainer (SNPT)

Google Data Analytics Professional Certi ficate

COURSERA https://www.credly.com/badges/c9142294-a8c1-41ee-8917-2e8eee41faee?source=linked_in_profile

HONOURS AND AWARDS

[10/2019] **Excellence Program for the Master's Degree in Physics Awarding institution:** Sapienza University of Rome

Admission and completion of the excellence program for the master's degree in physics, reserved only to the best 10 students of the associated academic year.

[10/2017] **Excellence Program for the Bachelor's Degree in Physics Awarding institution:** Sapienza University of Rome

Admission and completion of the excellence program for the bachelor's degree in physics, reserved only to the best 30 students of the associated academic year.

PUBLICATIONS

[2022] **Terahertz Resonators Based on YBa2Cu3O7 High-Tc Superconductor**

Salvatore Macis, Maria Chiara Paolozzi, Annalisa D'Arco, Luca Tomarchio, Alessandra Di Gaspare, Stefano Lupi

Appl. Sci. **2022**, *12*(20), 10242

[2022] **Electrodynamics of MnBi2Te4 intrinsic magnetic topological insulators**

Luca Tomarchio, Lorenzo Mosesso, Salvatore Macis, Antonio Grilli, Martina Romani, Mariangela Cestelli Guidi, Kejing Zhu, Xiao Feng, Michele Zacchigna, Massimo Petrarca, Ke He & Stefano Lupi *NPG Asia Materials* **14**, 82 (2022)

[2022] **Infrared plasmons in ultrahigh conductive PdCoO2 metallic oxide**

Salvatore Macis, Luca Tomarchio, Silvia Tofani, Federica Piccirilli, Michele Zacchigna, Vincenzo Aglieri, Andrea Toma, Gaurab Rimal, Seongshik Oh, Stefano Lupi *Commun Phys* **5**, 145 (2022)

[2021] **Low energy electrodynamics of CrI3 layered ferromagnet**

Luca Tomarchio, Salvatore Macis, Lorenzo Mosesso, Loi T. Nguyen, Antonio Grilli, Mariangela Cestelli Guidi, Robert J. Cava & Stefano Lupi

Scientific Reports **11**, 23405

[2021]

Disordered photonics behavior from terahertz to ultraviolet of a three-dimensional graphene network

Luca Tomarchio, Salvatore Macis, Annalisa D'Arco, Sen Mou, Antonio Grilli, Martina Romani, Mariangela Cestelli Guidi, Kailong Hu, Suresh Kukunuri, Samuel Jeong, Augusto Marcelli, Yoshikazu Ito & Stefano Lupi

NPG Asia Materials **13**, 73 (2021)

[2021]

Simultaneous elliptically and radially polarized THz from one-colour laser-induced plasma filament

Mou Sen, Annalisa D'Arco, Luca Tomarchio, Marta Di Fabrizio, Alessandro Curcio, Stefano Lupi, Massimo Petrarca

New Journal of Physics **23** (6), 063048

[2020]

Angular Dependence of Copper Surface Damage Induced by an Intense Coherent THz Radiation Beam

Salvatore Macis, Luca Tomarchio, Silvia Tofani, S Javad Rezvani, Luigi Faillace, Stefano Lupi, Akinori Irizawa, Augusto Marcelli *Condens. Matter* ***5***(1), 16

[2020] **Spatially Resolved Spectral Imaging by A THz-FEL**

Akinori Irizawa, Masaki Fujimoto, Keigo Kawase, Ryukou Kato, Hidenori Fujiwara, Atsushi Higashiya, Salvatore Macis, Luca Tomarchio, Stefano Lupi, Augusto Marcelli, Shigemasa Suga

Condens. Matter ***5***(2), 38

[2020]

Broadband Anisotropic Optical Properties of the Terahertz Generator HMQ-TMS Organic Crystal

Annalisa D'Arco, Luca Tomarchio, Valerio Dolci, Paola Di Pietro, Andrea Perucchi, Sen Mou, Massimo

Condens. Matter ***5***(3), 47

PROJECTS

[11/2022 – Current] **Time-resolved spectroscopy of relaxor ferroelectrics**

Sapienza research grant: Progetto per avvio alla ricerca - Tipo 2

[08/2021 – 08/2022]

THz Spectroscopy of high temperature superconductors-based Van der Waals heterostructures

Sapienza research grant: Progetto per avvio alla ricerca - Tipo 1

[30/09/2021 – 30/07/2022]

THz Spectroscopy of high temperature superconductors-based Van der Waals heterostructures

DAAD research grant: One-Year Grants for Doctoral Candidates, concerning an active collaboration with the Superpuddles lab of Dr. Nicola Poccia at the Leibniz Institute of Solid State and Materials Research in Dresden

[08/2020 – 08/2021] **Spectroscopic Study of new Topological Semimetals in the THz Frequency Gap**

Sapienza research grant: Progetto per avvio alla ricerca - Tipo 1

CREATIVE WORKS

[01/2023] **Il Metallo, L'Isolante e il Superconduttore**

Author of the book "Il Metallo, L'Isolante e il Superconduttore", published through the editor Youcanprint.

ISBN: 9791221457223

CONFERENCES AND SEMINARS

[09/10/2019 – 10/10/2019] **The 2nd 3D Graphene workshop: from fundamentals properties to applications**
University of Science and Technology of China, Hefei, Anhui Invited speaker

[09/12/2019 – 10/12/2019] **Spectroscopy and Imaging with THz Radiation using Ultimate Radiation Sources**
University of Rome La Sapienza, Rome, Italy Co-chair and speaker

[09/02/2020 – 11/02/2020] **SuperFOx2020 Conference on Superconductivity and Functional Oxides** Santa Margherita Ligure, Italy
Oral Contributor

[06/06/2021 – 09/06/2021] **11th NGSCES 2021 Conference** Zoom Conference Poster Contributor

[27/06/2021 – 30/06/2021] **LEES 2021 Conference (28/06-01/07/2021)** Zoom Conference Poster contributor

[25/11/2021] **Bilateral 3D Graphene workshop** University of Rome La Sapienza, Rome, Italy. Invited Speaker

[14/02/2022 – 15/02/2022] **Quantum Materials for Quantum Technologies workshop** Laboratori Nazionali di Frascati (LNF), Frascati, Rome, Italy. Invited Speaker

[16/06/2022 – 18/06/2022] **GEMCMP22 Conference** Rome, Italy
Invited Speaker

[20/06/2022 – 24/06/2022] **Superstripes 2022 Conference (20-24/06/2022),** Laboratori Nazionali di Frascati (LNF), Frascati, Italy.

Oral Contributor

LANGUAGE SKILLS

Mother tongue(s): Italian

Other language(s):

English

LISTENING C2 **READING** C2 **WRITING** C1

SPOKEN PRODUCTION C1 **SPOKEN INTERACTION** C1

German

LISTENING A1 **READING** A1 **WRITING** A1

SPOKEN PRODUCTION A1 **SPOKEN INTERACTION** A1

DIGITAL SKILLS

Statistical Data Analysis Skills

Microsoft Excel | MATLAB&Simulink | R Language and R Studio | Relational Databases: SQL | Data Science, Data Analytics, Data Visualization | LabVIEW programming

Oral and Written Presentation Skills

Microsoft Powerpoint | Microsoft Word | Latex Software

Management Skills

Analytical skills | Organizational and planning skills | Team-work oriented | Problem Analysis & Problem Solving

Physics Related Skills

Ultrafast spectroscopy | Material Characterization (Confocal, Optical and UV-Vis Spectroscopy, SEM, Raman Spectroscopy)) | nonlinear optics | Topological Materials | Material Science | Su perconductivity | Quantum Materials | Terahertz spectroscopy

DRIVING LICENCE

Cars: B