



# Mattia Udina

## ● WORK EXPERIENCE

2022 – CURRENT Rome

**ASSEGNISTA DI RICERCA (CAT. A)** SAPIENZA UNIVERSITY OF ROME

Research project: Exploring nonlinear light-matter interactions at low-frequency: theory of terahertz pump-probe spectroscopy

## ● EDUCATION AND TRAINING

2018 – 2022 Rome

**PHD IN PHYSICS** Sapienza University of Rome

**Address** Rome | **Thesis** Nonlinear optical response in interacting electron systems

03/2018 – 04/2018 Madrid

**INTERNSHIP** IMDEA Nanociencia Institute

**Address** Madrid | **Thesis** Nonlinear spectroscopy and pump-probe tests in strongly correlated systems

2015 – 2017 Rome

**MASTER DEGREE IN PHYSICS** Sapienza University of Rome

**Address** Rome | **Thesis** Collective modes and nonlinear optical response in charge-density-wave systems

2012 – 2015 Padova

**BACHELOR DEGREE IN PHYSICS** University of Padova

**Address** Padova | **Thesis** Vortici quantizzati nei superfluidi bosonici: correzioni all'equazione di Gross-Pitaevskii

2008 – 2012 Udine

**HIGH SCHOOL SCIENTIFIC DIPLOMA** Liceo Scientifico G. Marinelli

**Address** Udine

## ● ADDITIONAL INFORMATION

### PUBLICATIONS

**Tracing the dynamics of superconducting order via transient third harmonic generation** – 2023

M.-J. Kim, S. Kovalev, M. Udina, R. Haenel, G. Kim, M. Puviani, G. Cristiani, I. Ilyakov, T. V. A. G. de Oliveira, A. Ponomaryov, J.-C. Deinert, G. Logvenov, B. Keimer, D. Manske, L. Benfatto and S. Kaiser

arXiv:2303.03288

**The Ionic Kerr Effect** – 2022

M. Basini, M. Udina, M. Pancaldi, V. Unikandanunni, S. Bonetti, and L. Benfatto

arXiv:2210.14053

**Terahertz electric-field driven dynamical multiferroicity in SrTiO<sub>3</sub>** – 2022

M. Basini, M. Pancaldi, B. Wehinger, M. Udina, T. Tadano, M. C. Hoffmann, A. V. Balatsky, and S. Bonetti

arXiv:2210.01690

**Contribution of collective excitations to third harmonic generation in two-band superconductors: The case of MgB<sub>2</sub>**

– 2022

J. Fiore, M. Udina, M. Marciani, G. Seibold, and L. Benfatto

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Phys. Rev. B 106, 094515

**Terahertz displacive excitation of a coherent Raman-active phonon in V<sub>2</sub>O<sub>3</sub>** – 2022

F. Giorgianni, M. Udina, T. Cea, E. Paris, M. Caputo, M. Radovic, L. Boie, J. Sakai, C. W. Schneider, and S. L. Johnson

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Commun. Phys. 5, 103

**THz non-linear optical response in cuprates: predominance of the BCS response over the Higgs mode**

– 2022

M. Udina, J. Fiore, T. Cea, C. Castellani, G. Seibold, and L. Benfatto

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Faraday Discuss. 237, 168-185

**Third harmonic generation from collective modes in disordered superconductors** – 2021

G. Seibold, M. Udina, C. Castellani, and L. Benfatto

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Phys. Rev. B 103, 014512

**Non-linear terahertz driving of plasma waves in layered cuprates** – 2021

F. Gabriele, M. Udina, and L. Benfatto

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Nat. Comm. 12 (1), 1-8

**Raman response in the nematic phase of FeSe** – 2020

M. Udina, M. Grilli, L. Benfatto, and A. V. Chubukov

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Phys. Rev. Lett. 124, 197602

**Theory of coherent-oscillations generation in THz pump-probe spectroscopy: from phonons to electronic collective modes**

– 2019

M. Udina, T. Cea and L. Benfatto

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Phys. Rev. B 100, 165131

**CONFERENCES AND SEMINARS**

11/2022 – Online

**Seminar, Lebedev Physical Institute of the Russian Academy of Sciences** Title: Collective modes in Terahertz Spectroscopy

09/2022 – Dresden (Germany)

**Invited talk, 2022 TELBE/FELBE User Workshop** Title: Collective modes in THz pump-probe spectroscopy: from phonons to electronic excitations

06/2022 – Hersonissos, Crete (Greece)

**Invited talk, VII Ultrafast Dynamics and Metastability & Ultrafast Bandgap Photonics 2022 Conference** Title: Pump-probe spectroscopy of collective modes

05/2022 – London (UK)

**Talk, From optical to THz control of materials Faraday Discussion** Title: THz non-linear optical response in cuprates: predominance of the BCS response over the Higgs mode

03/2022 – Chicago (USA)

**Talk, American Physical Society March Meeting** Title: THz pump-probe spectroscopy: instantaneous response and coherent oscillations

07/2021 – Online

**Poster, LEES: International Conference on Low Energy Electrodynamics in Solids** Title: THz pump-probe spectroscopy: coherent oscillations and instantaneous response

02/2020 – Santa Margherita Ligure, Genova

**Talk, SuperFOx: Conference on Superconductivity and Functional Oxides** Title: Theory of coherent-oscillations generation in THz pump-probe spectroscopy: from phonons to electronic collective modes

04/2018 – Madrid (Spain)

**Seminar, ICMM-CSIC Institute, Autonomous University of Madrid** Title: THz pump-probe spectroscopy: accessing collective excitations in superconductors, charge-density-wave systems and correlated metals

02/2018 – Padova

**Seminar, Department of Physics, University of Padova** Title: The Higgs mode in condensed matter physics: from the superconducting to the charge-density-wave case

10/2017 – Trieste

**Poster, FisMat: Italian National Conference on the Physics of Matter, ICTP- SISSA Miramare Campus** Title: Higgs mode and quasi-particle excitations in a charge-density-wave system

## **SCHOOLS & WORKSHOPS**

06/2019

**ASCES, Workshop on Strongly Correlated Electron Systems, FTPI Institute, University of Minnesota, Minneapolis (USA)**

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09/2017

**International Doctoral Training Session, Frontiers of Condensed Matter, Ecole de Physique des Houches, Les Houches (France)**

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## **ADDITIONAL INFORMATION**

**Referee experience: Science Advances (AAAS), Sensors (MDPI)**

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