

Tiziana Mancini

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ABOUT ME

I am a PhD student in Physics at University of Rome, La Sapienza.

My research activity mainly focus on IR and THz spectroscopy, with particular interest in biophysics and environmental issues.

WORK EXPERIENCE

01/01/2022 Rome, Italy

PHD STUDENT IN PHYSICS AT LA SAPIENZA UNIVERSITY OF ROME SAPIENZA TERAHERTZ

My research field is Infrared (IR) and Terahertz (THz) spectroscopy and their possible applications for detection and analysis in biological and environmental fields.

In particular, actually I am focusing on biophysics issues, to deepen knowledge about structure and functionalities of biological macromolecules and I am also working on a possible application of IR and THz spectroscopy for air pollution monitoring, starting from the development of innovative specific sensors chemically functionalized, up to pollutants and pathogen detection and spectroscopic analysis.

01/05/2023 – 31/07/2023 Graz, Austria

VISITING PHD STUDENT AT UNIVERSITY OF TECHNOLOGY TU GRAZ INSTITUTE OF PHYSICAL AND THEORETICAL CHEMISTRY

Rome, Italy

TUTOR FOR UNIVERSITY COURSE LA SAPIENZA UNIVERSITY OF ROME

Tutor activity for first year university students (40 hours of lectures)

Foundations of mathematics - theory and exercises

EDUCATION AND TRAINING

01/10/2019 – 26/10/2022

MASTER DEGREE IN CONDENSED MATTER PHYSICS University of Rome La Sapienza

Exams: Nonlinear and quantum optics, Physics laboratory I, Condensed matter physics, English language, Photonics, Many body physics, Solid state physics, Physics laboratory II, Relativistic quantum mechanics, Medical applications of physics, Molecular biology, Chimica del restauro e della conservazione, Spectroscopy methods and nanophotonics

Final grade 110/110 cum laude |

Thesis Photophysical properties changes of phthalocyanine pigments after exposure to UV radiation

24/09/2016 – 01/10/2019

BACHELOR DEGREE IN PHYSICS University of Rome La Sapienza

Final grade 110/110 cum laude |

Thesis Polarization of Cosmic Microwave Background

05/02/2024 – 09/02/2024 Venice, Italy

05/09/2022 – 09/09/2022 Florence, Italy

BIOPHOTONICS AND ARTIFICIAL INTELLIGENCE SCHOOL Siof - Società Italiana di Ottica e Fotonica

10/07/2022 – 15/07/2022 Varenna, Italy

MULTIMODAL AND NANOSCALE OPTICAL MICROSCOPY SIF - Società Italiana di Fisica

06/06/2022 – 10/06/2022 Ischia, Italy

IV SCUOLA NAZIONALE DI BIOSENSORI OTTICI E BIOFOTONICA Siof - Società Italiana di Ottica e Fotonica

28/06/2022 – 30/06/2022 Naples, Italy

THE EVOLUTION OF ENZYMES AND METABOLIC PATHWAYS: ANALYSIS, UNDERSTANDING AND IMPLICATIONS FOR BIOTECHNOLOGY Stazione Zoologica Anton Dohrn

SAFETY TRAINING COURSES AIFOS - Base course (4 h) / INFORMA - Specific Risks Course - Medium Risk (8 h)

ENGLISH STUDY TRIP New York (2012) - Boston (2012) - London (2013) - Dublin (2014)

2011 – 2016 Gaeta, Italy

DIPLOMA DI LICEO SCIENTIFICO Liceo Scientifico Enrico Fermi

Address Piazza Trieste, 1, 04024, Gaeta, Italy | Final grade 100/100 e lode

LANGUAGE SKILLS

Mother tongue(s): ITAL
Other language(s): AN

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C1	C1	C1	C1	C1
FRENCH	B1	B1	B1	B1	B1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

DIGITAL SKILLS

Matlab & Matlab Simulink C Language Opus LaTeX OriginLab Microsoft Office Protein visualization Orange Data Mining
Protein Data Bank Define Secondary Structure of Proteins Estensivo uso dei database molecolari RCSB PDB, UniProt,
Alphafold. CLUSTAL CD Dichroism PUBLICATIONS

Infrared Spectroscopy of SARS-CoV-2 Viral Protein: from Receptor Binding Domain to Spike Protein

[2024]
Research paper
T. Mancini, S. Macis, R. Mosetti, N. Luchetti, V. Minicozzi, A. Notargiacomo, M. Pea, A. Marcelli, G. Della Ventura, S. Lupi and A. D’Arco.
Infrared Spectroscopy of SARS-CoV-2 Viral Protein: from Receptor Binding Domain to Spike Protein. *Advanced Science*, **2024**, 2400823.

Link [10.1002/advs.202400823](https://doi.org/10.1002/advs.202400823)

Nanofibrous Conductive Sensor for Limonene: One-Step Synthesis via Electrospinning and Molecular Imprinting

[2024]

Research paper

A. Macagnano, F. N. Molinari, P. Papa, T. Mancini, S. Lupi, A. D'Arco, A. R. Taddei, S. Serrecchia and F. De Cesare. *Nanomaterials* **2024**, 14(13), 1123.

Link <https://doi.org/10.3390/nano14131123>

Secondary Structures of MERS-CoV, SARS-CoV, and SARS-CoV-2 Spike Proteins Revealed by Infrared Vibrational Spectroscopy

[2023]

Research paper

D'Arco, A.; Di Fabrizio, M.; Mancini, T.; Mosetti, R.; Macis, S.; Tranfo, G.; Della Ventura, G.; Marcelli, A.; Petrarca, M.; Lupi, S. Secondary Structures of MERS-CoV, SARS-CoV, and SARS-CoV-2 Spike Proteins Revealed by Infrared Vibrational Spectroscopy. *Int. J. Mol. Sci.* **2023**, 24, 9550.

Link <https://doi.org/10.3390/ijms24119550>

New Frontier in Terahertz Technologies for Virus Sensing

[2023]

Review

Mancini, T.; Marcelli, A.; Lupi, S.; D'Arco, A. New Frontier in Terahertz Technologies for Virus Sensing. *Electronics* **2023**, 12, 135.

Link <https://doi.org/10.3390/electronics12010135>

Infrared characterization of spike protein of MERS-CoV, SARS-CoV, SARS-CoV-2 and its variants: first steps toward an optical biosensing device

[2023]

Conference paper

Mancini T., D'Arco A., Di Fabrizio M., Mosetti R., Macis S., Tranfo G., Della Ventura G., Marcelli A., Petrarca M., Lupi S. Infrared characterization of spike protein of MERS-CoV, SARS-CoV, SARS-CoV-2 and its variants: first steps toward an optical biosensing device. Proceedings Volume 12572, Optical Sensors 2023; 125720D (2023)
Event: SPIE Optics + Optoelectronics, 2023, Prague, Czech Republic

Link <https://doi.org/10.1117/12.2665812>

High Sensitivity Monitoring of VOCs in Air through FTIR Spectroscopy Using a Multipass Gas Cell Setup

[2022]

Research paper

A. D'Arco, T. Mancini, M.C. Paolozzi, S. Macis, L. Mosesso, A. Marcelli, M. Petrarca, F. Radica, G. Tranfo, S. Lupi, et al., High sensitivity monitoring of VOCs in air through FTIR spectroscopy using a multipass gas cell setup. *Sensors* **2022**, 22, 5624,

Link <https://doi.org/10.3390/s22155624>

Terahertz Spectroscopic Analysis in Protein Dynamics: Current Status

[2022]

Review

Mancini, T.; Mosetti, R.; Marcelli, A.; Petrarca, M.; Lupi, S.; D'Arco, A. Terahertz Spectroscopic Analysis in Protein Dynamics: Current Status. *Radiation* **2022**, 2, 100-123.

Link <https://doi.org/10.3390/radiation2010008>

Synthesis of WO₃ nanopowder using a green surfactant for efficient gas sensing applications

[2023]

Research paper

Pakdel, H., Galstyan, V., D'Arco, A., Mancini, T., Lupi, S., Moumen, A., Borsi, M., Comini, E.

Synthesis of WO₃ nanopowder using a green surfactant for efficient gas sensing applications. *Ceramics International*, **2023**, 49(18), 30501

Link <https://doi.org/10.1016/j.ceramint.2023.06.314>

UV Light Stereoselective Limonene Sensor Using Electrospun PVP Composite Nanofibers

[2024]

Conference paper

A. Macagnano, F. N. Molinari, T. Mancini, S. Lupi and F. De Cesare. UV Light Stereoselective Limonene Sensor Using Electrospun PVP Composite Nanofibers. *Proceedings* **2024**, 97, 131.

Link <https://doi.org/10.3390/proceedings2024097131>

CONFERENCES AND WORKSHOPS

16/06/2024 – 20/06/2024

XXVII SIBPA National Congress 2024 - Società Italiana di Biofisica Pura e Applicata - Genova, Italy

POSTER PRESENTATION

T. Mancini, A. D'Arco, M. C. Paolozzi, L. Mosesso, R. Mosetti, S. Macis, A. Marcelli, F. Radica, G. Tranfo, G. Della Ventura and S. Lupi. *High Sensitivity Monitoring of VOCs in Air through FTIR Spectroscopy Using a Multipass Gas Cell Setup and Machine Learning algorithm*

10/06/2024 – 13/06/2024

3rd MOSBRI Scientific Conference 2024 (Molecular-Scale Biophysics Research Infrastructure) - Ljubljana, Slovenia

ORAL PRESENTATION

Mancini T., D'Arco A., Mosetti R., Macis S., Della Ventura G., Marcelli A. and Lupi S.

First step toward the development of an optical biosensor based on vibrational spectroscopy for the detection of airborne pathogens

10/09/2023 – 13/09/2023

Eurosensors2023 XXXV conference Lecce, Italy

ORAL PRESENTATION

Mancini T., D'Arco A., Di Fabrizio M., Mosetti R., Macis S., Tranfo G., Della Ventura G., Marcelli A., Petrarca M. and Lupi S

Spike Proteins Spectroscopic Characterization of MERS-CoV, SARS-CoV, SARS-CoV-2 and Its Variants for the Development of an IR Optical Biosensing Platform 04/09/2023 – 08/09/2023

CMD30 FisMat 2023 conference Milan, Italy

ORAL PRESENTATION

Mancini T., D'Arco A., Di Fabrizio M., Mosetti R., Macis S., Tranfo G., Della Ventura G., Marcelli A., Petrarca M., Luchetti N., Minicozzi V. and Lupi S.

Infrared spectroscopy investigation of Spike protein from MERS-CoV, SARS-CoV, SARS-CoV-2 and its variants for the development of an optical biosensor 04/07/2023 – 05/07/2023

Workshop DEUPAS - "Ultrasensitive monitoring of VOCs and pathogens by spectroscopy - Innovative solutions and sensor systems for air-quality monitoring" - INFN - LNFN, Frascati, Italy

ORAL PRESENTATION

Mancini T., D'Arco A., Di Fabrizio M., Mosetti R., Macis S., Tranfo G., Della Ventura G., Marcelli A., Petrarca M. and Lupi S. *Spectroscopic comparative analysis of α , β , γ and δ variants of SARS-CoV-2 virus: first step toward an infrared sensor platform*

24/04/2023 – 27/04/2023

SPiE. Optics + Optoelectronics 2023 Conference. The International Society for Optics and Photonics (SPIE) - Prague, Czech Republic

ORAL PRESENTATION

Mancini T., D'Arco A., Di Fabrizio M., Mosetti R., Macis S., Tranfo G., Della Ventura G., Marcelli A., Petrarca M. and Lupi S. *Infrared characterization of Spike protein of MERS-CoV, SARS-CoV, SARS-CoV-2 and its variants: first steps toward an optical biosensing device*

19/04/2023 – 20/04/2023

Biophysics@Rome2023 Research on the path and sustainability

POSTER PRESENTATION

Mancini T., D'Arco A., Macis S., Mosetti R., Della Ventura G., Marcelli A., Paolucci C., Chronopoulou L., Comini E., Galstyan V. and Lupi S

TiO₂ nanostructured array for optical ultrasensitive biosensing

12/09/2022 – 16/09/2022

108° SIF National Congress Società Italiana di Fisica - SIF Milan, Italy

ORAL PRESENTATION

Mancini T., Paolozzi M.C., D'Arco A., Macis S., Marcelli A., Radica F., Tranfo G., Lupi S. and Della Ventura G. *Detection of low VOCs concentration through IR spectroscopy*

20/06/2022 – 23/06/2022

SYNC - First Symposium for YouNg Chemists: Innovation and Sustainability - Department of Chemistry - La Sapienza University of Rome - Rome, Italy

ORAL PRESENTATION

Mancini T., Paolozzi M.C., D'Arco A., Macis S., Marcelli A., Radica F., Tranfo G., Lupi S. and Della Ventura G. *Detection of low Volatile Organic Compounds concentrations through IR spectroscopy*

21/04/2022 – 22/04/2022

BIOAEROSOLS & ATMOSPHERE POLLUTANTS - Innovative solutions and sensor systems for air-quality monitoring - Workshop INFN - LNFN - Frascati, Italy

ORAL PRESENTATION

Mancini T., D'Arco A., Di Fabrizio M., Mosetti R., Macis S., Tranfo G., Della Ventura G., Marcelli A., Petrarca M. and Lupi S. *RNA characterization of SARS-CoV-2 virus through Infrared micro-spectroscopy*

10/09/2023 – 13/09/2023

Eurosensors2023 XXXV conference Lecce, Italy

Co-author contribution

- Macagnano A., Molinari F. N., Mancini T., Lupi S., De Cesare F. UV-Light Designed Stereoselective Limonene Sensor Using Electrospun PVP-Composite Nanofibers

04/09/2023 – 08/09/2023

CMD30 FisMat 2023 conference Milan, Italy

Co-author in contribution:

- D'Arco A., Mancini T., Macis S., Mosetti R., Della Ventura G., Marcelli A., Paolucci C., Chronopoulou L., Comini E., Galstyan V., Lupi S. Infrared optical ultrasensitive biosensor based on TiO₂ nanostructured array

04/07/2023 – 05/07/2023

Workshop DEUPAS - "Ultrasensitive monitoring of VOCs and pathogens by spectroscopy - Innovative solutions and sensor systems for air-quality monitoring" - INFN - LNFN, Frascati, Italy

Co-author contribution

- Molinari F.N., De Cesare F., Lupi S., Marelli M., Macagnano A. A novel approach for the fabrication of BVOCs sensors using conductive molecular imprinted nanofibers

04/07/2023 – 05/07/2023

Workshop DEUPAS - "Ultrasensitive monitoring of VOCs and pathogens by spectroscopy - Innovative solutions and sensor systems for air-quality monitoring" - INFN - LNFN, Frascati, Italy

Co-author in contribution

- Mosetti R., D'Arco A., Di Fabrizio M., Mancini T., Macis S., Tranfo G., Della Ventura G., Marcelli A., Petrarca A., Lupi S. Towards an ultrasensitive sensoristic platform for airborne pathogens in DEUPAS project: infrared spectroscopic characterization of spike glycoproteins of various β -coronaviruses.

19/04/2023 – 20/04/2023

Biophysics@Rome2023 Research on the path to sustainability

Co-author in contribution:

- D'Arco A., Mancini T., Di Fabrizio M., Mosetti R., Della Ventura G., Marcelli A., Petrarca M., Lupi S. Towards a spectroscopic sensoristic platform for airborne pathogens: infrared characterization of spike glycoproteins from MERS-CoV and its variants

12/09/2022 – 16/09/2022

108° SIF National Congress Società Italiana di Fisica - SIF Milan, Italy

Co-author in contribution:

- D'Arco A., Di Fabrizio M., Mancini T., Mosetti R., Della Ventura G., Marcelli A., Petrarca M., Lupi S. Infrared spectroscopy characterization of MERS-CoV, SARS-CoV and SARS-CoV-2 spike proteins for sensoristic platform.

20/06/2022 – 23/06/2022

SYNC - First Symposium for YouNg Chemists: Innovation and Sustainability - Department of Chemistry - La Sapienza University of Rome - Rome, Italy

Co-author in contribution:

- D'Arco A., Di Fabrizio M., Mancini T., Mosetti R., Della Ventura G., Marcelli A., Petrarca M., Lupi S. First step towards the infrared sensoristic platform: spectroscopic characterization of MERS CoV , SARS CoV and SARS CoV 2 spike proteins

Best poster XXXVII SIBPA National Congress 2024

HONORS AND AWARDS

[2024]

Concerning the development of a High Sensitivity sensor device for Monitoring VOCs in Air through FTIR Spectroscopy Using a Multipass Gas Cell Setup and Machine Learning algorithm **Best communications SIF 108° National Congress**

[2022]

Concerning the use of IR spectroscopy for ultra sensitive and selective detection of volatile organic compounds (VOCs) in atmosphere. Spectroscopic setup calibration and promising results on VOCs monitoring are exposed, overcoming current limitations. 09/11/2022 – 09/11/2023

Avvio alla Ricerca 2022 project

For measurements, analysis and engineering optimization of an IR spectroscopic setup for monitoring pollutants and pathogens in atmosphere. **LABORATORY SKILLS**

Spectroscopic instruments for condensed matter physics and biophysics

FTIR microspectrometer - Fourier Transform Infrared Spectrometer (NIR - MIR)

ATR-IR Spectrometer - Attenuated Total Reflectance

Circular Dichroism (CD) spectrophotometer

Raman microspectrometer

Spectrofluorimeter

UV-Vis Microscope

Dip coater

Chemical laboratory instruments

Various instrumental skills acquired during training workshops