SELECTED PUBLICATIONS

1. A. F. Payam, **R. Funari**, G. Scamarcio, and N. Bhalla – "Sensing Dynamically Evolved Short-Range Nanomechanical Forces in Fast-Mutating Single Viral Spike Proteins" *Small Science*, 2023, in press, DOI: 10.1002/smsc.202300029.
2. **R. Funari** and A. Q. Shen – "Detection and Characterization of Bacterial Biofilms and Biofilm-Based Sensors" *ACS Sensors*, 2022, 7 (2), pp 347-357, DOI: 10.1021/acssensors.1c02722.
3. **R. Funari**, K. Chu and A. Q. Shen – "Detection of antibodies against SARS-CoV-2 spike protein by gold nanospikes in an opto-microfluidic chip" *Bios. Bioel.*, 2020, 169, 112578, DOI: 10.1016/j.bios.2020.112578.
4. B. Miranda, K. Chu, P. L. Maffettone, A.Q. Shen and **R. Funari**– "Metal-enhanced fluorescence immunosensor based on plasmonic arrays of gold nanoislands on an etched glass substrate" ACS *Applied Nano Materials*, 2020, 3 (10), pp 10470-10478, DOI: 10.1021/acsanm.0c02388.
5. **R. Funari**, A. Matsumoto, J. R. de Bruyn and A. Q. Shen – "Rheology of the Electric Double Layer in Electrolyte Solutions" *Anal. Chem.*, 2020, 92, (12), pp 8244-8253 DOI: 10.1021/acs.analchem.0c00475.
6. R. Ripa, A. Q. Shen and **R. Funari** – "Detecting E. coli biofilm development stages on gold and titanium by quartz crystal microbalance" *ACS Omega*, 2020, 5, (5), pp 2295-2302, DOI: 10.1021/acsomega.9b03540.
7. **R. Funari**, R. Ripa, B. Söderström, U. Skoglund and A. Q. Shen – "Detecting gold biomineralization by Delftia acidovorans biofilms on a quartz crystal microbalance" *ACS Sensors*, 2019, 4 (11), pp 3023-3033, DOI: 10.1021/acssensors.9b01580.
8. **R. Funari**, N. Bhalla, K. Chu, B. Söderström and A. Q. Shen – "Nanoplasmonics for Real-Time and Label-Free Monitoring of Microbial Biofilm Formation" *ACS Sensors*, 2018, 3 (8), pp 1499-1509, DOI: 10.1021/acssensors.8b00287.
9. **R. Funari**, I. Terracciano, B. Della Ventura, S. Ricci, T. Cardi, N. D'Agostino and R. Velotta – "Label-free detection of gliadin in food by quartz crystal microbalance-based immunosensor" *J. Agric. Food Chem.*, 2017, 65 (6), pp 1281–1289, DOI: 10.1021/acs.jafc.6b04830.
10. **R. Funari**, B. Della Ventura, C. Altucci, A. Offenhäusser, D. Mayer, and R. Velotta – "Single Molecule Characterization of UV-Activated Antibodies on Gold by Atomic Force Microscopy" *Langmuir*, 2016, 32 (32), pp 8084–8091, DOI: 10.1021/acs.langmuir.6b02218.
11. **R. Funari**, B. Della Ventura, R. Carrieri, L. Morra, E. Lahoz, F. Gesuele, C. Altucci, R. Velotta - "Detection of parathion and patulin by quartz-crystal microbalance functionalized by the photonics immobilization technique" *Bios. Bioelectron.*, 2015, 67, pp 224-229, DOI: 10.1016/j.bios.2014.08.020.
12. **R. Funari**, B. Della Ventura, L. Schiavo, R. Esposito, C. Altucci and R. Velotta - "Detection of Parathion Pesticide by Quartz Crystal Microbalance Functionalized with UV-Activated Antibodies" *Anal. Chem.*, 2013, 85 (13), pp 6392–6397, DOI: 10.1021/ac400852c.

PhD thesis: **R. Funari** – "High sensitive sensing by effective immobilization of UV photo-activated antibodies" *Thesis submitted for the Degree of Doctor of Philosophy on NOVEL TECHNOLOGIES FOR MATERIALS, SENSORS* AND IMAGING – XXVII CYCLE 2015

Elenco Pubblicazioni

1. **I. Gianani,** C. Benedetti, “Multiparameter estimation of continuous-time Quantum Walk Hamiltonians through Machine Learning”, AVS Quantum Science 5 (1), 014405, 2023.
2. **I. Gianani,** I. Mastroserio, L. Buffoni, N. Bruno, L. Donati, V. Cimini, M. Barbieri, F. S. Cataliotti, F. Caruso, “Experimental Quantum Embedding for Machine Learning”, Advanced quantum technologies, 2100140, 2022.
3. **I. Gianani,** M. Barbieri, F. Albarelli, A. Verna, V. Cimini, R. Demkowicz-Dobrzanski, “Kramers-Kronig relations and precision limits in quantum phase estimation”, Optica, 8, 12, 2021
4. **I. Gianani,** Y.S. Teo, V. Cimini. G. Leuchs, M. Barbieri, and L. L. Sanchez-Soto, “Compressively certifying quantum measurements”, PRX Quantum, 1, 020307, 2020
5. **I. Gianani,** D. Farina, M. Barbieri, V. Cimini, V. Cavina, V. Giovannetti “Discrimination of thermal baths by single qubit probes”, Physical Review Research, 2, 033497, 2020.
6. **I Gianani,** A. Suprano, T. Giordani, N. Spagnolo, F. Sciarrino, D. Gorpas, V. Ntziachristos, K. Pinker, N. Biton, J. Kupferman, S. Arnon, “Transmission of Vector Vortex beams in dispersive media” Advanced Photonics 2(3), 036003, 2020
7. **I Gianani**, MG Genoni, M Barbieri, “Assessing data postprocessing for quantum estimation”, IEEE Journal of Selected Topics in Quantum Electronics, 26, 3, 1-7, 2020
8. **I. Gianani,** “Robust spectral phase reconstruction of time-frequency entangled bi-photon states” Physical Review Research, 1, 033165, 2019
9. V.Cimini, **I. Gianani**, N. Spagnolo, F. Leccese, F. Sciarrino, M. Barbieri “Calibration of quantum sensors by neural networks” Physical Review Letters, 123, 230502, 2019
10. V. Cimini, M. Mellini, G. Rampioni, M. Sbroscia, L. Leoni, M. Barbieri, and **I. Gianani** , “Adaptive Tracking of Enzymatic Reactions with Quantum Light “ Optics Express, 27, 35245, 2019
11. E. Roccia, **I. Gianani**, L. Mancino, M. Sbroscia, F. Somma, M. G. Genoni, M. Barbieri, ”Entangling measurements for multiparameter estimation with two qubits” Quantum Science and Technology, 3, 1, 2017
12. R. McCracken, **I. Gianani**, A, Wyatt, D. T. Reyd, “Multi-color carrier-envelope-phase stabilization for high-repetition-rate multi-pulse coherent synthesis.”, Optics Letters, Vol. 40 No 7, pp 1208-12011, 2015.
13. G. Vallone, **I. Gianani**, E. B. Inostroza, C. Saavedra, G. Lima, A. Cabello, and P. Mataloni, “Testing Hardy’s nonlocality proof with genuine energy-time entanglement” Physical Review A 83, 042105, 2011

Tesi di Dottorato: I. Gianani, “Characterization of ultrashort pulses”, University of Oxford

Riccardo Funari, Ph.D.

Department of Physics
University of Bari "A. Moro"
Via Amendola, 173
Bari, 70125, Italy

RESEARCH EXPERIENCE

Department of Physics, University of Bari "Aldo Moro", Bari, Italy

Assistant professor (non-tenured, RTDA) *01/04/2021 – present*

- Advanced applications of **Atomic Force Microscopy (AFM)** to image and investigate the nano-mechanical properties of relevant biomolecules such as the **Spike protein** variants of the **SARS-CoV-2**, to correlate their folding, flexibility and stability with the mutations in the individual proteins and strain virulency.
- Development of an integrated **AFM-transistor device** to investigate in-situ the effects of the electric field on the **Electrical Double Layer (EDL)** on **biofunctionalized metallic gates** for sensing applications.

Micro/Bio/Nanofluidics Unit, Okinawa Institute of Science and Technology (OIST), Okinawa, Japan

Post-doctoral researcher *01/07/2017 – 31/03/2021*

- Development of an optofluidic device for quantifying antibodies against the **SARS-CoV-2 Spike protein** in **human plasma**.
- Investigation of studying **bacterial biofilm** assembly in real time and evaluation of the performance of different drugs in preventing biofilm formation using a **nanoplasmonic biochip**.
- Real-time detection of **heavy metals** by **cell-based biosensors** integrating nanoplasmonic and quartz crystal microbalance (QCM) transducers.
- Quantification of **cancer biomarkers** by an optical immunosensor based on **metal enhanced fluorescence (MEF).**

Department of Physics, University of Naples "Federico II", Naples, Italy

Post-doctoral researcher *21/04/2015 – 30/06/2017*

- Design and development of **immunosensors** suitable for the quantification targets like **gluten** components in food extracts and **α-amylase** in human saliva.
- Studying of protein-protein and protein-ligand interaction phenomena by means of microgravimetric transducers.
- Surface chemistry and functionalization.

Bioelectronics (PGI-8/ICS-8), Institute of Complex Systems, Peter Grünberg Institute, Forschungszentrum Jülich GmbH, Jülich, Germany

Visiting researcher *04/09/2015 – 26/03/2016*

- Detection of **C-reactive protein in human serum** by electrochemical immunosensing.
- **Single protein imaging** by AFM.
- Improvement of QCM sensors by means of electrochemical and physical treatments.

Bioelectronics (PGI-8/ICS-8), Institute of Complex Systems, Peter Grünberg Institute, Forschungszentrum Jülich GmbH, Jülich, Germany

Visiting PhD student *13/03/2014 – 30/08/2014*

- Atomic Force Microscopy (**AFM**) imaging of nanostructures and **antibodies**.
- Design and development of **microfluidic devices** in Polydimethylsiloxane (PDMS) and glass for **protein** samples.

EDUCATION

Ph.D. School in Industrial Engineering, University of Naples "Federico II", Naples, Italy **2015**

- International PhD program in Novel technologies for materials, sensors, and imaging.
- Thesis: *High-sensitive sensing by effective immobilization of UV photo-activated antibodies.*

M.S. Molecular and Industrial Biotechnology, University of Naples "Federico II", Naples, Italy **2011**

Final mark 110/110 magna cum laude.

- Thesis: *A novel UV light induced immobilization technology for the development of QCM based immunosensors.*

B.S. Biomolecular and Industrial Biotechnology, University of Naples "Federico II", Naples, Italy **2009**

Final Mark 110/110 cum laude.

- Thesis: *Purification and structural characterization of the recombinant protein aidB From Pseudomonas putida.*

RESEARCH GRANTS

Principal investigator of the project "Nuove Metodologie Di Analisi Di Superfici Nano Strutturate E Funzionalizzate Per Innovazione Nell'industria Biomedicale". *30/12/2020 – present*

POR Puglia 2014/2020 – Asse X – Azione 10.4. Research for Innovation (REFIN)

ID: E3C61580

SSD FIS/03 – Fisica della materia

Activity focuses on three main objectives:

- Development of an **integrated device** to investigate in-situ at the nanoscale via AFM the properties of the **biofunctionalized metallic surfaces** of a transistor upon applying localized electric fields.
- **Electrochemical nanostructuring** of the gold gate prior to the biofunctionalization to enhance the sensing performances of the detection device.
- Understanding of the **collective phenomena** involving the structural modification of the biofunctionalized interfaces induced by the **single-molecule** biorecognition events.

Principal investigator of the project "Development of a dual-mode optical/microgravimetric biosensor for the detect ion of three prostate cancer biomarkers". *01/04/2019 – 31/03/2021*

Japanese Society for the Promotion of Science – Grant No. 20K20237

Activity focused on two main objectives:

- **Electrochemical nanostructuring** of Quartz Crystal Microbalance to fabricate a dual mode optical/microgravimetric device.
- Quantification of the cancer biomarkers in real samples

Principal investigator of the project "High-sensitive sensing by effective immobilization of UV photo-activated antibodies". *04/09/2015 – 26/03/2016*

Programma Star – Linea 2 – Mobilità Giovani Ricercatori; University of Naples "Federico II", Naples, Italy

Activity focused on two main objectives:

- Development of an electrochemical sensor based on ink-jet printed microelectrodes arrays for detecting **C-reactive protein in human serum**.
- Use of **AFM** to characterize the orientation of immobilized **antibodies**, upon different treatments, on sensing surfaces.

Collaborator on the project "Real-time piezoelectric biosensors for environmental, agricultural and food applications". *30/04/2013 – 30/07/2017*

Fondazione con il Sud – project Nr. 2011-PDR-18

The results achieved during my master thesis were the basis of this project. My contribution focused on two major topics:

- Development of **biosensors** able to detect gliadin (the protein responsible for the **coeliac disease**), parathion (a **pesticide**) and patulin (a **mycotoxin**).
- Surface functionalization methodologies and microscopic characterization of proteins.

HONORS AND AWARDS

Marie Sklodowska-Curie Actions Seal of Excellence for the project proposal 74560 "FOBS - Fibre optic biosensors for effective detection of environmental pollutants" *24/04/2017*

TEACHING AND MENTHORING EXPERIENCE

Department of Physics, University of Bari "Aldo Moro", Bari, Italy

Lecturer *01/04/2021 – present*

- **Laboratory of Physics for Biology**
  - Course details: Fisica (**Corso** Integrato) - [003205] - Laboratorio Di Fisica (32 h, ~150 students)
  - Statics and basic physics experiments for undergraduate students.
- **Condensed Matter Physics for Physics**
  - Course details: Condensed Matter Physics [063644] (32 h, ~20 students)
  - Advanced microscopy (AFM and SEM) of master students in Physics
- **Optoelectronics and Nanotechnologies for Material Science and Physics**
  - Course details: Fotonica E Nanotecnologie [A000289] and [A000190] (32 h, ~25 students)
  - Basics of optoelectronic devices, nanofabrication techniques and clean room activities.
- **Reference lecturer for the master's degree course in Materials Science and Technology since 2021 (for further information contact the interclass coordinator prof. Luigi Gentile,** luigi.gentile@uniba.it**).**
- **Committee for the design of the new Bachelor and Master degree courses in Material Sciences.**
- **Placement, dissemination and recruiting team.**

Micro/Bio/Nanofluidics Unit, Okinawa Institute of Science and Technology (OIST), Okinawa (Japan)

- Supervision and cooperation with final theses of 2 Master students in Bioengineering on:
  - Development of a metal enhanced fluorescence-based biosensor for detecting cancer biomarkers.

- Realization of a microbial biofilm based microgravimetric device to quantify heavy metals in aqueous samples.

Department of Physics, University of Naples "Federico II", Naples (Italy)

- Guest lecturer in Advanced Physics for Biotechnologists (20 master students. 15 h). Topics: Biosensing, Introduction to laboratory practice. Main duties: Lab coordinator (Biotechnology and Biosensing).
- Supervision and cooperation with final theses of 2 Master students in Biotechnology and 1 Master student in Physics. Development of piezoelectric and optical biosensors for food contaminants and urine biomarkers.

National Interuniversity Consortium for the Physical Sciences of Matter, Rome (Italy)

Lecturer *11/11/2013 – 30/11/2013*

- Polyciclic Aromatic Hydrocarbons (PAH) detection methods for mechanical engineers (30 h, 20 post-graduate students).
- External expert for project PON01_01517 – "Metodologie innovative di sviluppo di motopropulsori automobilistici" – "Qualità delle emissioni dei motori: sensing di idrocarburi policiclici aromatici" (*Novel methodologies for car engines – Quality of engine emissions: sensing of polycyclic aromatic hydrocarbons*).

PATENTS

- A. Yakushenko, **R. Funari**, K. J. Krause, J. H. Schnitker, D. Mayer, N. Y. Adly Hassan, A. Offenhäusser "A process for preparing a memory, storage, and use of the memory" **German patent DE102016003770A1.** *Under industrial development at Forschungszentrum Jülich GmbH, Jülich, Germany.*
- A. Yakushenko, **R. Funari**, K. J. Krause, J. H. Schnitker, D. Mayer, N. Y. Adly Hassan, A. Offenhäusser "Method for producing an accumulator and use of the accumulator" **International patent WO2017162222A1.** *Under industrial development at Forschungszentrum Jülich GmbH, Jülich, Germany.*

PERSONAL SKILLS

LANGUAGE

Italian: Native

English: Cambridge First Certificate in English (FCE) – European level B2

Japanese: Basic proficiency

JOB RELATED SKILLS

- Italian national scientific qualification (**ASN, seconda fascia**) for **02/B1** (**experimental physics of matter**) and **02/D1** (**applied physics**) sectors.
- Good communication skills proven in presenting results to both small and large groups, adapting style and content to the background.
- Valuable organizational abilities proven in both time and resources management. This attitude resulted to be particularly useful in organizing laboratory activity. Laboratory management and organization with focus on collaboration and teamwork.
- Good manual dexterity and knowledge of laboratory techniques and equipment in chemistry, biochemistry and biotechnology. Optics and biophotonics. Atomic force microscopy, Scanning electron microscopy. Cleanroom expertise, metal evaporation, reactive ion etching, maskless lithography.
- Excellent skills in using Microsoft Office™, graphics programs, bioinformatic tools for research and analysis of biological information, sequences, structures. Image processing tools for AFM data analysis. Good knowledge of Origin (OriginLab) software. LabVIEW Core 1 certificate.

PUBLICATIONS

JOURNAL PAPERS

1. A. F. Payam, **R. Funari**, G. Scamarcio, and N. Bhalla – "Sensing Dynamically Evolved Short-Range Nanomechanical Forces in Fast-Mutating Single Viral Spike Proteins" *Small Science*, 2023, in press, DOI: 10.1002/smsc.202300029.
2. **R. Funari**, N. Bhalla, and L. Gentile – "Measuring the Radius of Gyration and Intrinsic Flexibility of Viral Proteins in Buffer Solution Using Small-Angle X-ray Scattering" *ACS Meas. Sci. Au*, 2022, 2 (6), pp 547-552, DOI: 10.1021/acsmeasuresciau.2c00048.
3. **R. Funari**, H. Fukuyama and A.Q. Shen – "Nanoplasmonic multiplex biosensing for COVID-19 vaccines" *Bios. Bioel.,* 2022, 208, 114193, DOI: 10.1016/j.bios.2022.114193.
4. R. Iqbal, A. Matsumoto, D. Carlson, K. Toda Peters, **R. Funari**, A. K. Sen, A. Q. Shen – "Evaporation driven smart patterning of microparticles on a rigid-soft composite substrate" *J. Colloid Interface Sci.*, 2022, 623, pp 927-937, DOI: 10.1016/j.jcis.2022.05.087.
5. **R. Funari** and A. Q. Shen – "Detection and Characterization of Bacterial Biofilms and Biofilm-Based Sensors" *ACS Sensors*, 2022, 7 (2), pp 347-357, DOI: 10.1021/acssensors.1c02722.
6. **R. Funari**, K. Chu and A. Q. Shen – "Detection of antibodies against SARS-CoV-2 spike protein by gold nanospikes in an opto-microfluidic chip" *Bios. Bioel.*, 2020, 169, 112578, DOI: 10.1016/j.bios.2020.112578.
7. B. Miranda, K. Chu, P. L. Maffettone, A.Q. Shen and **R. Funari**– "Metal-enhanced fluorescence immunosensor based on plasmonic arrays of gold nanoislands on an etched glass substrate" ACS *Applied Nano Materials*, 2020, 3 (10), pp 10470-10478, DOI: 10.1021/acsanm.0c02388.
8. **R. Funari**, A. Matsumoto, J. R. de Bruyn and A. Q. Shen – "Rheology of the Electric Double Layer in Electrolyte Solutions" *Anal. Chem.*, 2020, 92, (12), pp 8244-8253 DOI: 10.1021/acs.analchem.0c00475.
9. R. Ripa, A. Q. Shen and **R. Funari** – "Detecting E. coli biofilm development stages on gold and titanium by quartz crystal microbalance" *ACS Omega*, 2020, 5, (5), pp 2295-2302, DOI: 10.1021/acsomega.9b03540.
10. B. Della Ventura, M. Banchelli, **R, Funari**, A. Illiano, M. De Angelis, P. Taroni, A. Amoresano, P. Matteini and R. Velotta – "Biosensor surface functionalization by a simple photochemical immobilization of antibodies: experimental characterization by mass spectrometry and surface enhanced Raman spectroscopy" *Analyst*, 2019, 144, pp 6871-6880, DOI: 10.1039/C9AN00443B
11. **R. Funari**, R. Ripa, B. Söderström, U. Skoglund and A. Q. Shen – "Detecting gold biomineralization by Delftia acidovorans biofilms on a quartz crystal microbalance" *ACS Sensors*, 2019, 4 (11), pp 3023-3033, DOI: 10.1021/acssensors.9b01580.
12. **R. Funari**, N. Bhalla, K. Chu, B. Söderström and A. Q. Shen – "Nanoplasmonics for Real-Time and Label-Free Monitoring of Microbial Biofilm Formation" *ACS Sensors*, 2018, 3 (8), pp 1499-1509, DOI: 10.1021/acssensors.8b00287.
13. B. Della Ventura, N. Sakač, **R. Funari** and R. Velotta – "Flexible immunosensor for the detection of salivary α-amylase in body fluids" *Talanta*, 2017, 174 (11), pp 52–58, DOI: 10.1016/j.talanta.2017.05.075.
14. B. Della Ventura, M. Iannaccone, **R. Funari**, M. Pica Ciamarra, C. Altucci, R. Capparelli, S. Roperto and R. Velotta – "Effective Antibodies Immobilization and Functionalized Nanoparticles in a Quartz-Crystal Microbalance-based Immunosensor for the detection of parathion" *PloS ONE*, 2017, 12 (2), e0171754, DOI: 10.1371/journal.pone.0171754.
15. **R. Funari**, I. Terracciano, B. Della Ventura, S. Ricci, T. Cardi, N. D'Agostino and R. Velotta – "Label-free detection of gliadin in food by quartz crystal microbalance-based immunosensor" *J. Agric. Food Chem.*, 2017, 65 (6), pp 1281–1289, DOI: 10.1021/acs.jafc.6b04830.

16. B. Della Ventura, A. Ambrosio, A. Fierro, **R. Funari**, F. Gesuele, P. Maddalena, D. Mayer, M. Pica Ciamarra, R. Velotta, and C. Altucci – "Simple and Flexible Model for Laser-Driven Antibody–Gold Surface Interactions: Functionalization and Sensing" *ACS Appl. Mater. Interfaces*, 2016, 8 (33), pp 21762–21769, DOI: 10.1021/acsami.6b04449.
17. **R. Funari**, B. Della Ventura, C. Altucci, A. Offenhäusser, D. Mayer, and R. Velotta – "Single Molecule Characterization of UV-Activated Antibodies on Gold by Atomic Force Microscopy" *Langmuir*, 2016, 32 (32), pp 8084–8091, DOI: 10.1021/acs.langmuir.6b02218.
18. B. Della Ventura, I. Rea, A. Caliò, P. Giardina, A. M. Gravagnuolo, **R. Funari**, C. Altucci, R. Velotta and L. De Stefano – "Vmh2 hydrophobin layer entraps glucose: A quantitative characterization by label-free optical and gravimetric methods" *Appl. Surf. Sci.*, 2016, 364, pp 201-207, DOI:10.1016/j.apsusc.2015.12.080.
19. B. Della Ventura, **R. Funari**, Anoop K.K, S. Amoruso, F. Gesuele, R. Velotta, and C. Altucci, "Nano-machining of bio-sensor electrodes through gold nanoparticles deposition produced by femtosecond laser ablation" *Appl. Phys. B*, 2015, 119 (3), pp 497-501, DOI: 10.1007/s00340-015-6091-3.
20. S. Longobardi, A. M. Gravagnuolo, **R. Funari**, B. Della Ventura, F. Pane, E. Galano, A. Amoresano, G. Marino, P. Giardina - "A simple MALDI plate functionalization by Vmh2 hydrophobin for serial multi-enzymatic protein digestions" *Anal. Bioanal. Chem.*, 2015, 407 (2), pp 487-496, DOI: 10.1007/s00216-014-8309-3.
21. **R. Funari**, B. Della Ventura, R. Carrieri, L. Morra, E. Lahoz, F. Gesuele, C. Altucci, R. Velotta - "Detection of parathion and patulin by quartz-crystal microbalance functionalized by the photonics immobilization technique" *Bios. Bioelectron.*, 2015, 67, pp 224-229, DOI: 10.1016/j.bios.2014.08.020.
22. S. Lettieri, A. Avitabile, B. Della Ventura, **R. Funari**, A. Ambrosio, P. Maddalena, M. Valadan, R. Velotta, C. Altucci - "Nano- and femtosecond UV laser pulses to immobilize biomolecules onto surfaces with preferential orientation" *Appl. Phys. A*, 2014, 117 (1), pp 185-190, DOI: 10.1007/s00339-014-8340-4.
23. **R. Funari**, B. Della Ventura, L. Schiavo, R. Esposito, C. Altucci and R. Velotta - "Detection of Parathion Pesticide by Quartz Crystal Microbalance Functionalized with UV-Activated Antibodies" *Anal. Chem.*, 2013, 85 (13), pp 6392–6397, DOI: 10.1021/ac400852c.

CONFERENCE PROCEEDINGS AND BOOK CHAPTERS

1. A. Di Nardo, …, **R. Funari**, et al. - "New Perspectives for Smart Water Network monitoring, partitioning and protection with innovative On-line Measuring Sensors" in E-proceedings of the 36th IAHR World Congress 28 June–3 July, 2015, The Hague, the Netherlands, 2015.
2. **R. Funari** and B. Della Ventura - "Antibody Anchoring on QCM Gold Surfaces by UV Based Strategy", in Nano-Structures for Optics and Photonics; Springer Netherlands, 2015; pp 447–448 DOI: 10.1007/978-94-017-9133-5_24.
3. B. Della Ventura, **R. Funari**, C. Altucci and R. Velotta - "UV-light-assisted functionalization of Quartz-Crystal-Microbalance" in Photonics Conference, 2014 Third Mediterranean; IEEE, Trani 7-9 May, 2014, pp 1–3, DOI: 10.1109/MePhoCo.2014.6866462.
4. B. Della Ventura, **R. Funari**, S. Lettieri, R. Esposito, C. Altucci and R. Velotta - "Effective Antibody Anchoring on Gold Plate by Ultra-short UV Pulses", in Sensors: Proceedings of the First National Conference on Sensors, Rome 5-17 February, 2012, Lecture Notes in Electrical Engineering 162, Springer Science+Business Media New York, 2014, DOI: 10.1007/978-1-4614-3860-1_20.
5. **R. Funari**, B. Della Ventura, A. Ambrosio, S. Lettieri, P. Maddalena, C. Altucci and R. Velotta - "UV-light-assisted functionalization for sensing of light molecules", in SPIE Optics + Optoelectronics 2013, 8774, 87740K, SPIE, 2013 DOI: 10.1117/12.2018510.

CONFERENCES AND POSTER ABSTRACTS

1. 107th National Congress of the Italian Physical Society, 13 – 17 September, 2021, online conference (invited talk).
2. 100th CSJ Annual Meeting, 22 – 25 March, 2020, Tokyo, Japan.
3. 7th International Symposium on Sensor Science (I3S 2019), 9 – 11 May, 2019, Naples, Italy.
4. Biosensors 2018, 12 – 15 June, 2018, Miami, USA.
5. Mini-symposium on Bacterial Biofilms: Transformative Measurements and Experimental Approaches for Bacterial Biofilms, 29 – 31, August, 2017, OIST, Okinawa, Japan.
6. 5th International Conference on Bio-Sensing Technology, 7 – 10 May, 2017, Riva del Garda, Italy.
7. Biosensors 2016, 25 – 27 May, 2016, Gothenburg, Sweden.
8. 2nd EIP Water Conference 2014, 5 – 6 November, 2014, Barcelona, Spain.
9. 9th International conference on Photo-Excited Processes and Applications (ICPEA-9) 29 September – 3 October 2014, Matsue, Japan.
10. Secondo Workshop, Gruppo Biosensori Ottici e Biofotonica della Società Italiana di Ottica e Fotonica, 19-20 September 2013, Sestri Levante, Italy.
11. 5th EOS Topical Meeting on Optical Microsystems (OμS'13) 12-14 September 2013, Capri, Italy.
12. Ettore Majorana foundation and center for scientific culture, International school of atomic and molecular spectroscopy, Nano-structures for optics and photonics, Optical Strategies for Enhancing Sensing, Imaging, Communication, and Energy Conversion, 4-19 July 2013, Erice, Sicily, Italy.
13. SPIE Optics + Optoelectronics, Optical Sensors 2013, 15-17 April 2013, Prague, Czech Republic.

Curriculum Dr. Ilaria Gianani

Researcher unique identifiers:
ORCID: _____
Scholar: _____
Scopus: _____

Languages: Italian (Native), English (Fluent), French (Intermediate), German (beginner)

CURRENT POSITION

2021 – date Fixed-term Assistant Professor (RTDa), Science Department, Università degli Studi Roma Tre (IT)

PREVIOUS POSITIONS

2020 – 2021 Post Doctoral Researcher in Prof. M. Barbieri's group, Università degli Studi Roma Tre (IT)

2019 – 2020 Post Doctoral Researcher in Prof. F. Sciarrino's group, Sapienza Università di Roma (IT)

2019 – 2020 Visiting PostDoc with Prof. M. Barbieri, Università degli Studi Roma Tre (IT)

2019 – 2019 Visiting PostDoc (4 months) with Prof. F. Sciarrino, Sapienza Università di Roma (IT)

2016 – 2019 Post Doctoral Researcher in Prof. M. Barbieri's group, RM3 (IT)

2012 – 2013 Visiting PhD (2 months) in Prof. D. Reid's group, Heriot-Watt University, Edinburgh (UK)

EDUCATION

2011 – 2018 DPhil. in Atomic and Laser Physics. Thesis: "Characterisation of Ultrashort pulses" St Anne's College, University of Oxford (UK) Supervisor: Prof. I. A. Walmsley

2008 – 2011 Master (MSc) in Physics. Thesis: "Application of non-maximally entangled two-photon states in non-locality test and quantum communications" Department of Physics, Sapienza Università di Roma (IT) Supervisor: Prof. P. Mataloni, mark: 110/110 cum laude

2005 – 2008 Bachelor (BSc) in Physics, Thesis: "Biophysics of vision: Intramolecular mechanisms of signal transduction in rhodopsin" Department of Physics, Sapienza Università di Roma (IT) Supervisor: Prof. L. Guidoni, mark: 110/110 cum laude

ABILITAZIONE SCIENTIFICA NAZIONALE

Abilitazione Scientifica Nazionale 02/B1 Seconda Fascia valid from 30/05/2022 to 30/05/2033

TEACHING ACTIVITIES

[9] A.A. 2022 - 23 - Elements of materials physics - molecules, solids, and lasers module, BSc in Optics and Optometry , Università degli Studi Roma Tre (IT)

[8] A.A. 2022 - 23 - Data analysis module, Physical processes in Enogastronomy, BSc in Enogastronomic sciences and cultures, Università degli Studi Roma Tre (IT)

[7] A.A. 2021 - 22, 2022 - 23 - "How to journal club", scientific public speaking course, Nanotechnologies and complex systems (SciMaNo) Doctoral School, Università degli Studi Roma Tre (IT)

[6] A.A. 2021 - 22 - TA for "Elements of general physics", BSc in Optics and optometry, Università degli Studi Roma Tre (IT)

[5] A.A. 2020 - 21, 2021 - 22 - Data analysis module (3 CFU), BSc in Sciences for the protection of nature and environmental sustainability, Università degli Studi Roma Tre (IT)

[4] A.A. 2020 - 21 - Data analysis module (3 CFU), BSc in Geology, Università degli Studi Roma Tre (IT)

[3] A.A. 2020 - 21 - TA for "Experimental Physics I", BSc in Geology, Università degli Studi Roma Tre (IT)

[2] A.A. 2019 - 20 - "Cultore della Materia" for the course "Electromagnetism and optics with laboratory", BSc in Optics and Optometry, Università degli Studi Roma Tre (IT)

[1] A.A. 2017 - 18 - Math revision course, BSc in Biology, Università degli Studi Roma Tre (IT)

STUDENT SUPERVISION

PhDs	M. Manrique (2023-date, Università degli Studi Roma Tre), G. Bizzarri, V. Cimini, L. Mancino, E. Roccia (2023-date, 2017-2020, 2016-2018, 2016-2018, assisted supervision, Università degli Studi Roma Tre) A. Suprano (2019, assisted supervision, Sapienza Università di Roma)
MSc	W. Zedda, M. Feyles (2021, 2018, assisted supervision, RM3)
BSc	D. Ashraf (2023, Università degli Studi Roma Tre), L. Asiani, G. Grossi (2023,2023,2021, co-supervisor, Università degli Studi Roma Tre), D. Acciaccarelli (2018, assisted supervision, Università degli studi Roma Tre)
Internships	L. Toscani De Col, G. Satta (2021, 2020, co-.supervisor, Università degli Studi Roma Tre) F.Trezzini (2019, assisted supervision, Sapienza Università di Roma), R. Booth (2017, assisted supervision, Università degli studi Roma Tre)

RESEARCH INTERESTS

Keywords: *quantum optics, ultrafast optics, quantum information, quantum and ultrafast metrology*

*My main research priorities are the **exploration at a fundamental level** of quantum properties of light, and their **exploitation for technological advancements** with particular interest towards **sensing and biological applications.***

Time- frequency correlations

Classical Ultrafast Metrology: I have a strong background in time-frequency characterisation of ultrafast light pulses. During my DPhil., I have developed a technique to reconstruct arbitrary pulses and helped developing a method for the mutual reconstruction of electric fields [3].

Quantum Time-Frequency Correlations: I have taken part in the investigation of indirect techniques for inferring time-frequency correlation [7,10,15], designed and led an experiment to tailor two photons interference through spectral shaping [14], designed and performed an experiment for quantum ghost spectrometry [42], led a collaboration using ghost spectroscopy for spectral discrimination [P6] and performed an experiment for line shape estimation with ghost spectroscopy [49].

Quantum Ultrafast Metrology: I have combined my expertise to devise a novel metrological technique for the spectral characterization of single photon sources [24].

Quantum Metrology

Multiparameter estimation: I have participated in an experiment on multiparameter estimation [16], then taken a leading role of the research line, by designing the extension to dynamical tracking [19], coordinated and supervised the application to the study of biological samples [22]. I have performed an experiment extending the results to function estimation [38] and employed these for the investigation of the metrology of absorptive samples using Kramers-Kronig relations [41].

Integrated Multiphase estimation: I have taken part in the implementation of an adaptive multiphase experiment on an integrated platform [37].

Machine Learning for quantum optics and metrology

I have taken part in the experimental application of Machine learning techniques for the calibration of quantum sensors [23, 39]. I have then led a collaboration on Hamiltonian parameter estimation of continuous-time quantum walks using machine learning estimators [48] and a genetic algorithm [P7] for determining a network topology.

MAJOR COLLABORATIONS

[8] Claudia Benedetti, Università degli Studi di Milano (IT)
(AVS Quantum Science [48] and 1 preprint)

[7] Lorenzo Maccone, Università di Pavia (IT) and P. Verrucchi, Università di Firenze (IT)
(I led a Templeton grant consortium as Project Leader in 2020 which passed the first stage of selection but was not funded at the second and final stage.)

[6] Luis Lorenzo Sanchez Soto, Universidad Complutense Madrid (ES)
(PRX Quantum,1, 020307, (2020), 1 submitted paper — ongoing FET project STORMYTUNE)

[5] Aephraim Steinberg, University of Toronto (CA)
(Physical Review A, 102, 022230, (2020))

[4] Chiara Macchiavello, Università di Pavia (IT)
(Phys. Rev. A 102, 052404, (2020) - Editors' suggestion)

[3] Jan Sperling, University of Paderborn (DE)

(Physical Review Research 1, 033020, (2019))

[2] Francesco Albarelli, University of Warwick (UK)
(Phys. Rev. A, 103, 042602, (2021))

[1] Zixin Huang, Macquarie University (AU)
(Physical Review A 97(3),032305, (2018))

LOCAL COLLABORATIONS

[4] Matteo Rosati and Gabriella Cincotti (Dip. ICITA)
(Developing quantum metrology approach for minflux confocal microscopy - submitted)

[3] Fabio Polticelli (Dip. Scienze)
(quantum circular dichroism - as part of Stg ERC 24 proposal)

[2] Iole Venditti and Chiara Battocchio (Dip. Scienze)
(shock and non linear optics in nanorods and pump probe experiments - will be involved in Stg ERC 2024 proposal)

[1] Livia Leoni and Giordano Rampioni (Dip. Scienze)
(tracking enzymatic activity with quantum light)

FUNDING

[1] 2021-2023 - NATO-SPS Project "HADES" **Co-Investigator** for RM3 unit.
RM3 funded amount: 107k EUR

PARTICIPATION IN RESEARCH PROJECTS

2020-2023 H2020-FET OPEN "STORMYTUNE", Researcher (RTDa), RM3 PI: Prof. M. Barbieri

2019-2020 H2020-FET OPEN "CANCER SCAN", Post Doc, Sapienza PI: Prof. F. Sciarrino

2019-2020 Lazio Innova - SINFONIA (Regione Lazio), , Post Doc, Sapienza PI: Prof. F. Sciarrino

2016 - 2018 H2020- FET OPEN "QCUMbER", Post Doc, RM3 PI: Prof. M. Barbieri

2011 -2015 Ultrafast optical metrology within the scope of the EPSRC grants EP/H000178/1 and EP/L015137/1, DPhil, University of Oxford, PI: Prof. I. A. Walmsley

INSTITUTIONAL RESPONSIBILITIES

2022 Member of the selection committee for the PhD "Characterization of single photon sources" for the SciMaNo Doctoral school, RM3(IT)

2022 - date Reviewer for INFN Commissione 5 grant proposals.

2022 Member of the selection committee for the Future Luminary Award, AIP

2022 - date Head and founder of the workgroup Women in STEM Roma Tre (WIS3), Università degli Studi Roma Tre (IT)

2022 - date Member of the orientation commission, Science Department, Università degli Studi Roma Tre (IT)

2021 Reviewer for Poland National Science Centre funding schemes.

2021 Panel member for the selection of PostDoc positions, Università degli Studi Roma Tre (IT)

2020 - date Head of the Outreach Committee for the FETOPEN STORMYTUNE EU Project

2016 - 2018 Member of the Outreach Committee for the FETOPEN QCUMbER EU Project

2014 - 2015 Graduate Rep, Oxford Women in Physics Society, University of Oxford (UK)

2013 - 2014 President of the Oxford University Italian Society, University of Oxford (UK)

ORGANIZATION OF SCIENTIFIC MEETINGS

[10] 2023 - Workshop ER(C)SHE, organised and chaired on behalf of WIS3, with 8 invited ERC grantees (AdG, CoG, StG) in PE panels and ERC project officer. Approx. 100 attendees. 31st of May 2023, held at Università degli Studi Roma Tre (IT) and online.

[9] 2022-2023 Organised over 10 scientific events (seminars, workshops and networking) for the group WIS3 throughout the year, involving four STEM RM3 Departments (Science, DIIEM, DICITA, MatFis).

[8] 2023 - WIS3 - International day of women and girls in science 3 Minute Thesis Competition, member of the organising committee (committee of 10), Departments of Science, Mathematics and Physics, DIIEM and DICITA, Università degli Studi Roma Tre (IT)

[7] 2022 - WIS3 - International day of women and girls in science 3 Minute Thesis Competition, chair, and member of the organising committee (committee of 8), Departments of Science, Mathematics and Physics, DIIEM and Engineering, Università degli Studi Roma Tre (IT).

[6] 2021 - WIS3 - International day of women and girls in science workshop and 3 Minute Thesis Competition, chair, and member of the organising committee (committee of 6), Departments of Science, Mathematics and Physics, and Engineering, Università degli Studi Roma Tre (IT).

[5] 2020 - Young Italian Quantum Information Science Conference (committee of 6) - on-line

[4] 2019 - Amaldi Research Center Open Day: Quantum Technologies (committee of 3), Sapienza Università di Roma (IT)

[3] 2017 - QCUMbER Workshop (committee of 2) – Università degli Studi Roma Tre (IT)

[2] 2015 - First Conference for Undergraduate Women in Physics (CUWiP UK 2015), Oxford (UK)

[1] 2013 - As President of the Oxford University Italian Society in 2013-14 I have led the organisation of several events (usually with 100-150 guests)

INVITED TALKS

[12] 2022 - CCS, Conference on Complex Systems, "Continuous time quantum walk recognition through machine learning", 17-21/10/2022, Palma de Mallorca (ES).

[11] 2022 - Invited Seminar, University of Naples QST Seminars, "Time-frequency characterization of biphoton states", 26/04/2022, on-line.

[10] 2021 - SIF conference, "Exploiting quantum frequency correlations: The metrology of ghost spectroscopy", 13-17/09/2021, on-line.

[9] 2021 - Invited seminar, Queen's University, Belfast "Characterization of frequency-entangled biphoton states", 29/04/2021, on-line.

[8] 2021 - Invited seminar, University of Milan QSPRING Seminars, "Response function estimation from phase measurements", 20/04/2021, on-line.

[7] 2021 - Invited seminar, University of Toronto CQIQC Seminars, "Quantum Thermodynamics simulations and their energetic cost", 05/03/2021, on-line.

[6] 2020 - (cancelled due to COVID restrictions) 12th workshop on Quantum Effects in Biological Systems - QuEBS 2020, Crete (GR)

[5] 2020 - (cancelled due to COVID restrictions) ENEA LIMS2020, Frascati (IT)

[4] 2019 - International Conference on Squeezed States and Uncertainty Relations, "Imperfect conditions in quantum sensors"17-21/06/2019, Madrid (ES).

[3] 2019 - Invited seminar, Heriot-Watt University, "Quantum Metrology: Practically as perfect as it gets", 20/03/2019, Edinburgh (UK).

[2] 2019 - Invited seminar, Department of Science, RM3, "Quantum Metrology", 17/01/2019, Rome (IT)

[1] 2017 - IQIS 2017, "Quantum optics and Quantum Thermodynamics: can there be a match?", 2-15/09/2017, Florence (IT)

CONTRIBUTED TALKS, POSTERS AND CONFERENCE ATTENDANCE

[11] Causality in the quantum word Workshop, Anacapri, 17th-20th September 2019 - Poster

[10] CEWQO 2019, Paderborn, 3rd-7th June 2019, Talk, Poster

[9] QIM V 2019, Rome, 3rd - 5th April 2019, Talk, Chair

[8] IQIS 2018, Catania, 17th - 20th September 2018, Poster

[7] QCUMbER Conference, Oxford, 10th - 13th July 2018, Chair

[6] IQIS 2017, Florence, 12-15 September 2017, Poster

[5] QCUMbER Consortium Meeting, 2-3 March 2017, Rome

[4] YQIS 2016, Barcelona, 19-21 October 2016. Poster

[3] IQIS 2016, Rome, 20-23 September 2016

[2] Oxford Photonics Day, Oxford, 12th March 2013 - awarded Poster Prize.

[1] SU2P Third Annual Symposium, Heriot Watt University, Edinburgh, 23rd, 24th April 2012.

EDITORIAL EXPERIENCE

[3] 2022 – date - Member of the Early Career Editorial Advisory Board of APL Photonics (AIP)

[2] 2021 – 2022 - Guest editor for the special issue "The Interplay between photonics and Machine learning", Photonics (MDPI) (with F. Sciarrino, F. Flamini, and V. Cimini)

[1] 2021 – date - Review Editor for Frontiers in Photonics - Quantum Optics

Referee for: Nature Communications, NPJ QI, PRX Quantum, Phys Rev Letters, Phys Rev Research, Phys Rev A, ACS Applied Optical Materials, Optics Letters, JSTQE (IEEE), New Journal of Physics, Scientific Report, APL Photonics.

AWARDS AND HONOURS

[3] 2022 - Selected as a member of the Early Career Editorial Advisory Board of APL Photonics (AIP)

[2] 2020 - Shortlisted for the Fulbright Research Scholarship

[1] 2013 - Awarded Poster Prize, Oxford Photonics Day (UK)

MEDIA COVERAGE

[6] 2022 - La Repubblica magazine Interview (IT): https://tinyurl.com/IGinterviewAL

[5] 2022 - Advanced Science News: https://www.advancedsciencenews.com/embedding-data-in-quantum-states-for-machine-learning/

[4] 2021 - Le Scienze: https://tinyurl.com/lescienzeKK AGI PR: https://tinyurl.com/agienergetics, RaiNews 24: https://tinyurl.com/n5u8qnps, TG Leonardo: https://tinyurl.com/18d8v9vo

[3] 2020 - SPIE PR: https://tinyurl.com/spie-vvb, Science Daily: https://tinyurl.com/sciencedaily-vvb

[2] 2019 - OSA PR: https://tinyurl.com/osa-enzymes, ANSA PR: https://tinyurl.com/notizia-ansa (major IT media outlet), Optics and Photonics News: https://tinyurl.com/opn-enzymes, Roma3 Radio interview: https://tinyurl.com/rm3radio)

[1] 2017 - Pintofscience.it: https://tinyurl.com/pos-gianani, Le Scienze: https://tinyurl.com/pos-lescienze

OUTREACH ACTIVITIES

[15] 2023 - Italian Quantum Weeks exhibition "Dire L'indicibile", local organiser (team of 3), RM3 (IT)

[14] Collaboration with QPlayLearn as outreach coordinator for the STORMYTUNE FET EU project, developing a computer game based on time-frequency entanglement and a "QUEST-quantum dictionary" page.

[13] 2022 - Project "'nDonnamo" installation on women in science, Municipio VIII - Roma Capitale, Globalshapers - Rome hub, RM3 (IT)

[12] 2022 - European Researchers Night: talk "Quantum wars: la minaccia del sensore fantasma", RM3 (IT)

[11] 2022 - Italian Quantum Weeks, national Italian quantum information video voice over.

[10] 2022 - Italian Quantum Weeks exhibition "Dire L'indicibile", local organiser (team of 3), RM3 (IT)

[9] 2021 - European Researchers Night: show "Hidden in plain sight" on Women in STEM (written, directed, produced, and performed)

[8] 2020 - European Researchers Night: online video "How is an experiment conceived?"

[7] 2020 - Seminar "Souvenirs from the quantum world" at "Occhi sulla luna" event, RM3 (IT)

[6] 2019 - "Meet the scientist", Open Day: Quantum Technologies, Amaldi Research Center (IT)

[5] 2019 - Lab tours for "Occhi su Marte" outreach event, RM3 (IT)

[4] 2018 - European Researchers' Night: participation with experimental demonstrations, RM3 (IT)

[3] 2017 - European Researchers' Night: participation with experimental demonstrations, RM3 (IT)

[2] 2017 - Pint of Science: seminar on QCUMbER FET EU project, Rome (IT)

[1] 2016 - European Researchers' Night: participation with experimental demonstrations, RM3 (IT)

MEMBERSHIPS OF SCIENTIFIC SOCIETIES

OSA (2020 - 2021), IEEE Photonics Society (2016-2017), SIF (2011-2013, 2019 - 2021)

TECHNICAL SKILLS

- Strong expertise in design and realisation of optical apparata
- Strong expertise in ultrafast optics and metrology
- Strong expertise in theoretical and experimental quantum optics.
- Strong expertise in theoretical and experimental nonlinear optics
- Strong expertise in theoretical and experimental quantum information.
- Strong expertise in machine learning for quantum optics
- Strong expertise in laser physics
- Solid expertise in machine learning
- Scientific programming with several software platforms (Python, Mathematica, Matlab)
- Graphic design and video editing (Photoshop, Illustrator, Blender, Cinema4D, Final Cut Pro X).
- Science communication, public speaking, and outreach skills

PUBLICATION SUMMARY

Total number of publications: 71 (51 peer-reviewed journal articles, 13 peer-reviewed conference proceedings, 1 thesis, 1 book chapter, and 5 articles at the peer-review stage),

H index: 17(Scopus), 19 (Scholar)
Citations: 668 (Scopus), 975 (Scholar)

Papers on high-impact journals: 1 Advanced Photonics, 2 Optica, 3 AVS Quantum Science, 3 Phys Rev Lett, 1 PRX Quantum, 3 NPJ Quantum Information.

PEER-REVIEWED JOURNAL ARTICLES

[51] M Guarneri, I Gianani, M Barbieri, A Chiuri "Simplified Quantum Process Characterization by Specialised Neural Networks", accepted on Advanced Quantum Technologies ,2023

[50] R Duquennoy, M Colautti, P Lombardi, V Berardi, I Gianani, C Toninelli, M. Barbieri "Singular Spectrum Analysis of Two Photon Interference from Distinct Quantum Emitters", accepted on Phys. Rev. Research, 2023

[49] **I. Gianani,** LLS Soto, AZ Goldberg, M Barbieri "Efficient lineshape estimation by ghost spectroscopy", Optics Letters 48, 3299-3302 (2023) **[as corresponding author]**

[48] **I. Gianani,** C. Benedetti, "Multiparameter estimation of continuous-time Quantum Walk Hamiltonians through Machine Learning", AVS Quantum Science 5 (1), 014405, 2023 **[as corresponding author]**

[47] J Sperling, I Gianani, M Barbieri, E Agudelo, "Detector entanglement: Quasidistributions for Bell-state measurements", Physical Review A 107 (1), 012426, 2023

[46] W. Zedda, I. Gianani, V. Berardi, and M. Barbieri, "Thresholded quantum LIDAR in turbulent media", AVS Quantum Science, 4, 041401, 2022 **[as corresponding author]**

[45] **I. Gianani**, I. Mastroserio, L. Buffoni, N. Bruno, L. Donati, V. Cimini, M. Barbieri, F. S. Cataliotti, F. Caruso, "Experimental Quantum Embedding for Machine Learning", Advanced quantum technologies, 2100140, 2022.

[44] S.E. D'Aurelio, M. Valeri, E. Polino, V. Cimini, I. Gianani, M. Barbieri, G. Corrielli, A. Crespi, R. Osellame, F. Sciarrino, and N. Spagnolo, "Experimental investigation of Bayesian bounds in multiparameter estimation", Quantum Sci. Technol. 7, 025011,2022

[43] **I. Gianani**, V. Berardi, M. Barbieri, "Witnessing quantum steering by means of the Fisher information", Phys.Rev. A 105, 022421, 2022

[42] A. Chiuri, I. Gianani, V. Cimini, L. De Dominicis, M. G. Genoni, and M. Barbieri, "Ghost imaging as loss estimation: Quantum versus classical schemes" Phys. Rev. A 105, 013506, 2022

[41] **I. Gianani**, M. Barbieri, F. Albarelli, A. Verna, V. Cimini, R. Demkowicz-Dobrzanski, "Kramers-Kronig relations and precision limits in quantum phase estimation", Optica,8,12, 2021

[40] V. Cimini, F. Albarelli, I. Gianani, M. Barbieri, "Semiparametric estimation in Hong-Ou-Mandel interferometry", Phys. Rev. A 104, L061701 2021 **[as corresponding author]**

[39] V. Cimini, E. Polino, M. Valeri, I. Gianani, N. Spagnolo, G. Corrielli, A. Crespi, R. Osellame, M. Barbieri, and F. Sciarrino, "Calibration of multiparameter sensors via machine learning at the single-photon level", Phys. Rev. Applied, 15, 044003, 2021

[38] **I. Gianani**, F. Albarelli, V. Cimini, M. Barbieri, "Experimental function estimation from quantum phase measurements", Phys. Rev. A, 103, 042602, 2021 **[as corresponding author]**

[37] M. Valeri, E. Polino, D. Poderini, I. Gianani, G. Corrielli, A. Crespi, R. Osellame, N. Spagnolo, F. Sciarrino, "Experimental adaptive Bayesian estimation of multiple phases with limited data", NJPQI 6, 92, 2020

[36] V. Cimini, S. Gherardini, M. Barbieri, I. Gianani, M. Sbroscia, L. Buffoni, M. Paternostro, F. Caruso, "Experimental characterization of the energetics of quantum logic gates" , NJPQI 6, 96 2020

[35] A. Suprano, T. Giordani, I. Gianani, N. Spagnolo, K. Pinker, J. Kupferman, S. Arnon, U. Klemm, D. Gorpas, V. Ntziachristos, F. Sciarrino, "Propagation of structured light through tissue-mimicking phantoms", Optics Express, 28, 24, 2020.

[34] V. Cimini, I. Gianani, M.F. Sacchi, C. Macchiavello, and M. Barbieri, "Experimental witnessing for the quantum channel capacity in the presence of correlated noise", Phys. Rev. A 102, 052404, 2020)
- **Editors' suggestion**

[33] **I. Gianani,** Y.S. Teo, V. Cimini. G. Leuchs, M. Barbieri, and L. L. Sanchez-Soto, "Compressively certifying quantum measurements", PRX Quantum, 1, 020307, 2020

[32] **I. Gianani**, D. Farina, M. Barbieri, V. Cimini, V. Cavina, V. Giovannetti "Discrimination of thermal baths by single qubit probes", Physical Review Research, 2, 033497, 2020.

[31] A. Z. Goldberg, I. Gianani, M. Barbieri, F. Sciarrino, A. M. Steinberg, N. Spagnolo, "Multiphase estimation without a reference mode", Physical Review A, 102, 022230, 2020.

[30] **I Gianani,** A. Suprano, T. Giordani, N. Spagnolo, F. Sciarrino, D. Gorpas, V. Ntziachristos, K. Pinker, N. Biton, J. Kupferman, S. Arnon, "Transmission of Vector Vortex beams in dispersive media" Advanced Photonics 2(3), 036003, 2020 - **Press release SPIE**

[29] **I Gianani**, MG Genoni, M Barbieri, "Assessing data postprocessing for quantum estimation" IEEE Journal of Selected Topics in Quantum Electronics, 26, 3, 1-7, 2020 **[as corresponding author]**

[28] V Cimini, I Gianani, F Piacentini, IP Degiovanni, M Barbieri, "Anomalous values, Fisher information, and contextuality, in generalized quantum measurements", Quantum Science and Technology, 5, 2, 2020

[27] V. Cimini, M.G. Genoni, I. Gianani, N. Spagnolo, F. Sciarrino, M. Barbieri "Diagnosing Imperfections in Quantum Sensors via generalized Cramér-Rao bounds" Phys. Rev. Applied, 13, 024048, 2020

[26] F. Albarelli, M. Barbieri, M. G. Genoni, I. Gianani, "A perspective on multiparameter quantum metrology: from theoretical tools to applications in quantum imaging" Physics Letters A,384, 126311, 2020

[25] **I Gianani,** M Sbroscia, M Barbieri, "Measuring the time-frequency properties of photon pairs: a short review", AVS Quantum Science, 2, 011701, 2020, **Selected as Journal Cover.**

[24] **I. Gianani,** "Robust spectral phase reconstruction of time-frequency entangled bi-photon states" Phys. Rev. Research, 1, 033165, 2019

[23] V.Cimini, **I. Gianani**, N. Spagnolo, F. Leccese, F. Sciarrino, M. Barbieri "Calibration of quantum sensors by neural networks" Phys. Rev. Letters, 123, 230502, 2019 **[as corresponding author]**

[22] V. Cimini, M. Mellini, G. Rampioni, M. Sbroscia, L. Leoni, M. Barbieri, and **I. Gianani** , "Adaptive Tracking of Enzymatic Reactions with Quantum Light " Optics Express, 27, 35245, 2019 - **Selected as Editor's Pick - Press release OSA and ANSA [as corresponding author]**

[21] V.Cimini, I. Gianani, M. Sbroscia, J. Sperling, and M. Barbieri "Measuring Coherence of Quantum Measurements", Physical Review Research 1, 033020, 2019

[20] M. M. Feyles, L. Mancino, M. Sbroscia, I. Gianani, M. Barbieri "Dynamical role of quantum signatures in quantum thermometry", Physical Review A 99 (6), 062114, 2019

[19] V.Cimini, **I. Gianani,** L. Ruggiero, T. Gasperi, M. Sbroscia, E. Roccia, D. Tofani, F. Bruni, M. A. Ricci, M. Barbieri "Quantum sensors for dynamical tracking of chemical processes", Phys. Rev. A 99, 053817, 2019 **[as corresponding author]**

[18] V. Cavina, L. Mancino, A. De Pasquale, I. Gianani, M. Sbroscia, R. I. Booth, E.Roccia, R. Raimondi, V. Giovannetti, M. Barbieri, "Bridging thermodynamics and metrology in non-equilibrium Quantum Thermometry" Phys. Rev. A, 98, 050101, 2018.

[17] L. Mancino, V. Cavina, A. De Pasquale, M. Sbroscia, R. I. Booth, E. Roccia, I. Gianani, V. Giovannetti, M. Barbieri, "Geometrical bounds on irreversibility in open quantum systems" Phys. Rev. Lett. 121, 160602, 2018. - **Editors' suggestion**

[16] E. Roccia, V. Cimini, M. Sbroscia, I.Gianani, L. Ruggiero, L. Mancino, M. G Genoni, M. A. Ricci, M. Barbieri. "Multiparameter approach to quantum phase estimation with limited visibility", Optica, 5, 10, 1171-1176, 2018.

[15] M. Sbroscia, I. Gianani, E. Roccia, V. Cimini, L. Mancino, P. Aloe, M. Barbieri "Assessing frequency correlation through a distinguishability measurement" Optics Letters, 43 ,16, 4045-4048, 2018

[14] **I. Gianani,** E. Polino, M. Sbroscia, A. S. Rab, E. Roccia, L. Mancino, N. Spagnolo, M. Barbieri, F. Sciarrino, "Hong–Ou–Mandel control through spectral shaping" Journal of Optics, 20, 8, 2018 **- Selected as Paper of the Week. [as corresponding author]**

[13] L. Mancino, M. Sbroscia, E. Roccia, I. Gianani, F.Somma, P. Mataloni, M. Paternostro, M. Barbieri. " The entropic cost of quantum generalized measurements", NPJQI 4, 20, 2018

[12] L. Mancino, M. Sbroscia, E. Roccia, I. Gianani, V.Cimini, M. Paternostro, M. Barbieri. "Information-reality complementarity in photonic weak measurements", Physical Review A 97(6),062108, 2018

[11] M. Sbroscia, I. Gianani, L. Mancino, E.Roccia, Z. Huang, L. Maccone, C. Macchiavello, M. Barbieri " Experimental ancilla-assisted phase-estimation in a noisy channel", Physical Review A 97(3),032305, 2018

[10] V. Ansari, E. Roccia, M. Santandrea, M. Doostdar Kejdehi, C. Eigner, L. Padberg, I. Gianani, M. Sbroscia, J. M. Donohue, L. Mancino, M. Barbieri, C. Silberhorn "Heralded generation of high-purity ultrashort single photons in arbitrary temporal shapes", Optics Express 26(3), pp. 2764-2774, 2018

[9] E. Roccia, M. G. Genoni, L. Mancino, I. Gianani, M. Barbieri, M. Sbroscia. "Monitoring dispersive samples with single photons: the role of frequency correlations", Quantum Measurements and Quantum Metrology, 4, 1,64–69, 2017

[8] E. Roccia, I. Gianani, L. Mancino, M. Sbroscia, F. Somma, M. G. Genoni, M. Barbieri, "Entangling measurements for multiparameter estimation with two qubits" Quantum Science and Technology, 3, 1, 2017

[7] M. Barbieri, E. Roccia, L. Mancino, M. Sbroscia, I. Gianani, and F. Sciarrino "What Hong-Ou-Mandel interference says on two-photon frequency entanglement" Scientific Reports 7, 7247, 2017

[6] E. Roccia, I. Gianani, L. Mancino, M. Sbroscia, I. Miatka, F. Somma, and M. Barbieri "Experimental method for measuring classical negativity of generic beam shapes", Journal of Optics, Vol. 19, N. 5, 2017.

[5] L. Mancino, M. Sbroscia, I. Gianani, E. Roccia, and M. Barbieri "Quantum simulation of single-qubit thermometry using linear optics" Phys. Rev. Lett. 118, 130502, 2017.

[4] R. McCracken, I. Gianani, A, Wyatt, D. T. Reyd, "Multi-color carrier-envelope-phase stabilization for high-repetition-rate multi-pulse coherent synthesis.", Optics Letters, Vol. 40 No 7, pp 1208-12011, 2015.

[3] C. Bourassin-Bouchet, M. Mang, I. Gianani, I. A. Walmsley,, "Mutual interferometric characterization of a pair of independent electric fields" Optics Letters, Vol. 38, Issue 24, pp. 5299-5302, 2013. - **Selected as Spotlights on Optics.**

[2] M. Lucamarini, G. Vallone, I. Gianani, P. Mataloni, and G. Di Giuseppe, "Device-independent entanglement-based Bennett 1992 protocol" Physical Review A 86, 032325, 2012.

[1] G. Vallone, I. Gianani, E. B. Inostroza, C. Saavedra, G. Lima, A. Cabello, and P. Mataloni, "Testing Hardy's nonlocality proof with genuine energy-time entanglement" Physical Review A 83, 042105, 2011

PEER-REVIEWED CONFERENCE PROCEEDINGS

[13] V. Cimini, E. Polino, M. Valeri, I. Gianani, N. Spagnolo, G. Corrielli, A. Crespi, R. Osellame, M. Barbieri, F. Sciarrino "Single-photon Calibration of an Integrated Multiarm Interferometer via Neural Netowrks", Quantum Information and Measurement, F2B.2, 2021

[12] M. Valeri, E. Polino, D. Poderini, N. Spagnolo, F. Sciarrino, I. Gianani, G. Corrielli, A.Crespi, R. Osellame, "Adaptive two-phase estimation on a photonic integrated device", Quantum Information and Measurement, Tu2A. 5, 2021

[11] E. Polino, F. Sciarrino, M. Valeri, N. Spagnolo, R. Osellame, A. Crespi, I. Gianani, G. Corrielli, D. Poderini, R. Silvestri, M. Riva, "Quantum multiphase estimation in an integrated photonic circuit", Bulletin of the American Physical Society, 2021.

[10] A. Suparano, I. Gianani, T. Giordani, N. Spagnolo, K. Pinker, U. Klemm, D. Gorpas, V. Ntziachristos, N. Biton, J. Kupferman, S. Arnon, F. Sciarrino, " Characterization of the transmission of structured light

in scattering media", Proc. SPIE 11646, Polarized Light and Optical Angular Momentum for Biomedical Diagnostics; 116460N, 2021.

[9] M. Valeri, E. Polino, M. Riva, R. Silvestri, D. Poderini, I. Gianani, G. Corrielli, A. Crespi, R. Osellame, N. Spagnolo, F. Sciarrino, "Quantum two-phase estimation inside a photonic integrated device", 24th IMEKO TC4 International Symposium and 22nd International Workshop on ADC and DAC Modelling and Testing, 281-285, 2020

[8] V Cimini, L Ruggiero, I Gianani, M Sbroscia, T Gasperi, E Roccia, D. Tofani, F. Bruni, M. A. Ricci, M. Barbieri, "Multiparameter Approach to Dynamic Quantum Phase Estimation", Multidisciplinary Digital Publishing Institute Proceedings 12 (1), 55, 2019

[7] V.Cimini, I. Gianani, L. Ruggiero, T. Gasperi, M. Sbroscia, E. Roccia, D. Tofani, F. Bruni, M. A. Ricci, M. Barbieri "Use of optical quantum sensors to study chemical processes" The European Conference on Lasers and Electro-Optics, jsv 2 4 , 2019

[6] V.Cimini, I. Gianani, L. Ruggiero, T. Gasperi, M. Sbroscia, E. Roccia, D.Tofani, F.Bruni, M.A. Ricci, M. Barbieri "Multiparameter quantum tracking of optical activity" CLEO: QELS Fundamental Science, JW2A. 116, 2019.

[5] V.Cimini, I. Gianani, L. Ruggiero, T. Gasperi, M. Sbroscia, E. Roccia, D. Tofani, F. Bruni, M. A. Ricci, M. Barbieri "Quantum sensors for dynamical tracking of chemical processes" Quantum Information and Measurement, T5A. 33, 2019.

[4] L. Mancino, V. Cavina, A. De Pasquale, M. M. Feyles, M. Sbroscia, I. Gianani, E. Roccia, R. I. Booth, R. Raimondi, V. Giovannetti, M. Barbieri "Non-equilibrium quantum thermometry" Quantum Information and Measurement , S4B. 6, 2019.

[3] I. Gianani "Robust reconstruction of the joint spectral phase of two photons" Quantum Information and Measurement, S1A. 4, 2019.

[2] P.N. Anderson, F. Wiegandt, D. J. Treacher, M. M. Mang, I. Gianani, A. Schiavi, D. T. Lloyd, K. O'Keeffe, S. M. Hooker and I. A Walmsley "Blind digital holographic microscopy" Proc. SPIE 10127, Practical Holography XXXI: Materials and Applications, 101270H (February 15, 2017).

[1] M. M. Mang, C. Bourassin-Bouchet, I. Gianani, and I. A. Walmsley, "Mutual Interferometric Characterization of Electric-fields", in Frontiers in Optics 2013, I. Kang, D. Reitze, N. Alic, and D. Hagan, eds., OSA Technical Digest (online) (Optical Society of America, 2013), paper FTu4F.2.

BOOKS CHAPTERS

[1] L. Mancino, M.A. Ciampini, M.D. Vidrighin, M. Sbroscia, I. Gianani and M. Barbieri, "Maxwell's Demon in Photonic Systems - in Thermodinamics in the Quantum Regime", Eds. F. Binder, L.A. Correa, C. Gogolin, J. Anders and G. Adesso, Springer (2019)

THESIS PUBLICATIONS

[1] I. Gianani "Characterisation of ultrashort pulses" (DPhil thesis). University of Oxford, 2018 Available at ORA **https://tinyurl.com/thesisIG**

PRE-PRINTS

[P5] A Chiuri, M Barbieri, I Venditti, F Angelini, C Battocchio, MGA Paris, **I. Gianani,** "Fast remote spectral discrimination through ghost spectrometry", arXiv:2303.15120

[P4] C. Benedetti, **I. Gianani,** "Identifying network topologies via quantum walk distributions", arXiv:2301.13842

[P3] **I Gianani**, S Gentilini, I Venditti, C Battocchio, N Ghofraniha, M Barbieri "Coexistence of local and nonlocal shock waves in nanomaterials", arXiv:2211.06341

[P2] **I Gianani**, A Belenchia, S Gherardini, V Berardi, M Barbieri, M Paternostro "Diagnostics of quantum-gate coherences via end-point-measurement statistics", arXiv:2209.02049

[P1] **I. Gianani,** C. Bourassin-Bouchet, P.N. Anderson, M.M. Mang, A.S. Wyatt, M. Barbieri, and I.A. Walmsley, "Spectral-gap immune characterisation of electric fields", arXiv:1612.06937

REFERENCES

Prof. Paolo Mataloni, Dipartimento di Fisica, Sapienza Università di Roma, P.le Aldo Moro 2, 00185 Roma, Italy. Email: paolo.mataloni@uniroma1.it

Prof. Ian A. Walmsley FRS, Provost of Imperial College London, London, UK. Email: ian.walmsley@imperial.ac.uk

Prof. Marco Barbieri, Dipartimento di Scienze, Università degli studi Roma Tre, Via della vasca navale 84, 00146 Roma, Italy. Email: marco.barbieri@uniroma3.it

Prof. Fabio Sciarrino, Dipartimento di Fisica, Sapienza Università di Roma, P.le Aldo Moro 2, 00185 Roma, Italy. Email: fabio.sciarrino@uniroma1.it