Curriculum Dr. Ilaria Gianani

Researcher unique identifiers:
ORCID: 0000-0002-0674-767X
Scholar: https://tinyurl.com/igscholar
Scopus: 43761981300

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

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