

NICOLO' SPAGNOLO
Curriculum Vitae
ai fini della pubblicazione

Rome, 09/10/2019

Part I – General Information

Full Name	Nicolò Spagnolo
E-mail	nicolo.spagnolo@uniroma1.it
Spoken Languages	Italian (mother language), English

Part II – Education

Type	Year	Institution	Notes (Degree, Experience,...)
University graduation	2006	Sapienza Università di Roma	Laurea Triennale in Fisica, 110/110 con lode
University graduation	2008	Sapienza Università di Roma	Laurea Specialistica in Fisica, 110/110 con lode
PhD	2012	Università degli Studi di Roma Tre	Dottorato di Ricerca in Scienze Fisiche della Materia, Giudizio: Eccellente

Part III – Appointments

IIIA – Academic Appointments

Start	End	Institution	Position
01/11/08	31/10/11	Università degli Studi di Roma Tre	PhD Student, XXIV Ciclo, Scienze Fisiche della Materia
01/11/11	31/10/12	Sapienza Università di Roma	Research Fellowship (Assegno di Ricerca): “Hybrid optical technologies for quantum information processing”, Resp. Scientifico Prof. Fabio Sciarrino
01/11/12	31/10/13	Sapienza Università di Roma	Research Fellowship (Assegno di Ricerca): “Informazione quantistica sperimentale con il momento angolare orbitale della luce”, Resp. Scientifico Prof. Fabio Sciarrino
01/11/13	31/10/15	Sapienza Università di Roma	Research Fellowship (Assegno di Ricerca): “Informazione quantistica sperimentale con fotonica integrata”, Resp. Scientifico Prof. Fabio Sciarrino

01/11/15	31/10/16	Sapienza Università di Roma	Research Fellowship (Assegno di Ricerca): “Informazione quantistica sperimentale con fotonica integrata” (RINNOVO), Resp. Scientifico Prof. Fabio Sciarrino
01/11/16	31/10/19	Sapienza Università di Roma	Ricercatore a tempo determinato Tipologia A, presso Dipartimento di Fisica. Programma di Ricerca: “Simulazione quantistica con Fotonica integrata”, SC: 02/B1, SSD: FIS/03.

IIIB – Other Appointments

Start	End	Institution	Position
05/01/10	05/03/10	Institut d'Optique Graduate School and Laboratoire Charles Fabry, Palaiseau	Visiting Student/Scientist

Part IV – Teaching experience

Year	Institution	Lecture/Course
2011/2012	Sapienza Università di Roma	Assistant to Course: “Laboratorio di Meccanica”, Prof. Cesare Cametti, A.A. 2011/2012, II semestre, Corso di Laurea Triennale in Fisica, Sapienza Università di Roma.
2012/2013	Sapienza Università di Roma	Assistant to Course: “Elettromagnetismo”, Prof. Fulvio Ricci, A.A. 2012/2013, II semestre, Corso di Laurea Triennale in Fisica, Sapienza Università di Roma.
2014/2015	Sapienza Università di Roma	Assistant to Course: “Laboratorio di Meccanica”, Prof. Fabio Sciarrino, A.A. 2014/2015, II semestre, Corso di Laurea Triennale in Fisica, Sapienza Università di Roma.
2015/2016	Sapienza Università di Roma	Assistant to Course: “Laboratorio di Meccanica”, Prof. Fabio Sciarrino, A.A. 2015/2016, II semestre, Corso di Laurea Triennale in Fisica, Sapienza Università di Roma.
2016/2017	Sapienza Università di Roma	- Co-Docente: “Ottica e Laboratorio”, Prof. Antonio Polimeni, A.A. 2016/2017, II semestre, Corso di Laurea Triennale in Fisica, Sapienza Università di Roma. Responsible for: 3 CFU

		- Co-Docente: “Ottica e Laboratorio”, Prof. Fabio Sciarrino, A.A. 2016/2017, II semestre, Corso di Laurea Triennale in Fisica, Sapienza Università di Roma. Responsible for: 3 CFU
2017/2018	Sapienza Università di Roma	- Co-Docente: “Ottica e Laboratorio”, Prof. Antonio Polimeni, A.A. 2017/2018, II semestre, Corso di Laurea Triennale in Fisica, Sapienza Università di Roma. Responsible for: 3 CFU
		- Co-Docente: “Ottica e Laboratorio”, Prof. Fabio Sciarrino, A.A. 2017/2018, II semestre, Corso di Laurea Triennale in Fisica, Sapienza Università di Roma. Responsible for: 3 CFU
2018/2019	Sapienza Università di Roma	- Co-Docente: “Ottica e Laboratorio”, Prof. Antonio Polimeni, A.A. 2018/2019, II semestre, Corso di Laurea Triennale in Fisica, Sapienza Università di Roma. Responsible for: 3 CFU
		- Co-Docente: “Ottica e Laboratorio”, Prof. Fabio Sciarrino, A.A. 2018/2019, II semestre, Corso di Laurea Triennale in Fisica, Sapienza Università di Roma. Responsible for: 3 CFU
2019/2020	Sapienza Università di Roma	(Scheduled) Docente: “Fisica”, A.A. 2019/2020, II Semestre, Corso di Laurea Triennale in Science Naturali, Sapienza Università di Roma. 6 CFU

Seminars

- Invited Seminar to Course for PhD student in Quantum Optics at Università degli Studi di Roma Tre, 12/02/2016.
- Seminars to Course: “Ottica nonlineare e quantistica”, Prof. Paolo Mataloni, A.A. 2011/2012, A.A. 2012/2013, II semestre, Corso di Laurea Triennale in Fisica, Sapienza Università di Roma.
- Seminars to Course: “Informazione e Computazione Quantistica”, Prof. Fabio Sciarrino, A.A. 2011/2012, A.A. 2012/2013, A.A. 2013/2014, A.A. 2014/2015, I semestre, Corso di Laurea Magistrale in Fisica, Sapienza Università di Roma.

Supervision activity

- Co-supervision of 7 master students: Niko Viggianiello, Valerio Gili, Ludovico Latmiral, Emanuele Polino, Alessandro Lumino, Marco Romano, Francesco Hoch.
- Supervision and co-supervision of 5 bachelor students: Michele Guerrieri, Nicola Bonardo, Lavinia Rossi Mori, Mattia Trapella, Alessandro Verdini (current)

Other teaching activities

- Teaching activity at Master Class di Ottica 2013 and 2014, within project PLS (Piano Lauree Scientifiche).

Outreach activities

- Youtube videos on research highlights for the general public:
- Highlight video on paper: Nature Photonics 8, 615 (2014).

<https://www.youtube.com/watch?v=jjodj5b8Z1E>

- Highlight video on paper: Science Advances 1, e1400255 (2015).

<https://www.youtube.com/watch?v=VPChHtm5ifs>

- Highlight video on paper: Nature Communications 7, 10469 (2016).

<https://www.youtube.com/watch?v=75AV6pOIVLM>

- Highlight video on paper: Nature Photonics 12, 173-178 (2018).

<https://www.youtube.com/watch?v=3ooc8vFyiAQ>

Part V – Institutional activities

- Responsible for video recording of the Lectures of Cattedra Enrico Fermi:

- A. A. 2013-2014, “Presente e futuro della fisica delle particelle fondamentali”, Prof. Luciano Maiani, Sapienza Università di Roma.

- A. A. 2016-2017, “Tematiche di Fisica della Materia Condensata”, Prof. Roberto Car, Sapienza Università di Roma.

- A. A. 2017-2018, “Ricerca Scientifica con la luce di sincrotrone”, Prof. Francesco Sette, Sapienza Università di Roma.

- A. A. 2018-2019, “Fisica degli esopianeti”, Prof.ssa Giovanna Tinetti, Sapienza Università di Roma.

- Member of “Commissione per i prodotti della ricerca”, Physics Department, Sapienza Università di Roma from June 2019.

Part VI - Society memberships, Awards and Honors

Year	Title
2011-2013	Member of Società Italiana di Fisica and European Physical Society
2013	Poster Award at conference ICOAM 2013, Glasgow, UK, 3-5 June 2013. Poster title: “Two-photon quantum state joining into one”
2013	Poster Award at conference QIPC 2013, Firenze Italy, 30 June-5 July 2013. Poster title: “Experimental boson sampling”

Part VII – Responsibility Roles and Participation to European Projects

Year	Title and Program	Role	Grant value
2012-2013	FET-Open Program, within the 7th Framework Programme of the European Commission under Grant no. 255914, PHORBITECH, Coordinator of the Sapienza research unit: Prof. Fabio Sciarrino.	Participation to the project as Investigator in the Sapienza Research Unit and as Task Leader.	Euro 350000 (Roma unit)
2013-2017	European Research Council (ERC)-Starting Grant 3D-QUEST, 3D-Quantum Integrated Optical Simulation, grant agreement no. 307783, http://www.3dquest.eu . Principal investigator: Prof. Fabio Sciarrino.	Participation to the project as Investigator.	Euro 1474800
2015-2018	H2020-FETPROACT-2014 Grant QUCHIP, Quantum Simulation on a	Participation to the project as Investigator in the Sapienza	Euro 431250 (Roma unit)

	Photonic Chip, grant agreement no. 641039, http://www.quchip.eu . Principal Investigator: Prof. Fabio Sciarrino	Research Unit and as Leader of Workpackage WP2: "Boson Sampling"	
2017-	ERC Advanced Grant 2015 PHOSPHOR (Photonics of Spin-Orbit Optical Phenomena), Principal Investigator: Prof. Lorenzo Marrucci. PI of Rome Unit: Prof. Fabio Sciarrino.	Participation to the project as Investigator in the Sapienza Research Unit	Euro 190000 (Roma unit)
2018-	ERC Advanced Grant 2015 CAPABLE (Composite integrated photonic platform by femtosecond laser micromachining), Principal Investigator: Prof. Roberto Osellame. PI of Rome Unit: Prof. Fabio Sciarrino.	Participation to the project as Investigator in the Sapienza Research Unit	Euro 300000 (Roma unit)

Part VIII – Funding

2014	Efficient photon source for telecom wavelength Bando di Ricerca Scientifica Anno 2014, Progetti di Avvio alla Ricerca, Tipologia B, Sapienza Università di Roma	Principal Investigator	Euro 2500
2017-2019	FFABR 2017 Fondo di Finanziamento delle attività di Base di Ricerca 2017, ANVUR	Principal Investigator	Euro 3000
2018-	SINFONIA – Trattamento Sicuro dei dati mediante l'INFormazione con singoli fotoNI A richiesta Lazio Innova, Regione Lazio. Coordinator: Prof. Antonio Polimeni	Co-Investigator	Euro 149802,60
2019-	Multiphase estimation in multiarm interferometer Bando di Ateneo "Progetti di Ricerca (Piccoli, Medi) – Progetti Piccoli", Sapienza Università di Roma	Principal Investigator	Euro 4000

Part IX – Research Activities

Keywords

Quantum information
Integrated photonics
Quantum Simulation
Quantum Optics
Quantum Sensing

Brief Description

The research activity of Nicolò Spagnolo focused on the experimental implementation of quantum information and quantum simulations protocols with different photonic platforms. The research efforts during the PhD period focused on the generation, manipulation, and characterization of photonic quantum states, for their applications in fundamental tests of quantum mechanics and in quantum information protocols. The generation of multiphoton states through the process of optical parametric amplification has been investigated, in particular by showing their capabilities to increase the robustness to losses of phase estimation protocols.

After the PhD period, research efforts have been devoted to hybrid optical systems, aimed at exploiting different degrees of freedom of the light such as polarization, orbital angular momentum, and path. A tool to enhance the estimation of angular rotation by employing orbital angular momentum states has been demonstrated. Recently, the implementation of multiphoton experiments in integrated optical circuits has been addressed. This included several experimental implementations of Boson Sampling instances, and of related validation protocols. Furthermore, the application of integrated multiport splitters in the context of phase estimation has been analyzed both theoretically and experimental, for single-parameter estimation and for the novel field of quantum multiparameter estimation. Recently, research effort has been devoted to the application of machine learning for quantum information experiments, including device certification, quantum state engineering, and adaptive control of quantum systems for quantum metrology.

Technical skills

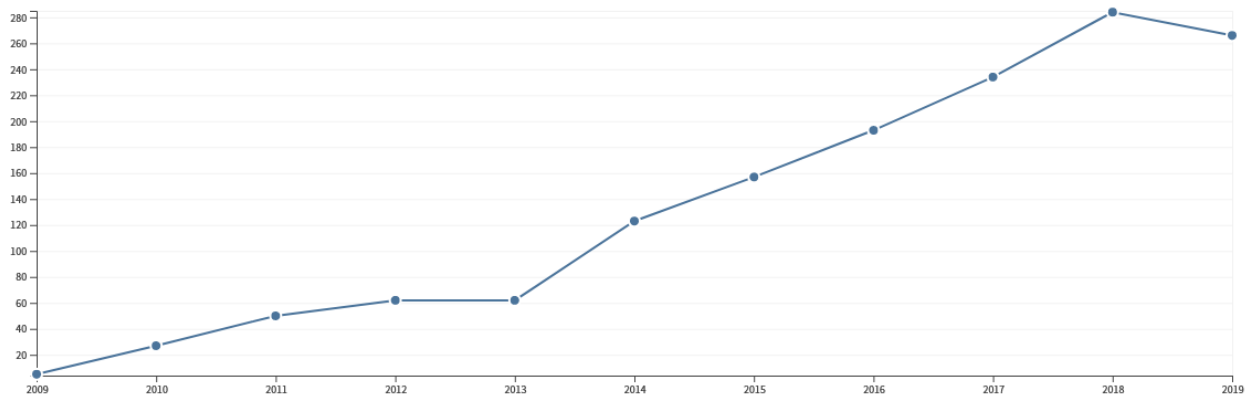
- Strong expertise in experimental physics
- Strong expertise in theoretical and experimental quantum optics.
- Strong expertise in theoretical and experimental nonlinear optics (parametric down-conversion, second harmonic generation).
- Strong expertise in theoretical and experimental quantum information.
- Strong expertise in laser physics (theory and application to quantum optics and quantum information experiments)
- Strong expertise in integrated quantum photonics for quantum optics and quantum information experiments
- Strong expertise in scientific programming with several software platforms (Wolfram Mathematica, Matlab, Python, C, C++)

Part X – Summary of Scientific Achievements

Overall Scientific Production

Data Base	Web Of Science	Scopus	Google Scholar
Total number of publications	68	92	108
Total Citations	1463	1555	2435
Average Citations per Product	21.51	16.90	22.55
Hirsch (H) index	19	19	25

Citation summary from Web Of Science:



Part XI– Referee and Editorial, Activity

- Referee for high impact international journals, including:
Nature Photonics, Nature Physics, Nature Communications, Optica, Physical Review Letters, Physical Review A, Quantum Science and Technology, Scientific Reports, Entropy.
- **Guest Editor** of Special Issue “Quantum Information processing” on International Journal *Entropy* (MDPI, IF: 2.305): https://www.mdpi.com/journal/entropy/special_issues/QIP

Part XII– Abilitazione Scientifica Nazionale

Abilitazione Scientifica Nazionale (ASN) come professore di II fascia.
Tornata 2016-2018, Quarto Quadrimestre.
From 30/03/2018 to 30/03/2024.

Part XIII– Presentations at conference and meetings

Invited Talks: 8

- 1) Conference Quantum 2019, From Foundations of Quantum Mechanics to Quantum Information and Quantum Metrology & Sensing, Turin, Italy, 26 May-1 June 2019.
Invited contribution: “Validation of multiphoton interference via machine learning”
- 12) ESA Workshop Quantum Processing of Big Data: from Quantum computing to Earth observation, Rome, Italy, 3 April 2019.
Invited contribution: “Integrated photonic platform for quantum machine learning”
- 13) Workshop Quantum Technologies in Optronics, Toulouse, France, 12 March 2019.
Invited contribution: “Integrated photonic platform for quantum multiphase estimation”.

- I4) Workshop Quantum Photonic Technologies for Space, Bern, Switzerland, 8-10 October 2018.
Invited contribution: "Integrated quantum photonics for manipulation of photonic quantum states."
- I5) 11th Italian Quantum Information Science Conference, Catania, Italy, 17-20 September 2018.
Invited contribution: "Machine Learning for Quantum Metrology".
- I6) 10th Italian Quantum Information Science Conference, Florence, Italy, 12-15 September 2017.
Invited contribution: "Validation of Boson Sampling experiments".
- I7) Conference IQIS 2014, Salerno, Italy, 15-19 September 2014.
Invited contribution: "Efficient experimental validation of photonic boson sampling".
- I8) International Workshop on Singularities and Topological Structures of Light, ICTP, Trieste, Italy, 8-12 July 2013.
Invited contribution: "The Photonics gear: from alignment free quantum communication to super-sensitive quantum correlations".

Contributed Talks: 16

- C1) Conference CLEO Europe/EQEC 2019, Munich, Germany, 23-27 June 2019.
Oral presentation: "Experimental multiphase estimation in an integrated multi-arm interferometer".
- C2) Conference QTech 2018, Paris, France, 5-7 September 2018.
Oral presentation: "Phase estimation enhanced by machine learning"
- C3) Conference Quantum Simulation and Computation, Bilbao, Spain, 12-16 February 2018.
Oral presentation: "Integrated Photonic quantum simulation of spin chain dynamics"
- C4) Conference CLEO Europe/EQEC 2017, Munich, Germany, 25-29 June 2017.
Oral presentation: "Quantum simulation of spin chain dynamics via integrated photonics".
- C5) Conference CLEO Europe/EQEC 2015, Munich, Germany, 21-25 June 2015.
Oral presentation: "Validation of boson sampling experiments".
- C6) Conference CLEO Europe/EQEC 2015, Munich, Germany, 21-25 June 2015.
Oral presentation: "Photonic gears for ultra-sensitive angular measurements".
- C7) PICQUE Workshop in Integrated Quantum Photonics, Oxford, United Kingdom, 7-9 June 2015.
Oral presentation: "Experimental Boson Sampling with integrated photonics".
- C8) Conference CEWQO 2014, Brussels, Belgium, 23-27 June 2014.
Oral presentation: "Experimental Boson Sampling with integrated photonics".
- C9) Workshop on Quantum Simulations, Centro de Ciencias de Benasque, Benasque, Spain, 29 September- 4 October 2013.
Oral presentation: "Experimental Boson Sampling".
- C10) Phorbitech 3rd Annual Meeting, Glasgow, UK, 6 June 2013.
Oral presentation: "Joining the quantum state of two photons into one"
- C11) CLEO Europe - IQEC 2013, Munich, Germany, 12-16 May 2013.
Oral presentation: "Integrated quantum interferometry with three-dimensional geometry".
- C12) Phorbitech 2nd Review Meeting, Napoli, Italy, 23 November 2012.
Oral presentation: "Quantum state merging in photons"
- C13) XCVII Congresso Nazionale della Società Italiana di Fisica, L'Aquila, Italy, 26-30 September 2011.
Oral presentation: "Hybrid techniques for witnessing entanglement in a microscopic-macroscopic system".
- C14) Conference CLEO Europe/EQEC 2011, ICM Centre, Munich, Germany, 22-26 May 2011.
Oral presentation: "Detecting nonlocality in macroscopic systems".
- C15) Conferenza Fotonica 2011, Palazzo Ducale, Genova, Italy, 9-11 May 2011.

Oral presentation: "Enhanced resolution in lossy phase estimation by optical parametric amplification".

C16) Spie Optics+Optoelectronics, Prague Congress Center, Prague, Czech Republic, 18-21 April 2011.

Oral presentation: "Enhanced resolution in lossy phase estimation by optical parametric amplification".

Poster Presentations: 13

Part XIV– Conference and event organization

- Member of the local Organizing Committee for conference IQIS 2016 9th Italian Quantum Information Science Conference, Rome, 20-23 September 2016.
- Member of the Organizing Committee for European project QUCHIP meetings.
- Member of the Organizing Committee for International conference **Quantum Information and Measurement (QIM) V: Quantum Technologies**, Rome, 4-6 April 2019 [approximately 400 participants].
- Member of the Organizing Committee for public outreach event **Amaldi Research Center Open Day - Quantum Technologies**, Rome, 22 November 2019, Physics Department, Sapienza Università di Roma.

Part XV– Patents

Coauthor of European Patent: "Ultra-sensitive photonic tiltmeter utilizing the orbital angular momentum of the light, and relevant angular measurement method" V. D'Ambrosio, N. Spagnolo, L. Del Re, S. Slussarenko, L. Marrucci, Y. Ling, C. Kwek, S. Walborn, L. Aolita, F. Sciarrino (2013) [application no. EP 2811258 A1].

Part XVI– Full List of Publications

Refereed Journal: 55

- [1] N. Spagnolo, C. Vitelli, S. Giacomini, F. Sciarrino, and F. De Martini, *Polarization preserving ultra-fast optical shutter for quantum information processing*, Opt. Expr. **16**, 17609 (2008).
- [2] F. De Martini, F. Sciarrino, N. Spagnolo, C. Vitelli, and F. S. Cataliotti, *Macroscopic quantum entanglement in light reflection from Bose-Einstein condensates*, Int. Journ. Quant. Inform. **7**, 171 (2009).
- [3] C. Vitelli, N. Spagnolo, F. Sciarrino, and F. De Martini, *Amplification of polarization NOON states*, JOSA B **26**, 892 (2009).
- [4] F. De Martini, F. Sciarrino, and N. Spagnolo, *Decoherence, environment-induced superselection, and classicality of a macroscopic quantum superposition generated by quantum cloning*, Phys. Rev. A **79**, 052305 (2009).
- [5] F. De Martini, F. Sciarrino, and N. Spagnolo, *Anomalous Lack of Decoherence of the Macroscopic Quantum Superpositions based on Phase-Covariant Quantum Cloning*, Phys. Rev. Lett. **103**, 100501 (2009).
- [6] N. Spagnolo, C. Vitelli, T. De Angelis, F. Sciarrino, and F. De Martini, *Wigner function theory and decoherence of the quantum-injected optical parametric amplifier*, Phys. Rev. A **80**, 032318 (2009).
- [7] C. Vitelli, N. Spagnolo, L. Toffoli, F. Sciarrino, and F. De Martini, *Quantum-to-classical transition via fuzzy measurements on high gain spontaneous parametric down-conversion*, Phys. Rev. A **81**, 032123 (2010).

- [8] F. De Martini, F. Sciarrino, N. Spagnolo, and C. Vitelli, *Generation of Highly Resilient to Decoherence Macroscopic Quantum Superpositions via Phase-covariant Quantum Cloning*, Found. Phys. **41**, 492 (2010).
- [9] C. Vitelli, N. Spagnolo, L. Toffoli, F. Sciarrino, F. De Martini, *Enhanced Resolution of Lossy Interferometry by Coherent Amplification of Single Photons*, Phys. Rev. Lett. **105**, 113602 (2010).
- [10] N. Spagnolo, F. Sciarrino, F. De Martini, *Resilience to decoherence of the macroscopic quantum superpositions generated by universally covariant optimal quantum cloning*, Phys. Rev. A **82**, 032325 (2010).
- [11] N. Spagnolo, C. Vitelli, F. Sciarrino, and F. De Martini, *Entanglement criteria for microscopic-macroscopic systems*, Phys. Rev. A **82**, 052101 (2010).
- [12] C. Vitelli, N. Spagnolo, F. Sciarrino, and F. De Martini, *Measurement-induced quantum operations on multiphoton states*, Phys. Rev. A **82**, 062319 (2010).
- [13] M. Barbieri, N. Spagnolo, M. G. Genoni, F. Ferreyrol, R. Blandino, M. G. A. Paris, P. Grangier, and R. Tualle-Brouri, *Non-Gaussianity of quantum states: An experimental test on single-photon-added coherent states*, Phys. Rev. A **82**, 063833 (2010).
- [14] F. Caruso, N. Spagnolo, C. Vitelli, F. Sciarrino, and M. B. Plenio, *Simulation of noise-assisted transport via optical cavity networks*, Phys. Rev. A **83**, 013811 (2011).
- [15] N. Spagnolo, C. Vitelli, M. Paternostro, F. De Martini, and F. Sciarrino, *Hybrid methods for witnessing entanglement in a microscopic-macroscopic system*, Phys. Rev. A **84**, 032102 (2011).
- [16] C. Vitelli, M. Terra-Cunha, N. Spagnolo, F. De Martini, F. Sciarrino, *Continuous-variable nonlocality test performed over a multiphoton quantum state*, Phys. Rev. A **85**, 012104 (2012).
- [17] N. Spagnolo, C. Vitelli, V. G. Lucivero, V. Giovannetti, L. Maccone, F. Sciarrino, *Phase Estimation via Quantum Interferometry for Noisy Detectors*, Phys. Rev. Lett. **108**, 233602 (2012).
- [18] N. Spagnolo, L. Aparo, C. Vitelli, A. Crespi, R. Ramponi, R. Osellame, P. Mataloni and F. Sciarrino, *Quantum interferometry with three-dimensional geometry*, Sci. Rep. **2**, 862 (2012).
- [19] F. Ferreyrol, N. Spagnolo, R. Blandino, M. Barbieri, and R. Tualle-Brouri, *Heralded processes on continuous-variable spaces as quantum maps*, Phys. Rev. A **86**, 062327 (2012).
- [20] N. Spagnolo, C. Vitelli, L. Aparo, P. Mataloni, F. Sciarrino, A. Crespi, R. Ramponi, and R. Osellame, *Three-photon bosonic coalescence in an integrated tritter*, Nature Commun. **4**, 1606 (2013).
- [21] C. Vitelli, N. Spagnolo, L. Aparo, F. Sciarrino, E. Santamato and L. Marrucci, *Joining the quantum state of two photons into one*, Nature Photon. **7**, 521 (2013).
- Highlight:** J. Neergaard-Nielsen, Nature Photon. **7**, 512 (2013).
- Press release: <https://www.uniroma1.it/it/node/16541>
- [22] A. Crespi, R. Osellame, R. Ramponi, D. J. Brod, E. F. Galvao, N. Spagnolo, C. Vitelli, E. Maiorino, P. Mataloni, and F. Sciarrino, *Integrated multimode interferometers with arbitrary designs for photonic boson sampling*, Nature Photon. **7**, 545 (2013).
- Highlight:** T. C. Ralph, Nature Photon. **7**, 514 (2013).
- [23] V. D'Ambrosio, N. Spagnolo, L. Del Re, S. Slussarenko, Y. Li, L. C. Kwek, L. Marrucci, S. P. Walborn, L. Aolita, and F. Sciarrino, *Photonic polarization gears for ultra-sensitive angular measurements*, Nature Commun. **4**, 2432 (2013).
- [24] N. Spagnolo, C. Vitelli, L. Sansoni, E. Maiorino, P. Mataloni, F. Sciarrino, D. J. Brod, E. F. Galvão, A. Crespi, R. Ramponi, and R. Osellame, *General Rules for Bosonic Bunching in Multimode Interferometers*, Phys. Rev. Lett. **111**, 130503 (2013).
- [25] E. Passaro, C. Vitelli, N. Spagnolo, F. Sciarrino, E. Santamato, L. Marrucci, *Joining and splitting the quantum state of photons*, Phys. Rev. A **88**, 062321 (2013).
- [26] N. Spagnolo, C. Vitelli, M. Bentivegna, D. J. Brod, A. Crespi, F. Flamini, S. Giacomini, G. Milani, R. Ramponi, P. Mataloni, R. Osellame, E. F. Galvao, and F. Sciarrino, *Experimental validation of photonic boson sampling*, Nature Photon. **8**, 615 (2014).
- Press release: <https://www.uniroma1.it/it/node/17568>

- [27] M. Bentivegna, N. Spagnolo, C. Vitelli, D. J. Brod, A. Crespi, F. Flamini, R. Ramponi, P. Mataloni, R. Osellame, E. F. Galvao, and F. Sciarrino, *Bayesian approach to Boson Sampling validation*, Int. Journ. Quant. Inform. **12**, 1560028 (2014).
- [28] M. Bentivegna, N. Spagnolo, C. Vitelli, F. Flamini, N. Viggianiello, L. Latmiral, P. Mataloni, D. J. Brod, E. F. Galvao, A. Crespi, R. Ramponi, R. Osellame, and F. Sciarrino, *Experimental scattershot boson sampling*, Sci. Adv. **1**, e1400255 (2015).
Press release: <https://www.uniroma1.it/it/node/18608>
- [29] M. Barbieri, N. Spagnolo, F. Ferreyrol, R. Blandino, B. J. Smith, R. Tualle-Bruori, *Qubit-Programmable Operations on Quantum Light Fields*, Sci. Rep. **5**, 15125 (2015).
- [30] F. Flamini, L. Magrini, A. S. Rab, N. Spagnolo, V. D'Ambrosio, P. Mataloni, F. Sciarrino, T. Zandrini, A. Crespi, R. Ramponi, R. Osellame, *Thermally reconfigurable quantum photonic circuits at telecom wavelength by femtosecond laser micromachining*, Light Sci. Appl. **4**, e354 (2015).
Highlight: N. Horiuchi, Nature Photon. **10**, 73 (2016)
- [31] A. Crespi, R. Osellame, R. Ramponi, M. Bentivegna, F. Flamini, N. Spagnolo, N. Viggianiello, L. Innocenti, P. Mataloni, F. Sciarrino, *Suppression law of quantum states in a 3D photonic fast Fourier transform chip*, Nature Commun. **7**, 10469 (2016).
- [32] M. A. Ciampini, N. Spagnolo, C. Vitelli, L. Pezze, A. Smerzi, F. Sciarrino, *Quantum-enhanced multiparameter estimation in multiarm interferometers*, Sci. Rep. **6**, 28881 (2016). [**as corresponding author**]
- [33] L. Latmiral, N. Spagnolo, F. Sciarrino, *Towards quantum supremacy with lossy scattershot boson sampling*, New J. Phys. **18**, 113008 (2016).
- [34] F. Flamini, N. Viggianiello, M. Bentivegna, N. Spagnolo, P. Mataloni, A. Crespi, R. Ramponi, R. Osellame, and F. Sciarrino, *Generalized quantum fast transformations via femtosecond laser writing technique*, Interdisciplinary Information Sciences **23**, 115 (2017).
- [35] L. Pezzè, M. A. Ciampini, N. Spagnolo, P. C. Humphreys, A. Datta, I. A. Walmsley, M. Barbieri, F. Sciarrino, and A. Smerzi, *Optimal Measurements for Simultaneous Quantum Estimation of Multiple Phases*, Phys. Rev. Lett. **119**, 130504 (2017).
Selected as **Editors' suggestion**.
- [36] A. S. Rab, E. Polino, Z.-X. Man, N. Ba An, Y.-J. Xia, N. Spagnolo, R. Lo Franco, F. Sciarrino, *Entanglement of photons in their dual wave-particle nature*, Nature Commun. **8**, 915 (2017).
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Part XVII– Selected Publication

List of the publications selected for the evaluation. For each publication report title, authors, reference data, journal IF (if applicable), citations, press/media release (if any).

1) N. Spagnolo, C. Vitelli, L. Aparo, P. Mataloni, F. Sciarrino, A. Crespi, R. Ramponi, and R. Osellame, “Three-photon bosonic coalescence in an integrated tritter”, Nature Communications 4, 1606 (2013).

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Firma

Nicolò Spagnolo