

# Curriculum Vitae

## PERSONAL INFORMATION

Family name, First name: **Toninelli, Costanza**  
Researcher unique identifiers: Research ID: C-2184-2009, [orcid.org/0000-0002-6843-058X](https://orcid.org/0000-0002-6843-058X),  
SCOPUS AUTHOR ID: 24776990200

Nationality: **Italian**  
Group web site: <http://www.quantumnanophotonics-lab.it>

## CURRENT POSITION

03/11/2011-Present Permanent Researcher (PI)  
National Research Council (CNR)/ National Institute of Optics (INO)  
Associated to LENS, University of Florence (Italy)

## CURRENT RESEARCH INTERESTS

In my lab, we study solid state quantum emitters and in particular organic molecules. In these systems, a strong interaction with light is combined with powerful designing of the chemical structure at the atomic level. **Our vision is to bring the flexibility of organic materials in quantum technologies by integrating isolated molecules in proper photonic platforms.** Addressing single molecules, we realize bright sources of non-classical light states as well as nanoscale sensors of fields, temperature and local defects. We have recently developed novel strategies to efficiently collect indistinguishable photons into single mode optical fibers, that have already been used for the metrological calibration of single photon detectors. Based on our recently-demonstrated technologies for in-situ tuning of the molecular resonance and for the selective coupling to complex photonic structures, we currently target the realization of large single-photon-source arrays. Also, we are developing single photon sources based on single molecules at room temperatures, to be specifically deployed for in-field quantum communications.

## PREVIOUS POSITIONS

01/2009–06/2011 Post-Doctoral Research Associate  
Laboratory of Physical Chemistry, ETH Zürich, (Switzerland)  
(Research Group: Prof. V. Sandoghdar),  
Research Activity: Nanophotonics and Quantum Optics with Single Molecules

2008 Visiting Researcher  
Institut NonLinéaire de Nice, Nice, (France) (Research Group: D. Wilkowski)  
Research Activity: Photonic Hall Effect from a cold atom cloud

02/2007–12/2008 Post-Doctoral Research Associate  
European Laboratory for NonLinear Spectroscopy (LENS), Florence, (Italy)  
Research Activity: Nanophotonics, Complex Systems, Wave Transport

## EDUCATION AND TRAINING

2004–2007 Ph.D. Degree in Physics with Distinction  
University of Florence (Mentor: Prof. D.S. Wiersma), Florence (Italy)

1998–2003 Master degree in Physics (Summa cum Laude)  
University of Florence (Mentor: Prof. G.M.L. Tino), Florence (Italy)

2002 DEA (Ph.D. School) in Quantum Physics

Ecole Normale Supérieure de Paris, Paris (France)

## AWARDS, FELLOWSHIPS

2017	Invited to Interview for the ERC Starting grant 2017
2017	Seal of Excellence in Marie Skłodowska-Curie actions
2011	Caroline von Humboldt prize for excellent young female researcher Humboldt University, Berlin (Germany)
2007	Firenze University Press 2007 (PhD Thesis with high scientific impact)

## STUDENT SUPERVISION

I have the Italian national Professorship “abilitazione”.

03/11/2011-Present	Supervisor of 2 Bachelor, 4 Master, 7 PhD students, 2 Erasmus Mundus PhD Students at LENS and University of Florence, Florence (Italy)
01/2009–06/2011	Co-supervisor of 1 Bachelor student, 1 Master Student, 1 PhD student Laboratory of Physical Chemistry, ETH Zürich, (Switzerland)

## TEACHING ACTIVITIES

2019	Lecturer - Complex Nanophotonics Science Camp (UK 11-14 August 2019)
2018	Lecturer – Varenna summer school “Nanoscale Quantum Optics”, PhD students, Varenna (IT)
2018	Lecturer – ADOPT winter school “Advanced Optics and Photonics”, PhD students, Romme (Sweden)
2017-2023	Seminars during the course by F.S. Cataliotti on Tecnologie Quantistiche, at University of Florence (Italy)
2016	Lecturer – Heraus seminar “Hybrid systems for quantum optics”, PhD students, Physikzentrum Bad Honnef (GE)
2014	Lecturer - Summer school “Quantum Information, Computing and Control”, PhD students, Exeter (UK)
2013	Teaching Assistant - Laboratory course on Advanced Spectroscopy Techniques University of Florence (Italy)
02-07/2010	Teaching Assistant - Spectroscopy Course, 4th year, ETH Zürich (CH)
02-07/2009	Teaching Assistant - Quantum Mechanics Course, 2nd year, ETH Zürich, (CH)

## FUNDED GRANTS

2023 (5 years)	QUINTESSEnCE, ERC-Co grant, (2 MEuro)
2020 (3 years)	SEQUME: Single-and entangled photon sources for quantum metrology; Local PI (1.8 MEuro)
2018 (3 Years)	ORQUID: Organic Quantum Integrated Devices: Coordinator (1.7 MEuro) QuantERA, EU ERANET on Quantum technologies
2018 (3 Years)	SIQUST: Single-photon sources as new quantum standards; Local PI (1.8 MEuro) European Metrology Programme For Innovation And Research EMPIR
2018 (3 Years)	FASPEC: Fibre-Based Planar Antennas for Biosensing and Diagnostics: Local PI (100 kEuro for the PI) Regione Toscana (Italy)
2015 (3 Years)	Intermodal Secure Quantum Communication on Ground and Space: Local PI (30 kEuro for the PI)

2014 (2 Years)	MIUR (Ministry of University and Research, Italy) Atom-Based Nano-Technology: Scientific Coordinator (800 kEuro, out of which 120 kEuro for the PI)
2014 (6 Months)	MIUR (Ministry of University and Research, Italy) Electrical nano-diamond single-photon source (10 kEuro) EU (Nanophotonics for Energy Efficiency, Seed Project): Coordinator
2014 (2 Year)	Graphene-Based nano-position sensor (55 kEuro) Ente cassa di Risparmio di Firenze (Private Foundation)
2012 (6 Months)	OLEIT Organic Light Emitters for Information Transfer (31 kEuro): Coordinator EU (Nanophotonics for Energy Efficiency, Seed Project)

## ORGANIZATION OF SCIENTIFIC MEETINGS

2022	Director of the workshop/school in Erice, Italy: "The foremost photonics 2022"
2021, 2020, 2019, 2017	CLEO committee member
2021	Co-Organizer of the famous Quantum Science Seminars (average 500 followers)
2018	Co-organizer of the Workshop: "Plasmonica" for SIOF, Florence (IT)
2018	International School of Physics "E. Fermi": Nanoscale Quantum Optics
2016	Single-Photon-Single-Spin Meeting – Co-organizer Oxford (GB)
2014	Fermi Colloquia, LENS, University of Florence - Chair, Florence (Italy)
2014	Material Research Society (MRS) - Chair, Boston (USA)
5/12/2008	50 Years of Anderson Localization, Symposium, Chair, Paris (FR)
2006	PhOREMOST Network of Excellence, Organizing Committee, Firenze (Italy)

## PUBLIC OUTREACH

2022	Organizer of the exhibition Speakable and Unspeakable ( <a href="https://qw.ino.cnr.it">https://qw.ino.cnr.it</a> )
2019	Speaker for "Notti di scienza al teatro romano", Lecce (Italy)
2018-2019	Co-Organizer of the Festival "Scienza Estate", Florence (Italy)
2018-2019	CNR local Outreach coordinator
2017	Organizer of the "Festival of Light" for high school students, Florence (Italy)
2015	Organizer of the "Festival of Light", Florence (Italy)
2014	Interview for the Magazine Humboldt Chancengleich, November 2014 (Germany)
2014	Video Documentary for the 90 <sup>th</sup> Anniversary of the CNR (Italy)

## INSTITUTIONAL RESPONSIBILITIES

2022	PhD Thesis Jury Member (I. Palestra), Amolf, Amsterdam (NL)
2021	PhD Thesis Rferee (V. Cimini), University of Roma 3, (It)
2020	Guest Editor for APL
2020	PhD Thesis Jury Member (U. Stella), Politecnico di Torino, (It)
2018	PhD Thesis Jury Member (S. Zhao), Ecole Normale Supérieure Paris Saclais, (Fr)
2018	PhD Thesis Jury Member (K. Schaedler), ICFO, Barcelona (ES)
2016	Scientific evaluator for the ANR, French National Research Agency (FR)
2014	PhD Thesis Jury Member, Karlsruhe Institute of Technology, Karlsruhe (GE)
2014	PhD Thesis Jury Member, Université Pierre et Marie Curie, Paris, (FR)
2012-2014	Organizer of Seminar cycle: Incontri di micro e nano-fotonica, LENS (IT)
2013-2016	Member of the Faculty Committee, University of Florence, (I)
2010-present	Reviewer for ERC Starting Grants, ACS, Nature, OSA publishing groups and Optical Materials journals

## MEMBERSHIPS OF SCIENTIFIC SOCIETIES AND NETWORKS

- 2018-present Member of SIOF, Società Italiana di Ottica e Fotonica
- 2016-present Management Board Member, COST Action Nanoscale Quantum Optics
- 2014-present Member of the Material Research Society

- 2013-2014 Member of the Research Network “Nanophotonics for Energy Efficiency”

## CAREER BREAK

I have two children, born on February 12<sup>th</sup> 2014 and on March 10<sup>th</sup> 2016, respectively. In both cases I was officially on maternity leave (5 months off and 7 months 50% employed each time).

## INVITED PRESENTATIONS

- I have been invited to give plenary seminars and colloquia in many prestigious research institutes and universities, including the ICN2 University in Barcelona (2022), N. Bohr University Copenhagen (2023), the German Transregional Collaborative Research Center “Quantum Cooperativity of Light and Matter” (June 2021), the Humboldt University in Berlin (November 2020), CDT Advanced Lecture - Cambridge Graphene Centre (UK) (2019), TU University of Vienna (2017), the Imperial College (London, UK 2015), ICFO (Barcelona, SP 2013), the Humboldt University (Berlin, GE 2011), the Columbia University (New York 2010).
- I have held invited talk to over 30 international workshops and conferences, including Quantum 2.0 (Denver 2023), the Lavoisier conference: Quantum Emitters in 2D (Nice 2023), DPG conference on solid state (Regensburg 2022), HBSM conf. (Bayreuth 2022), BQIT (Bristol 2020), SPIE Photonics Europe (2020), Frontiers in Optics 2020, “Quantum” (Torino, May 2019), “13TH European Conference On Atoms, Molecules And Photons” (Florence 2019), Workshop on “Quantum Nanophotonics” (Benasque 2019), “Heraus Workshop on Quantum Networks” (Bad Honnef 2018), “Engineering of Quantum emitter properties” (Rome, 2018), SPIE conference San Diego (USA 2017), SCOM (San Sebastian, SP 2016), the Material Research Society Fall Meeting, (Boston, USA 2014), the GDR MesoImage Summer School, (Cargese, FR 2014), ICTON conference, (München, GE 2010), 50 Years of Anderson Localization Symposium, (Paris FR 2008) and OSA Topical Meeting, (Jackson hole, Wyoming USA, 2007).
- I have been Lecturer for the international Summer School for Quantum Communication Information and Control, in Exeter (UK 2014), the Europhotonics Spring School (Paderborn GE 2014), the Heraus seminar “Hybrid systems for quantum optics” in Bad Honnef (GE 2016) and invited as a lecturer to the Heraus seminars on “Quantum Networks” (Bad Honnef 2018), ADOPT winter school on quantum photonic technologies (Romme, Sweden March 2018), Complex Nanophotonics Science Camp (UK 11-14 August 2019), the Varenna Summer school (2018), Complex Nanophotonics Science Camp (UK 11-14 August 2019), DK ALM (PhD Atomi Light Molecule, Innsbruck) summerschool 2021.

## MAJOR COLLABORATIONS

**Prof. F. Koppens**, Institute of Photonic Sciences (ICFO) in Barcelona (Spain)

**Prof. O. Benson**, Humboldt University in Berlin (Germany)

**Prof. D.S. Wiersma** and **Prof. F.S. Cataliotti**, University of Florence, (Italy)

**Dr. M. Agio**, Siegen University (Germany)

**Prof. W. Pernice**, University of Muenster (Germany)

**Prof. N. F. van Hulst**, Institute of Photonic Sciences (ICFO) in Barcelona (Spain)

**Prof. M. Orrit**, University of Leiden, (The Netherlands)

## LIST of SELECTED PEER-REVIEWED PUBLICATIONS

1. V Estesó, R Duquennoy, RC Ng, M Colautti, P Lombardi, G Arregui, E Chavez-Ángel, CM Sotomayor-Torres, PD García, M Hilke, C Toninelli, “Quantum thermometry with single molecules in portable nanoprobe”, *Phys. Rev. X Quantum* **4**, 040314 (2023)
2. R. Duquennoy, M. Colautti, P. Lombardi, V. Berardi, I. Gianani, C. Toninelli, and M. Barbieri, “Singular Spectrum Analysis of Two Photon Interference from Distinct Quantum Emitters”, *Phys. Rev. Research* **5**, 023191 – (2023)

3. G.Murtaza et al., “Efficient room-temperature molecular single-photon sources for quantum key distribution”, (2022) <https://doi.org/10.48550/arXiv.2202.12635>, Optics Express
4. R. Duquennoy, M. Colautti, R. Emadi, P. Majumder, P. Lombardi, C. Toninelli, “Real-time two-photon interference from distinct molecules on the same chip”, Optica 9, 731-737 (2022)
5. P. Lombardi et al., “Triggered emission of indistinguishable photons from an organic dye molecule”, Appl. Phys. Lett. 118, 204002 (2021); <https://doi.org/10.1063/5.0048567>
6. C. Toninelli, I. Gerhardt, A.S. Clark, A. Reserbat-Plantey, S. Götzinger, Z. Ristanovic, M. Colautti, P. Lombardi, K.D. Major, I. Deperasińska, W.H. Pernice, F.H.L. Koppens, B. Kozankiewicz, A. Gourdon, V. Sandoghdar, M. Orrit, “Single organic molecules for photonic quantum technologies”, Nature Materials 20, pages 1615–1628 (2021), <https://doi.org/10.1038/s41563-021-00987-4>
7. C Becher, S Höfling, J Liu, P Michler, W Pernice, C Toninelli, “Special topic on non-classical light emitters and single-photon detectors”, Applied Physics Letters 120 (1) 010401 (2022)
8. Kuck S.; Lopez M.; Hofer H.; Georgieva H.; Christinck J.; Rodiek B.; Porrovecchio G.; Smid M.; Gotzinger S.; Becher C.; Fuchs P.; Lombardi P.; Toninelli C.; Trapuzzano M.; Colautti M.; Margheri G.; Degiovanni I.P.; Traina P.; Rodt S.; Reitzenstein S., “Single photon sources for quantum radiometry: a brief review about the current state-of-the-art”, Applied Physics B-Lasers And Optics 128, Article number: 28 (2022)
9. S. Boissier, R.C. Schofield, L. Jin, A. Ovvyan, S. Nur, F. H. L. Koppens, C. Toninelli, W. H. P. Pernice, K.D. Major, E. A. Hinds, and A.S. Clark, “Coherent characterisation of a single molecule in a photonic black box”, Nat. Comm. 12-706 (2021), <https://doi.org/10.1038/s41467-021-20915-z>
10. M. Colautti, F.S. Piccioli, Z. Ristanovic, P. Lombardi, A. Moradi, S. Adhikari, I. Deperasinska, B. Kozankiewicz, M. Orrit and C. Toninelli, “Laser-Induced Frequency Tuning of Fourier-Limited Single-Molecule Emitters”, ACS Nano (2020) 10.1021/acsnano.0c05620
11. Nicola Palombo Blascetta, Pietro Lombardi, Costanza Toninelli, and Niek F. van Hulst, Cold and Hot Spots: from Inhibition to Enhancement by Nanoscale Phase Tuning of Optical Nanoantennas, ACS Nano DOI: 10.1021/acs.nanolett.0c02607 (2020)
12. D. Bacco, I. Vagniluca, B. Da Lio, N. Biagi, A. Della Frera, D. Calonico, C. Toninelli, F. S. Cataliotti, M. Bellini, L. K. Oxenløwe, A. Zavatta, “Field trial of a finite-key quantum key distribution system in the Florence metropolitan area”, EPJ QuantumTechnology 6:5 (2019)
13. M. Colautti, P. Lombardi, M. Trapuzzano, F. S. Piccioli, S. Pazzagli, B. Tiribilli, S. Nocentini, F. S. Cataliotti, D.S. Wiersma and C. Toninelli, “Quantum optics with single molecules in a three-dimensional polymeric platform”, Advanced Quantum technologies 3, 7 cover (2020)
14. P. Lombardi, M. Trapuzzano, M. Colautti, G. Margheri, I. P. Degiovanni, M. López, S. Kück, and C. Toninelli, “A Molecule-Based Single-Photon Source Applied in Quantum Radiometry”, Advance Quantum technologies, 3, 1900083, (2020) DOI: 10.1002/qute.201900083
15. C. Ciancico, K. G. Schädler, S. Pazzagli, M. Colautti, P. Lombardi, J. Osmond, C. Dore, A. Mihi, A. P. Ovvyan, W. H. P. Pernice, E. Berretti, A. Lavacchi, C. Toninelli, F. Koppens, and A.e Reserbat-Plantey, “Narrow Line Width Quantum Emitters in an Electron-Beam-Shaped Polymer”, ACS Photonics 6, 12, 3120–3125 (2019)
16. K. G. Schädler, C. Ciancico, S. Pazzagli, P. Lombardi, A. Bachtold, C. Toninelli, A. Reserbat-Plantey, and F.H. L. Koppens, “Electrical Control of Lifetime-Limited Quantum Emitters Using 2D Materials”, Nanoletters 19, 6, 3789–3795 (2019)

17. S. Pazzagli, P. Lombardi, D. Martella, M. Colautti, B. Tiribilli, F. S. Cataliotti, and C. Toninelli, "Photostable single-photon emission from self-assembled nanocrystals of polycyclic aromatic hydrocarbons", *ACS Nano* 12, 4295–4303 (2018)
18. P. Lombardi, A. P. Ovyvan, S. Pazzagli, G. Mazzamuto, G. Kewes, O. Neitzke, N. Gruhler, O. Benson, W.H.P. Pernice, F. S. Cataliotti, and C. Toninelli, "Photostable molecules on chip: integrated single photon sources for quantum technologies", *ACS Photonics* 5, 1, 126-132 (2017)
19. Matz Liebel, Costanza Toninelli and Niek F. van Hulst, "Room-temperature ultrafast nonlinear spectroscopy of a single molecule", *Nature Photonics* 12, 45–49 (2018)
20. S. Checcucci, P. Lombardi, S. Rizvi, F. Sgrignuoli, N. Gruhler, F.B.C. Dieleman, F.S. Cataliotti, W. H. P. Pernice, M. Agio, and C. Toninelli, "Beaming light from a quantum emitter with a planar optical antenna", *Light: Science and Applications*, (2017) 6, e16245
21. G. Kewes, M. Schoengen, O. Neitzke, P. Lombardi, R. Schönfeld, G. Mazzamuto, A.W. Schell, J. Probst, J. Wolters, B. Löchel, C. Toninelli, and O. Benson, "A realistic fabrication and design concept for quantum gates based on single emitters integrated in plasmonic-dielectric waveguide structures", *Scientific Reports* 6, 28877 (2016)
22. A. Reserbat-Plantey, K. G. Schädler, L. Gaudreau, G. Navickaite, J. Güttinger, D. Chang, C. Toninelli, A. Bachtold, F. H.L. Koppens, "Electro-mechanical control of an optical emitter using graphene", *Nature Communications* 7, 10218, (2016)
23. L. Pattelli, G. Mazzamuto, D.S. Wiersma and C. Toninelli, "Diffusion of light in semitransparent media", *Phys. Rev. A* 94, 043846 (2016)
24. G. Mazzamuto, L. Pattelli, C. Toninelli and D.S. Wiersma, "Deducing effective light transport parameters in optically thin systems", *New J. Phys.* 18, 023036 (2016)
25. F. Sgrignuoli, G. Mazzamuto, N. Caselli, F. Intonti, F. S. Cataliotti, M. Gurioli and C. Toninelli, "Necklace state hallmark in disordered 2D photonic systems", *ACS Photonics* 2, 1636–1643 (2015)
26. S. Lagomarsino, F. Gorelli, M. Santoro, N. Fabbri, A. Hajeb, S. Sciortino, L. Palla, C. Czelusniak, M. Massi, F. Taccetti, L. Giuntini, N. Gelli, D. Yu Fedyanin, F. S. Cataliotti, C. Toninelli, Mario Agio, "Robust luminescence of the silicon-vacancy center in diamond at high temperatures", *AIP Advances* 5, 127117 (2015)
27. G. Mazzamuto, A. Tabani, S. Pazzagli, S. Rizvi, A. Reserbat-Plantey, K. Schaedler, G. Navickaite, L. Gaudreau, F.S. Cataliotti, F. Koppens, and C. Toninelli, "Single-molecule study for a graphene-based nano-position sensor", *New J. Phys.* 16, 113007, (2014)
28. P. D. Garcia, R. Sapienza, C. Toninelli, C. Lopez, and D. S. Wiersma, "Photonic crystals with controlled disorder," *Phys. Rev. A*, 84, 023813 (2011)
29. C. Toninelli, K. Early, J. Breimi, A. Renn, S. Götzinger, and V. Sandoghdar, "Near-infrared single-photons from aligned molecules in ultrathin crystalline films at room temperature", *Opt. Express* 18, 6577 (2010)
30. C. Toninelli, Y. Delley, T. Stöferle, A. Renn, S. Götzinger, and V. Sandoghdar, "A scanning microcavity for *in situ* control of single-molecule emission", *APL*, 97, 021107, (2010)
31. C. Toninelli, E. Vekris, G.A. Ozin, S. John and D.S. Wiersma, "Exceptional reduction of the diffusion constant in partially disordered photonic crystals", *Phys. Rev. Lett.*, 101, 123901 (2008)
32. Z. Gaburro, M. Ghulinyan, L. Pavesi, P. Barthelemy, C. Toninelli and D.S. Wiersma, "Dynamics of capillary condensation in bistable optical superlattices", *Phys. Rev. B*, 77, 115354 (2008)

33. P. Barthelemy, M. Ghulinyan, Z. Gaburro, C. Toninelli, L. Pavesi, and D.S. Wiersma, "Optical switching by capillary condensation", *Nature Photonics*, 1, 172, (2007)
34. A. Ledermann, L. Cademartiri, M. Hermatschweiler, C. Toninelli, G.A. Ozin, D.S. Wiersma, M. Wegener, and G. von Freymann, "Three-dimensional silicon inverse photonic quasicrystals for infrared wavelengths", *Nature materials*, 5, 942-945, (2006)
35. M. Ghulinyan, M. Galli, C. Toninelli, J. Bertolotti, S. Gottardo, D.S. Wiersma, L. Pavesi, and L. C. Andreani, "Wide-band transmission of nondistorted slow waves in one-dimensional optical superlattices", *App. Phys. Lett.*, 88, 241103, (2006)
36. M. Ghulinyan, C. J. Oton, Z. Gaburro, L. Pavesi, C. Toninelli and D.S. Wiersma, "Zener tunneling of light waves in an optical superlattice", *Phys. Rev. Lett.*, 94, 127401, (2005)
37. G. Ferrari, P. Cancio, R. Drullinger, G. Giusfredi, N. Poli, M. Prevedelli, C. Toninelli and G. M. Tino, "Precision frequency measurement of visible intercombination lines of strontium", *Phys. Rev. Lett.*, 91, 243002-1, (2003)

## CONFERENCE PROCEEDINGS AND BOOK CHAPTERS

38. S. Checcucci, P. E. Lombardi, S. Rizvi, F. Sgrignuoli, N. Gruhler, F. B. C. Dieleman, F. S. Cataliotti, W. H. P. Pernice, M. Agio, and C. Toninelli, "Planar optical antenna to direct light emission", in *Conference on Lasers and Electro-Optics*, OSA Technical Digest (online) (Optical Society of America, 2016), paper FM4B.4.
39. K. Schadler, A. Reserbat-Plantey, L. Gaudreau, G. Navickaite, J. Guttinger, I. Tsioutsios, A. Tabani, C. Muschik, M. Lewenstein, D. Chang, C. Toninelli, A. Bachtold, F. Koppens, "Graphene Hybrid Optomechanics", in *Conference on Lasers and Electro-Optics (CLEO)*, OSA Technical Digest (online), (Optical Society of America, 2016), paper FM3B.4
40. G. Mazzamuto, A. Tabani, S. Pazzagli, S. Rizvi, A. Reserbat-Plantey, K. Schaedler, G. Navickaite, L. Gaudreau, F.S. Cataliotti, F. Koppens, and C. Toninelli, "Coupling of single DBT molecules to a graphene monolayer: proof of principle for a graphene nanoruler", *MRS Proceedings*, 1728, mrsf14-1728-106-02 (2014)
41. C. Toninelli, M. Huppert, A. Renn, S. Götzinger, and V. Sandoghdar, "Coupling single molecules to microcavities", in *European Quantum Electronics Conference*, EQEC 2011, Conference Technical digest, paper EA9\_4 (2011)
42. A. Ledermann, G. Von Freymann, C. Toninelli, D.S. Wiersma, L. Cademartiri, G.A. Ozin, M. Wegener, "Optical transport properties of three-dimensional photonic quasicrystals", in *Conference On Lasers And Electro-Optics & Quantum Electronics And Laser Science Conference*, Vols 1-9 pages 3389-3390 (2008)
43. A. Ledermann, L. Cademartiri, M. Hermatschweiler, C. Toninelli, G.A. Ozin, D.S. Wiersma, M. Wegener, G. Von Freymann, "Three-dimensional photonic quasicrystals: Fabrication and characterization", in *Advances in Nanophotonics II*, AIP Conference Proceedings 959, 97 (2007)
44. C. Toninelli, D.S. Wiersma, S. John, N. Tétreault, G. A. Ozin, "Towards Anderson Localization of Light in Photonic Crystals", in *Photonic Metamaterials: From Random to Periodic META 2006*, (OSA Technical Digest), MC3 (2007)
45. C. Toninelli, D.S. Wiersma, M. Ghulinyan, Z. Gaburro, L. Pavesi, C. Oton, "Broken Symmetry in Photonic Crystals: Resonant Zener Tunneling of Light Waves", in *Photonic Metamaterials: From Random to Periodic, META 2006*, (OSA Technical Digest), ThD4 (2006)
46. M. Ghulinyan, Z. Gaburro, and L. Pavesi, C.J. Oton and N. Capuj, R. Sapienza, C. Toninelli, P. Costantino, and D.S. Wiersma, "Optical superlattices: where photons behave like electrons", Book chapter in *New Topics in Lasers and Electro-Optics*, Ed. William T. Arkin (Novapublishers, 2006)
47. M. Ghulinyan, R. Sapienza, C. Toninelli, C.J. Oton, P. Costantino, Z. Gaburro, L. Pavesi, and D.S. Wiersma, "Bloch oscillations and resonant Zener tunneling of light in optical superlattices", *Proc. SPIE Int. Soc. Opt. Eng.*, 5840, 421, (2005)

48. M. Ghulinyan, Z. Gaburro, and L. Pavesi, C.J. Oton, C. Toninelli, and D.S. Wiersma, "Zener tunneling of light in an optical superlattice", in Progress in Compound Semiconductor Materials IV-Electronic and Optoelectronic Applications, Materials Research Society Symposium Proceedings 829, 251 (2005)
49. G. Ferrari, P. Cancio, R. Drullinger, G. Giusfredi, N. Poli, M. Prevedelli, C. Toninelli and G. M. Tino, "Laser sources for precision spectroscopy on atomic strontium", SPIE proc. 2003, vol.1, (2003)

## PATENTS

- I. M. Agio, C. Toninelli, S. Checcucci, F. Sgrignuoli, P. Lombardi, S. Rizvi, "Device for the beaming of light emitted by light sources, in particular fluorescence of molecules," Patent pending No. RM2015A000155, PCT/EP2016/058069 filed on 13.04.2016, EU and US; nat/reg phase entering