

Alessandro Trenti
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Address
Nothartgasse 21,
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Alessandro Trenti

Scientist

About Me I was born in Trento (Italy), the 11/01/1990, and raised in Rovereto. I did the PhD in the NanoLab group at the University of Trento, defending my PhD thesis dissertation on 20/04/2018. In August 2018 I moved to Vienna, where I joined the Walther group. I worked for 3 years as Postdoctoral researcher, two of them as a Marie-Curie PostDoc fellow. Since 1 October 2021 I have been a member with scientist position in the quantum communication group at the Austrian Institute of Technology, based in Vienna. During the free time I play football and I like reading books and watching films in mother tongue.

Employment

01/10/2021 - present, Scientist at the Austrian Institute of Technology (AIT)

Scientist in the competence unit Security & Communication Technologies, in the center for Digital Safety & Technology at the Austrian Institute of Technology. Supervisor: Dr. Hannes Hübel.

Topics: Generation, manipulation and detection of quantum states of light for quantum communication applications based on free-space and integrated photonics.

Projects: UNIQORN, FAQT (<https://www.ait.ac.at/>)

01/07/2019 - 30/09/2021, ESQ PostDoc at the University of Vienna

ESQ Postdoctoral researcher, Marie Skłodowska-Curie COFUND 2-years fellowship (<https://www.oeaw.ac.at/esq/home/esq-postdocs/>), in the group "Quantum Information Science & Quantum Computation" at the Faculty of Physics, University of Vienna. Supervisor: Prof. Philip Walther.

Topics: quantum communication and quantum simulation experiments on free-space and integrated photonics. Nonlinear and quantum optics in nanostructured graphene.

Projects: PhoQuGraph, UNIQORN, EPIQUS (<https://walther.quantum.at/>)

08/09/2020 - 04/12/2020, Secondment at Austrian Institute of Technology (AIT)

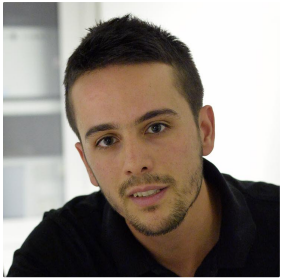
3-month secondment at Austrian Institute of Technology (AIT) GmbH, Center for Digital Safety&Security / Security & Communication Technologies, Vienna. Research activity within the H2020 project UNIQORN (<https://quantum-uniqorn.eu/>), coordinated by AIT.

Topics: design and characterization of free-space and integrated entangled photon source.

01/09/2018 - 30/06/2019, PostDoc at the University of Vienna

Postdoctoral researcher in the group "Quantum Information Science & Quantum Computation" at the Faculty of Physics at the University of Vienna. Supervisor: Prof. Philip Walther.

Topics: nonlinear and quantum optics in nanostructured graphene (PhoQuGraph).



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Education

01/11/2014 - 20/04/2018, PhD at the University of Trento

PhD student in the NanoLab group, under the supervision of Prof. Lorenzo Pavesi within the SiQuro project: <http://events.unitn.it/en/siquro>. Topics: nonlinear and quantum optics in free-space (bulk nonlinear crystals) and integrated experiments, with a particular focus on silicon and silicon-based materials. PhD thesis title: *Generation, manipulation and detection of NIR and MIR entangled photon pairs*.

17/10/2012 - 22/10/2014, Master degree at the University of Trento

Master degree in Nanophotonics. Achieving qualification with the thesis: *A set-up for the generation of entangled photons via second order parametric processes*, under the supervision of Prof. Lorenzo Pavesi. Final mark: 110/110 cum laude.

List of the taken exams and related marks:

Course	Mark
Nuclear and subnuclear physics advanced	30L/30
Statistical mechanics advanced	30/30
Laboratory of physics advanced	30L/30
Optoelectronics	30/30
Quantum optics	30L/30
Photonics	30L/30
Integrated photonics devices	30L/30
Advanced photonics laboratory	29/30
Physics of matter advanced	30L/30
Quantum mechanics advanced	30/30
Laboratory of condensed matter	30/30
Experimental methods	27/30
Experimental methods in material science	29/30

Related projects:

- *Photoacoustic spectroscopy of molecular oxygen using diode laser in Littrow configuration*, final project for the course Laboratory of Physics Advanced;
- *Photonic crystal fibre*, final project for the course Integrated Photonics Devices;
- *Biomolecule sensors and photodetectors*, final project for the course Laboratory of Advanced Photonics;
- *Raman spectra on alanine aqueous solution and Homodyne experiment*, final projects for the course Laboratory of condensed matter;

26/10/2010 - 25/09/2012, Bachelor degree at the University of Trento

Second and third year Bachelor degree in Physics. Achieving qualification with the thesis: *Collective plasma phenomena*, under the supervision of Dr. Riccardo Checchetto. Final mark: 106/110.

23/10/2009 - 26/10/2010, University of Padova

First year Bachelor degree in Physics.

13/09/2004 - 16/07/2009, Diploma at Guglielmo Marconi institute

Secondary high school scientific diploma at "Guglielmo Marconi", Rovereto (TN) Italy. Final mark: 96/100.



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Teaching experience

01/03/2020 - 30/06/2021, Thesis supervisor

Supervision of the thesis "Comparison of quantum states of light generated by means of parametric processes and quantum emitters", Bachelor degree in Physics at the University of Vienna.

18/03/2020 - 24/06/2020, Lecturer

Challenges in Research II - from practical work to publication, Master degree in Physics at the University of Vienna.

01/10/2019 - 31/01/2020, Thesis supervisor

Supervision of the thesis "Superconducting nanowire single photon detection", Bachelor degree in Physics at the University of Vienna.

26/09/2017 - 20/12/2017, Teaching assistant

Teaching assistant of *General physics II* (electromagnetism), Bachelor degree in Physics at the University of Trento.

14/09/2016 - 30/09/2017, Teaching assistant

Teaching assistant of *General physics II* (electromagnetism), Bachelor degree in Physics at the University of Trento.

14/09/2015 - 30/09/2016, Teaching assistant

Teaching assistant of *General physics II* (electromagnetism), Bachelor degree in Physics at the University of Trento.

14/09/2015 - 30/09/2016, Teaching assistant

Teaching assistant of *Laboratory of advanced photonics*, Bachelor degree in Physics at the University of Trento.

Publications

- P. Namdar, P. K. Jenke, I. Alonso Calafell, A. Trenti, M. Radonjić, B. Dakić, P. Walther and L. A. Rozema, *Experimental Higher-Order Interference in a Nonlinear Triple Slit*, arXiv preprint arXiv:2112.06965 (2021).
- I. Calafell Alonso, L. A. Rozema, D. Alcaraz Iranzo, A. Trenti et al., *Giant enhancement of third-harmonic generation in graphene-metal heterostructures*, Nat. Nanotechnol., **16** (2021).
- C. Castellan, A. Trenti, C. Vecchi, A. Marchesini, M. Ghulyanian, G. Pucker and L. Pavesi, *On the origin of second harmonic generation in silicon waveguides with silicon nitride cladding*, Sci. Rep., **9** 1088 (2019).
- M. Borghi, A. Trenti and L. Pavesi, *Four Wave Mixing control in a photonic molecule made by silicon microring resonators*, Sci. Rep., **9** 408 (2019).
- A. Trenti, *Generation, manipulation and detection of NIR and MIR entangled photon pairs*, PhD thesis, University of Trento (2018).
- A. Trenti, M. Borghi, S. Biasi, M. Ghulyanian, F. Ramiro-Manzano, G. Pucker and L. Pavesi, *Thermo-optic coefficient and nonlinear refractive index of silicon oxynitride waveguides*, AIP Adv., **8** 025311 (2018).
- M. Borghi, C. Castellan, S. Signorini, A. Trenti and L. Pavesi, *Nonlinear silicon photonics*, J. Opt., **19** 9 (2017).



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- M. Mancinelli, A. Trenti, S. Piccione, G. Fontana, J. S. Dam, P. Tidemand-Lichtenberg, C. Pedersen and L. Pavesi, *Mid-infrared coincidence measurements on twin photons at room temperature*, Nat. Commun., **8** 15184 (2017).
- A. Trenti, M. Borghi, M. Mancinelli, H. M. Price, G. Fontana and L. Pavesi, *Quantum interference in an asymmetric Mach-Zehnder interferometer*, J. Opt., **18** 8 (2016).
- S. Piccione, M. Mancinelli, A. Trenti, G. Fontana, J. S. Dam, P. Tidemand-Lichtenberg, C. Pedersen and L. Pavesi, *Mid-infrared coincidence measurements based on intracavity frequency conversion*, SPIE Photonics West 10516, (2018).
- C. Castellan, A. Trenti, M. Mancinelli, A. Marchesini, M. Ghulinyan, G. Pucker and L. Pavesi, *From SHG to mid-infrared SPDC generation in strained silicon waveguides*, SPIE Nanoscience + Engineering 2017 10358, (2017).
- A. Trenti, M. Borghi, M. Mancinelli, H. M. Price, G. Fontana and L. Pavesi, *One and two-photon quantum interference in a Mach-Zehnder interferometer*, SPIE Photonics Europe 9894, (2016).
- F. Ramiro Manzano et al., *Microring Resonators and Silicon Photonics*, MRS Advances (2016).

Conferences

Annual ÖPG-SPG conference & SFB BeyondC Autumn Workshop 2021, Oral Presentation

Title: *Towards broadband photon pair generation in ultrathin carbon nanotube films*, 31 August-3 September 2021.

CLEO/Europe-EQEC 2021 virtual Conference, Oral Presentation

Title: *Towards plasmonic-enhanced optical nonlinearities in graphene metal-heterostructures*, 21-25 June 2021.

2020 CLEO Virtual Conference, Oral Presentation

Title: *What is the origin of second harmonic generation in strained silicon waveguides?*, 11-15 May 2020.

2020, International Conference on Quantum Optics 2020, Poster

Title: *Giant nonlinear optical enhancement in graphene-metal heterostructures and quantum applications*, Obergurgl 23-29 February 2020, Austria.

2019, Quantum Information and Measurement (QIM) V, Poster

Title: *Huge plasmon-enhanced Third Harmonic Generation with graphene nanoribbons*, Rome 4-6 April 2019, Italy.

2017, Congresso Nazionale della Società Italiana di Fisica (SIF), Oral Presentation

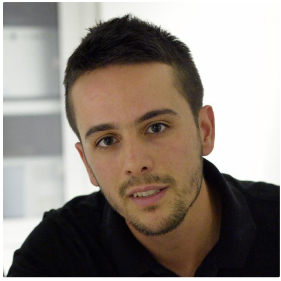
Title: *Mid-infrared coincidence measurements on twin photons at room temperature*, Trento 11-15 September 2017, Italy.

2017, CLEO/Europe-EQEC Conference, Oral presentation

Title: *Towards MIR SPDC generation in strained silicon waveguides*, Munich 25-29 June 2017, Germany.

2017, Integrated Quantum Photonics winter school (IQP2017), Poster

Title: *Mid-infrared coincidence measurements on twin photons at room temperature*, Folgaria 26 March-3 April 2017, Italy.



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2016, SPIE Photonics Europe 2016, *Oral presentation*

Title: *One and two photon interference in a Mach Zehnder interferometer*, Bruxelles 1-8 April 2016, Belgium

Awarded by the "Best student paper presentation" in the conference *Non-linear optics and its applications*.

2015, Fotonica 2015, *Oral presentation*

Title: *Quantum interference effects in a Mach Zehnder interferometer*, Torino 6-8 May 2015, Italy.

2015, Topolight 2015 winter school, *school participant*

8th edition of the Optoelectronics and Photonics Winter School, Fai della Paganella 15-21 March 2015, Italy.

2014, Introductory Course on Quantum Information summer school, *school participant*

Organized by University of Innsbruck, the SFB project *Foundations and applications of quantum science* (FoQus) and the Institute for Quantum Optics and Quantum Information (IQOQI), Innsbruck 7-11 July 2014, Austria.

Computer skills

Operating system

- Linux
- Microsoft windows

Programming, scripting and markup languages

- Matlab
- \LaTeX
- LabVIEW
- Comsol
- Origin
- C and C++ (basics)

Language skills

Italian

Mother tongue

English

Fluent

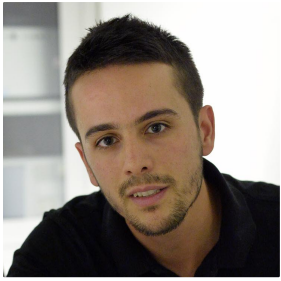
German

Intermediate, B2 Zertifikat

Outreach & Extras

Trento SPIE student chapter officer

- Outreach activity with the title: "Science enters into the class. Optics experiments with children to bring them closer to the scientific method". Optics related scientific experiments were demonstrated at the elementary Filzi school in Rovereto (TN), 23-24 May 2018;
- Organization of the workshop "Photonics as a key enabling technology", Trento 17/11/2017;
- Participation to the SPIE Student Chapter Leadership Workshop, Munich 24/06/2017;
- Organization of the event "Day of Photonics", Trento 27/10/2016. Oral presentation, demo & hands-on (optical cloaking, peppers ghost, total internal reflection...) for the city community.



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European Researcher's Night 2015

Active participation to the event European Researcher's Night 2015 with the preparation of two divulgative scientific stands: "The electronics of light: the silicon nanophotonics" and "Nanophotonics as a microscopic investigation tool", Trento 25/09/2015. Divulgative teaching to the city community with demo & hands-on: interactive diffraction experiment from a hair (estimation of the hair size), real-time speckle pattern of a visible laser passing through different disordered media, experimental demonstration of a silicon-based optical biosensors, optical cloaking.

Participation to the event *Industrial Problem Solving with Physics*

This is a one-week event where 30 students and young researchers get in touch with the industry and challenge themselves working on the technological problems raised by the participating companies.

- Proceedings of the event IPSP2016: Industrial Problem Solving with Physics: Trento, 18-23 July 2016. ISBN: 978-88-8443-712-9;
- Proceedings of the event IPSP2015: Industrial Problem Solving with Physics: Trento, 20-25 July 2015. ISBN: 978-88-8443-674-0;
- Proceedings of the event IPSP2014: Industrial Problem Solving with Physics: Trento, 21-26 July 2014. ISBN: 978-88-8443-581-1.