

# ACADEMIC CURRICULUM VITAE Stefano Oss

place and date of birth: Trento (Italy), Sept 3<sup>rd</sup>, 1959; nationality: Italian

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## Education since leaving school

- 1978-1982, Laurea in Fisica (four-year degree, cum laude), University of Trento - Italy
- 1985-86, PhD courses in physics, II cycle, Universities of Padova and Trento – Italy

## Academic appointment

- Full professor in Physics Education and History of Physics (“Didattica e Storia della Fisica”, ssd PHYS06b, ex-FIS08) at the University of Trento, Department of Physics, Trento, Italy since March 1<sup>st</sup>, 2023

## Academic responsibilities

- Head of the Physical Science Communication Laboratory, Department of Physics, University of Trento
- Deputy of the Rector for Science Communication at the University of Trento
- Deputy of the Rector for High School Counseling Policies at the University of Trento
- Deputy of the Director for Communication and Outreach at the Physics Department
- Member of the Executive Board at the University-Secondary School cooperation and coordination office (Direttivo di Ateneo Formazione Insegnanti e Rapporti con le Scuole, FIRS)

## Professional experience

1986-2001: scientific researcher – assistant professor, General Physics (B01A), Science Faculty – Physics Department - University of Trento

- Teaching: courses for exercises in General Physics (mechanics, electromagnetism, thermodynamics, at undergraduate level) and courses in Advanced Theoretical Physics (application of group theory to physical topics, PhD courses)
- Research: Experimental atomic physics (molecular scattering of low-energy electron and positrons) and theoretical molecular physics (development of algebraic techniques based on dynamical symmetries)

1990: visiting scientific researcher, Yale University, New Haven, CT, USA

- Research: theoretical molecular physics and group theory with F. Iachello

1993: visiting assistant professor, Princeton University, Princeton, NJ, USA.

- Teaching: course in “Topics in Advanced Chemical Physics”, Post-doctoral level
- Research: theoretical molecular physics with G. Scoles and F. Iachello

2001-2012: associate professor (confirmed since 2004), Structure of Matter (FIS03), Science Faculty – Physics Department - University of Trento

- Teaching: courses in General Physics (mechanics, electromagnetism, thermodynamics) and in statistics at undergraduate level; courses in Physics Education (educational aspects of classical and modern physics, physics laboratory) at the pre-service teacher training school (SSIS)
- Research: theoretical molecular physics; physics education and teaching research, settling of the new physics education and communication laboratory
- In charge as head of the Physical Science Communication Laboratory

2012-2023: confirmed associate professor, Physics Education and History of Physics (FIS08), Physics Department - University of Trento

- Teaching: courses in General Physics (mechanics, undergraduate); courses in Physics Education (physical science communication and teaching methods, computers in the lab, experiments in the introductory lab); courses for pre-service teacher training at the SSIS, TFA, PAS and pre-FIT schools; courses for in-service teachers at primary and secondary school levels.
- Research: physics education
- Head of the Physical Science Communication Laboratory
- Coordinator of the Academic Advisory Board of the MUSE Science Center in Trento (2011-2013)
- In charge of the SSIS/TFA/PAS/FIT/PFPTI schools, physics area, for teacher training and enrollment, Trentino Alto-Adige (1999-2023)

2023-present: full professor, Physics Education and History of Physics (FIS08/PHYS06/B), Physics Department - University of Trento

## Experience in academic teaching

courses in the last 6 years

- General Physics I, Physics Department, Trento University, about 80 students (I and II semester), av. score 10/10
- General Physics I, Physics Department, Trento University, about 80 students (I semester), 120 students (II semester), av. score 9.5/10
- Elements of Modern Physics at the Philosophy Department (II semester), about 20 students, av. score 8.1/10
- General Physics I (first and second part), Science Communication and Elements of Modern Physics: online courses on dedicated YouTube channels (<https://stefanooss59.com/didattica-education/materiale-per-i-corsi-universitari/>).
- Modern Physics (educational topics in quantum mechanics and applied physics), Mathematics Department, Master Degrees in Physics and Mathematics, av. score 8.9/10, about 35 students per semester.
- History of Physics (including story-telling in science and technology), Math and Physics Departments, Bachelor degree, Trento University, av. score 8.8/10, about 20 students per semester.
- Science storytelling: a critical view, SciComm, Master in Communication of Science and Innovation, University of Trento
- Physics I (introduction to classical mechanics), Industrial Engineering Department, Bachelor degree, Trento University, av. score 8.9/10, about 120 students per semester.
- Physics (general introduction to classical physics: mechanics, thermodynamics and electromagnetism), Department of Information Engineering and Computer Science, Bachelor degree, Trento University, av. score 8.7/10, about 110 students per semester.
- Science Communication (non-formal and pedagogical topics in science communication), Math, Biology, Computer Science and Physics Departments, Bachelor degree, Trento University, av. score 8.6/10, about 40 students per semester.
- Physical Science Communication and Teaching Methods (theoretical and practical aspects in physics teaching), Math and Physics Departments, Master degree, Trento University, av. score 8.8/10, about 35 students per semester.

Note: Scores are attributed according to the official evaluation procedure at the University of Trento (grand-averaged score of courses in science departments: 8.6/10)

The undersigned has been scientific coordinator and instructor in a series of refresher courses offered as a teacher training system (mostly in cooperation with IPRASE, Istituto Provinciale per la Ricerca e la Sperimentazione Educativa, Ente Strumentale della Provincia Autonoma di Trento – Local government Institution for research and educational experimentation, <http://www.iprase.tn.it/>), among which:

- kindergarten level (Trento, 2010);
- first level secondary schools (Frascati - RM, 2005, Marostica -VI, 2007)
- primary and secondary 1<sup>st</sup> level schools (Trento, 2009, 2010, 2014, 2018, 2019, 2020)
- Licei Scientifici Galilei e Da Vinci (Trento, 2013, 2015, 2022)
- Liceo Scientifico Torricelli (Bolzano, 2005-2019 on a yearly base)

## PhD in physics education supervision: thesis titles

- Proposal and development of new non-formal tools for education and communication of physical sciences (XXV cycle)

- Educational projects about energy and energetics. Analysis of case studies and a proposal for a renewed approach to physics teaching (XXVIII cycle)
- Design and experimentation of communication and of a teaching sequence on atmospheric physics (XXIX cycle)
- Digital Physics Education. Personal devices, mediated reality, serious gaming (XXX cycle, prize for the best PhD thesis at the Physics Department, cum laude)
- Physics education research in a two-year course with extended hour amount (XXXV cycle)
- Active learning approaches based on V-Phyton/Phyton computational platforms (XXXVI cycle)
- Physics education, climate change and sustainability (XXXVIII cycle)
- Physics education with virtual, augmented reality (XXXIX cycle)

### **Other past and present academic responsibilities**

- President of the Education and History of Physics General Section VII, 103<sup>rd</sup> National Conference of the Italian Physical Society 2017
- Scientific coordinator of the “Researcher Night” events – University of Trento, 2013
- Scientific coordinator of exhibitions devoted to the physics of sound and of cosmic ray detection at the “Science Festival” in Genova (2012 and 2014) and at “Bergamo Scienza” (2015)
- Scientific advisor and co-founder of the Jet Propulsion Theatre (2012-present)
- Referent of the local UniTrento office for the national Master IDIFO, Innovazione didattica in fisica e orientamento (2016-present)
- President of the committee “Commissione Paritetica Docenti-Studenti” – Physics Department (2020-2023)
- Coordinator of the high-school teacher enrollment services in the physics area at the University of Trento (1999-2023)
- Scientific co-director of the science festival “Teatro della Meraviglia” (2017-present).
- Local coordinator of the physics area in the Piano Nazionale Lauree Scientifiche, MUR for the Trentino-Alto Adige region (2004-2023)
- Member of the Executive Committee of the Doctoral Physics School at the Physics Department in Trento (2019-2024)

### **Past and present memberships**

- scientific advisor and author for the magazine “Query” founded by Piero Angela (2009-2017)
- chairman of the CICAP section for Trentino-Alto Adige (2009-2013)
- unique European member of the Editorial Board of “The Physics Teacher” AAPT – APS Journal (2009-2012)
- member of the Scientific Advisory Board of Frascati Scienza (2008-2010)
- chairman of the Academic Advisory Board of the MUSE Science Center in Trento (2011-2013)
- member of GIREP (International Research Group on Physics Teaching)
- member of the scientific committee of the SciComm Master in Science Communication and Innovation, University of Trento (2018-2020)
- member of the scientific committee “DiMMI, Dictionary of Multidisciplinary Integration”, University of Trento and Conservatory F. Bonporti, Trento, (2019-present)
- member of the Scientific Committee of the GEO (Gioventù, Educazione, Orientamento) consortium (2015-2017)

### **Participation in exhibitions and public events**

The Physical Science Communication Laboratory (ruled by the undersigned) has been in charge, in co-operation with Science Museums in Trento, Bolzano and other institutions, for the project and organization of several exhibitions and events for the diffusion of science and for the support of new educational teaching-learning and “edutainment” practices, such as:

- Sperimentiamo! (1998, Science Museum in Trento)
- Destinazione Stelle (1999, Caproni Aeronautics Museum, Trento)
- Energia 2001 (2001, Science Museum in Trento)
- Il pianeta Rosso (2003, Caproni Aeronautics Museum Trento)
- Fisica ... mente divertente (2004, Bolzano)
- Mobilità (2004, Science Museum in Trento)
- I giochi di Einstein (2005, Science Museum in Trento and 2006 Science Museum in Warsaw, Poland)
- Try to Fly (2007, Caproni Aeronautics Museum, Trento)

- Astronomia in Mostra (2010, Science Museum in Trento)
- Cooperation with Bergamo Scienza and The Walt Disney Company Italy for the production of experimental kits devoted to the life and discoveries of Guglielmo Marconi (2010)
- Co-ordination and project of the full plan for exhibitions at the physics hall in the new MUSE Science Center in Trento (2010-2013)
- Scientific support for the itinerant exhibition “La fisica dei giocattoli” in cooperation with ForMath
- Cooperation with “Reinventore”, producer of science kits at various school levels, see <http://www.reinventore.it/>
- Cooperation with and institutional sponsorship to LevelUp, a new startup for the realization of science laboratories at various school levels, see <https://leveluptrento.com/>
- Co-ordination of “Fisica e Techne”, public physics seminars for teachers and citizens at the Liceo Prati in Trento (2016-2018)
- Co-ordination of “Scienza dietro le quinte”, cycles of public science seminars at the University of Trento (2012-2014)
- Award to the laboratory for the best paper in Physics Education of the Real Sociedad Española de Física (RSEF, 2015)
- Co-winner of the bronze award prize, section “cultivating curiosity” at the 2016 Reimagine Education Conference, Philadelphia PA (USA)
- “Twenty years of Scientific Toys”, the new exhibition (presented on occasion of the 103<sup>rd</sup> National Conference of the Italian Physical Society, 2017, Trento, see: <https://lcsfunitn.wordpress.com/i-giocattoli-e-la-scienza-online/>)

Estimated total number of visitors at the exhibitions: over two million people and several thousands of school classes from primary to secondary levels.

## Grants/joint-projects

- FP6-2004-SCIENCE-AND-SOCIETY-11: Physics is Fun (FP6: partner – 16 months)
- L.6/2003/DM7999 – Scientific knowledge diffusion: new tools for an effective communication of contemporary physics. (coordinator – 12 months) – MIUR 2003
- L.6/2004/DM16857 – Physics and flight simulation: beyond videogaming (coordinator – 12 months) – MIUR 2004
- L.6/2007/DM43921 – How airplanes fly: science communication and the physics of flight (coordinator – 12 months) – MIUR 2007
- PRIN 2004020419\_003 Area 02 Models and reality: development to physics knowledge – University of Naples, coordinator, University of Trento, partner – 24 months – PRIN 2004
- MIUR grant for the Piano Nazionale Lauree Scientifiche (on a biannual basis, 2006-2022, see: <https://plstrento.wordpress.com/>), local coordinator
- PRIN 2012, University of Bologna, coordinator, University of Trento, partner – not financed; “Science Education, strategic goal for the development of the Country: MOdels and STRategies for teacher education in Physics (MOST)”. – PRIN 2012
- PRIN 2015, national coordinator: “X-PHYS: eXtra-ordinary PHYSicists at work”. Scienze fisiche e modernità sociale in una rete di ricerca e azione per costruire nuove vie didattiche, comunicative e per una più efficace percezione e condivisione dell’indagine sulla natura dell’universo e delle tecnologie derivate. – not financed
- Joint physical-chemistry introductory courses in Technical Schools. Research grant, 2017-2020, Autonomous Province of Trento and University of Trento.
- PRIN 2017, not financed, University of Bologna, coordinator, University of Trento, partner: “COGNitive models in teaching physics through learning Objects (COGITO)”
- COSID-20, University of Trento, “COllaborazioni per le Scienze In laboratorio Didattico – 2020”, Research Grant 2021-2023.
- CURIOUS, “Culture as a Unique Resource to Inspire, Outreach & Understand Science”, Creative Europe EC Research Grant 2021-2023, Joint venture “Jet Propulsion Theater” and Physics Department, UniTrento

## Research and scholarships

The undersigned started his academic life as an experimentalist in the field of low energy atomic physics with antimatter. He then turned his attention to more theoretical issues, mainly to the development of new algebraic techniques devoted to the interpretation of rovibrational spectra of complex molecules. This first period of activity is traced along the list of “early” (48) publications at the end of this CV. The experience matured in both the experimental and the theoretical phases was very important to inspire and to permanently support an

even more significant change in the professional career of the undersigned. This happened with the renewal of the Physical Science Communication Laboratory (<https://lcsfunitn.wordpress.com/>), headed by the undersigned since 2001: in this lab, at that time ruled by a single researcher, there are now 3 staff members, 1 post-doc researcher, 3 PhD students and 2 collaborators. This laboratory constitutes a natural environment for the physics education research as well as to sustain the more general task of the academic “third mission”, in which the results of physical science research are shared and communicated to a wide audience: a very challenging task. Current work of the undersigned is devoted to push and enforce new ways of addressing these subjects of study, working inside schools, with teachers and students and exploring new routes for disseminating physical science. All this makes sense, since physics can be discovered and enjoyed beyond its traditional academic interpretation, at various cultural and formation levels. This discipline has to be seen, perceived and intended as a very efficient, quite unique observatory allowing its followers to enter in touch with the scientific method and to practice it.

Efforts of the undersigned are dedicated to the construction of a series of teaching-learning paths allowing physics and science teachers at every school level to give their own contribution to the paradigmatic change and methodological evolution in their work. As a particularly important node, the introduction and usage of simple – possibly non-expensive objects (such as toys) as an alternative and non-formal framework has been systematically considered, deeply analyzed and brought to reality. The adoption and development of computer-based educational activities is also a central point in the research scenario of the undersigned. Using smartphones, tablets and other modern and popular devices is a way of considering alternative languages to the communication of science. There are more routes to be followed in this perspective: non-formal and informal storytelling is a promising approach which is also being convincingly supported by the undersigned in his recent and present research. Collaborations and mixing of science contents with theatrical interpretation and dramatization is in fact being more and more spread and adopted by several school teachers and by communicators in collaboration with the laboratory headed by the undersigned. This part of the current research is based on a mixed science-theater venue (the “Jet Propulsion Theater”) co-funded by the undersigned and by an art director and actor (and physicist), see <http://www.jetpropulsiontheatre.org/>. Events and productions of this laboratory are delivered to a wide audience, yet, and as already said, with a special cure for high schools (students and teachers). The above mentioned “third mission” of university, i.e. the science-society connections and the enforcement and spread of scientific literacy, are special focuses of the research commitment of the undersigned and of his laboratory. Within the frame of art-science interactions, it is since 2017 that the “Teatro della Meraviglia” (“wonder’s theater”) science festival is being organized and partially financed by the Trento University under the supervision of the undersigned. All these activities have a direct correspondence with the chronological sequence of publications (and with the organization and participation to special events, conferences, seminars, workshops, teamwork with museums and science centers) as reported in this CV.

The laboratory headed by the undersigned has gained a central and strategical role and it serves a continuously increasing number of users, with a specific dominance of school teachers at every level, from primary to secondary/high schools, including the extremely important area of permanent counseling and advising during the transitions to the university. A web page allows the exchange information at several educational levels for teaching/learning physics (and, more generally, science) subjects (see: <https://fisicaperlascuola.wordpress.com/>).

## Publications (peer reviewed)

1. Tofaletti S, Di Mauro M, Fiorello C, Rosi T, Tufino E, Onorato P and Oss S “**Climate change: The physical basis of radiative phenomena for the study of the greenhouse effect**” (2024) In: IL NUOVO CIMENTO C. - ISSN 2037-4909. - 47:5(2024). DOI: 10.1393/ncc/i2024-24342-2
2. Oss S. “**Exploring the Role of AI in Learning and Teaching Thermodynamics: A Case Study with ChatGPT**” (2024) p.2450013-25 The Physics Educator **6**, No. 3 DOI: 10.1142/S2661339524500136
3. Rosi T., Zendri G., Tufino E., Tofaletti S., Oss S. and Onorato P “**First results using a home-kit designed in the COSID-20 project: teaching physics laboratory at a distance**” (2024) p.012033-42 in JOURNAL OF PHYSICS.CONFERENCE SERIES 2750 (1) DOI: 10.1088/1742-6596/2750/1/012033
4. Tufino E., Alemani M. and Oss S “**Integrating Python data analysis in an existing introductory laboratory course**” (2024) in EUROPEAN JOURNAL of PHYSICS **45** pp.045707-25 DOI: 10.1088/1361-6404/ad4fcc
5. Oss S. “**First thermodynamics steps of ChatGPT**” (2024) in Giornale di Fisica della Società Italiana di Fisica, **LXV**(2) 83-119 DOI: 10.1393/gdf/i2024-10552-7
6. Toffaletti S., Di Mauro M., Malgieri M., Rosi T., Tufino E., Onorato P. and Oss S. “**A teaching-learning sequence about climate change: From theory to practice**” (2023) p.676-684 in: AMERICAN JOURNAL of PHYSICS **91**, DOI: 0.1119/5.0137089
7. Tufino E., Gratton L.M. and Oss S. “**wo Simple Experiments Using FFT with Digital Devices in the Introductory Physics Laboratory**” (2023) p.23500013 In: The Physics Educator **5** n.3 DOI: 10.1142/S2661339523500130
8. Oss S. “**Artificial intelligence at school: please handle with care**” (2023) p.046501 In: PHYSICS EDUCATION – **58** DOI: 10.1088/1361-6552/acd7c0
9. Di Mauro M, Gratton L M, Onorato P and Oss S “**A Classical Experiment for the Quantum Eraser: A Comparison Between Model and Experimental Results**” (2023) p.2350002-10 In: The Physics Educator **5** No. 1 DOI: 10.1142/S2661339523500026
10. Oss S. and Perini M. “**A journey through physics: a thematic curriculum for high schools**” (2022) in

- Giornale di Fisica della Società Italiana di Fisica **LXIII** (4) 359-371 DOI: 10.1393/gdf/i2023-10502-y
11. Oss S. "**A simple mechanical model of the drumroll**" (2022) - p. 065021 In: PHYSICS EDUCATION - **57** (6) DOI:10.1088/1361-6552/ac9210
  12. Brunello A. and Oss S. "**Augmented Lectures: A Unique Resource to Inspire, Outreach and Understand Science**", (2022), *Science & Theatre: Communicating Science and Technology with Performing Arts*, Emerald Publishing Limited, Bingley, pp. 143-150. <https://doi.org/10.1108/978-1-80043-640-420221012>
  13. Oss S. "**Making jets of air visible in the infrared**". (2022) pp.043001. In PHYSICS EDUCATION -**57** (4) DOI:10.1088/1361-6552/ac59cf.
  14. Oss S. "**Thermal Infrared Imaging as a Bridge Between Mathematical Models and the Laboratory**", (2022) in THERMAL CAMERAS IN SCIENCE EDUCATION, Vol. **26**, Innovation in Science Education and Technology, Springer International Publishing, ISBN 978-3-030-85288-0, 978-3-030-85288-7
  15. Oss S. "**A simple model of thermal conduction in human skin: temperature perception and thermal effusivity**" (2022) in EUROPEAN JOURNAL OF PHYSICS **43** DOI:10.1088/1361-6404/ac4c8a. pp.035101. ISSN:0143-0807
  16. Oss S and Perini M "**Thermal energy transfer: some mathematical models and infrared thermography in an undergraduate laboratory**" (2021) in Giornale di Fisica della Società Italiana di Fisica **LXII**(2) 193-215 DOI: 10.1393/gdf/i2021-10406-x
  17. Oss S. "**Vintage thermology and modern-day infrared imaging**" (2021) in: PHYSICS EDUCATION **56**– 025025 (6 pp) DOI:10.1088/1361-6552/abdd91
  18. Oss S. "**Infrared visualization of lumped and non-lumped thermal transient processes in an introductory laboratory**" (2021) EUROPEAN JOURNAL OF PHYSICS **42** (2021) 015101
  19. Rosi T; Perini M; Onorato P and Oss S "**Commercial virtual reality headsets for developing augmented reality setups to track three-dimensional motion in real time**". (2021) DOI:10.1088/1361-6552/abd5a2. pp.025016. In PHYSICS EDUCATION - ISSN:0031-9120 vol. **56** (2)
  20. Oss S. "**Infrared imaging of the cooling fin equation**" (2020) In: EUROPEAN JOURNAL OF PHYSICS **41** 055102-055111
  21. Logiurato F; Gratton L and Oss S "**Optical Simulation of Laue Crystal Diffraction with New Experiments on Diffraction**" (2020)- In: THE PHYSICS TEACHER. - ISSN 0031-921X. - 58:2, pp. 130-132.
  22. Onorato, P.; Malgieri, M.; Polesello, M.; Salmoiraghi, A. and Oss, S. "**From chance to the physical laws: Toy models to connect the microscopic and macroscopic understanding of physical phenomena**" (2020) In: IL NUOVO CIMENTO C. - ISSN 2037-4909. - **42**, pp. 1-13.
  23. Oss S. "**Infrared imaging of a non-stationary thermal conductive process and observation of its Green's kernel**" (2019) In EUROPEAN JOURNAL OF PHYSICS. - ISSN 0143-0807. - **41**:1, pp. 01510201-01510220
  24. Malgieri M; De Ambrosio A; Rosi T; Onorato P; Gratton L. M and Oss S "**Colours in your pocket: Smartphone-based spectrometers to investigate the quantum world**". (2019) DOI:10.1088/1742-6596/1287/1/012005. pp.012005. In JOURNAL OF PHYSICS. CONFERENCE SERIES - ISSN:1742-6588 vol. 1287 (1)
  25. Rosi, T; Onorato, P and Oss, S "**The Augmented Laboratory – 3D, Multiple Object Tracking**". In JOURNAL OF PHYSICS. CONFERENCE SERIES - ISSN:1742-6588 vol. 1286 (2019) pp.012052. DOI:10.1088/1742-6596/1286/1/012052
  26. Rosi T; Onorato P and Oss S. "**The Augmented Laboratory - A mixed reality setup for physics education**". DOI:10.1088/1742-6596/1287/1/012059. pp.012059. In JOURNAL OF PHYSICS. CONFERENCE SERIES - ISSN:1742-6588 vol. 1287 (2019)
  27. Onorato, P; Gratton, L M; Oss, S and Malgieri, M "**From the dicey world to the physical laws: dice toy models for bridging microscopic and macroscopic understanding of physical phenomena**". In JOURNAL OF PHYSICS. CONFERENCE SERIES - ISSN:1742-6588 vol. 1287 (2019) pp.012026 DOI:10.1088/1742-6596/1287/1/012026.
  28. Gratton, L M; Perini, M and Oss, S "**A simple experimental observation and modeling of optical diffraction patterns**". In PHYSICS EDUCATION - vol. 54 (2019) pp.043006 DOI:10.1088/1361-6552/ab1e94.
  29. Rosi T; Gratton L M; Onorato P and Oss S. "**Light interference from a soap film: A revisited quasi-monochromatic experiment**". DOI:10.1088/1361-6552/aae9a7. pp.015018.1-015018.5. In PHYSICS EDUCATION - ISSN:0031-9120 vol. 54 (2019)
  30. Oss, S; Brunello, Andrea and Echard, P "**From science to theatre**". In NATURE NANOTECHNOLOGY - ISSN:1748-3395 vol. **14** (2019) pp.402-403. DOI:10.1038/s41565-019-0445-7.
  31. Onorato, P. Gratton, L. M.; Polesello, M.; Salmoiraghi, A. and Oss, S., "**The Beer Lambert law measurement made easy**" in PHYSICS EDUCATION, v. 53, n. 3 (2018), p. 035033. - DOI: 10.1088/1361-6552/aab441
  32. Malgieri M, Rosi T, Onorato P and Oss S "**Looking at phosphorescence with a smartphone, explaining phosphorescence with a dice toy model**". Vol.53 n.6 (2018) DOI:10.1088/1361-6552/aaddf1. pp.065016.1-065016.8. In PHYSICS EDUCATION - ISSN:0031-9120
  33. Rosi, T.; Oss, S. and Onorato, P." **Discussing fundamental topics of quantum physics using**

- visualizations of bound states**" JOURNAL OF PHYSICS. CONFERENCE SERIES. - ISSN 1742-6588. - 1076:1(2018), p. 012010.
34. Rosi, T; Malgieri, M; Oss, S; and Onorato, P 2018. **Quantitative Measurements of RGB and CMYK Colours with a Homemade Spectrophotometer**. DOI:10.1007/978-3-319-96184-2\_22. pp.269-278. In *The Role of Laboratory Work in Improving Physics Teaching and Learning* - ISBN:978-3-319-96183-5
  35. Onorato, P.; Gratton, L.; Malgieri, M. and Oss, S., "**The photoluminescence of a fluorescent lamp: didactic experiments on the exponential decay**" in PHYSICS EDUCATION, v. 52, n. 1 (2017), p. 015011-015018. - DOI: 10.1088/1361-6552/52/1/015011
  36. Oss, S; Onorato, P and Rosi, T, "**Studying colors with a smartphone**" in IL NUOVO CIMENTO C, v. 2017, (2017). - DOI: 10.1393/ncc/i2017-17104-8
  37. Rosi, T.; Onorato, P. and Oss, S., "**Multiple object, three-dimensional motion tracking using the Xbox Kinect sensor**" in EUROPEAN JOURNAL OF PHYSICS, v. 38, n. 6 (2017), p. 065003. - DOI: 10.1088/1361-6404/aa8183
  38. Moggio, L; Onorato, P; Gratton, L M and Oss, S, "**Time-lapse and slow- motion tracking of temperature changes: response time of a thermometer**" in PHYSICS EDUCATION, v. 52, n. 2 (2017), p. 023005- 023007. - DOI: 10.1088/1361-6552/aa5363
  39. Onorato, P.; Malgieri, M.; Moggio, L. and Oss, S., "**Microscopic and probabilistic approach to thermal steady state based on a dice and coin toy model**" in EUROPEAN JOURNAL OF PHYSICS, v. 38, n. 4 (2017), p. 045102-045118. - DOI: 10.1088/1361-6404/aa690f
  40. Bonato, J.; Gratton, L. M.; Onorato, P. and Oss, S., "**Using high speed smartphone cameras and video analysis techniques to teach mechanical wave physics**" in PHYSICS EDUCATION, v. 52, n. 4 (2017), p. 045017-045021. - DOI: 10.1088/1361-6552/aa6f8c
  41. Oss, S; Zendri, G and Rosi, T, "**The Hubble party balloon and the expanding universe**" in EUROPEAN JOURNAL OF PHYSICS, v. 2016, n. 37 (2016), p. 1-11. - DOI: 10.1088/0143-0807/37/5/055701
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## Conference contributions in physics education research (last 18 years)

1. Toffaletti S., Di Mauro M., Salmoiraghi A., Fiorello C., Onorato P., Oss S **La sfida di educare gli studenti alla sostenibilità: progettazione e risultati preliminari di una sequenza didattica.** 110th SIF Conference 2024 Bologna
2. Salmoiraghi A., Di Mauro M., Toffaletti S., Fiorello C., Onorato P., Oss S **Concetti chiave per l'educazione alla sostenibilità nelle scuole secondarie: uno studio Delphi.** 110th SIF Conference 2024 Bologna
3. Oss S **IA nella didattica della fisica. Ignoranza o intelligenza artificiale? Pochi dubbi oggi, ma il fenomeno è in rapida evoluzione.** 110th SIF Conference 2024 Bologna - invited
4. Di Mauro M., Perli L. S., Carli M., Cogo D., Malgieri M., Onorato P., Oss S. **L'insegnamento della fisica quantistica nelle scuole: le opinioni degli esperti e degli insegnanti.** 110th SIF Conference 2024 Bologna
5. Fiorello C., Di Mauro M., Salmoiraghi A., Toffaletti S., Onorato P., Oss S. **Un percorso multidisciplinare di formazione docenti di scuola secondaria dedicato alla sostenibilità e alla cittadinanza scientifica** 110th SIF Conference 2024 Bologna
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9. Tufino E., Onorato P., Oss S. **Methods and technological tools to support active learning at school and university** GIREP 2023, Košice, Slovakia
10. T. Rosi, P. Onorato, S. Oss **Using low cost and standalone virtual and augmented reality headsets to teach and learn motion concepts** 25th Multimedia in Physics Teaching and Learning Workshop, Wroclaw, Poland 2022
11. Tufino E, Oss S, Gratton L, **Un percorso semplificato per introdurre la trasformata di Fourier tramite smartphone e altri dispositivi** 108th SIF Conference 2022, Milano
12. Rosi T, Zendri G, Tufino E, Toffaletti S, Onorato P, Oss S **First results using a Home-Kit designed in the COSID-20 project: teaching physics laboratory at a distance** GIREP 2022, Ljubljana, Slovenia
13. T. Rosi, P. Onorato, S. Oss **Quando il laboratorio di fisica resta a casa: Strumenti e metodi per un apprendimento attivo a distanza** 107th SIF Conference 2021
14. Onorato P, Bonino R, De Ambrosis A, Fabbri L, Levrini O, Malgieri M, Mezzasalma A M, Morandi E, Oss S, Rosi T, Tasquier G, Valentinetti S, **Equilibrio di genere nei corsi di laurea in Fisica: Risultati di un'indagine PLS** 107th SIF Conference 2021
15. Oss S. **Gioie e dolori della termografia infrarossa**, 106th SIF Conference 2020, Milano (invited)
16. Bonino R, De Ambrosis A, Levrini O, Malgieri M, Mezzasalma A.M, Morandi E, Onorato P, Oss S, Rosi T, Tasquier G, **Equilibrio di genere nei corsi di laurea in Fisica: Prospettive di un'indagine PLS**, 106th SIF Conference 2020, Milano
17. T. Rosi, P. Onorato, S. Oss **Augmented Reality Active Learning (AnReAL) activities for exploring motion concepts**. GIREP Webinar 2020, Malta
18. Onorato P, Malgieri M, Salmoiraghi A, Polesello M, Oss S, **Una sequenza di esperimenti e modelli per afferrare la strana natura della luce**, 105th SIF Conference 2019, L'Aquila
19. T. Rosi, P. Onorato, S. Oss **Apprendimento della cinematica basato su Augmented Active Learning Activities**. 105th SIF Conference 2019, L'Aquila
20. Onorato P, De Ambrosis A, Malgieri M, Oss S. **Motivazioni, aspettative e autoefficacia. Alla ricerca delle ragioni della differenza di genere nei corsi di Fisica**, 105th SIF Conference 2019, L'Aquila
21. T. Rosi, P. Onorato, S. Oss, **Learning motion concepts using Augmented Reality Active Learning (AnReAL) activities**, GIREP Conference 2019, Budapest, Hungary
22. P. Onorato, M. Malgieri, M. Polesello, A. Salmoiraghi, S. Oss, **Dal mondo del caso alle leggi fisiche: modelli giocattolo per collegare la comprensione microscopica e macroscopica dei fenomeni fisici**, 104th SIF Conference 2018, Arcavacata di Rende
23. P. Onorato, M. Malgieri, M. Polesello, A. Salmoiraghi, S. Oss, **The Augmented Laboratory: un nuovo setup di Realtà Aumentata per il laboratorio di fisica**, 104th SIF Conference 2018, Arcavacata di Rende
24. P. Onorato, T. Rosi, L. M. Gratton, M. Polesello, A. Salmoiraghi, S. Oss, **Smartphone, un laboratorio in tasca. La misura della legge di Lambert-Beer**, 104th SIF Conference 2018, Arcavacata di Rende
25. P. Onorato, M. Malgieri, M. Polesello, A. Salmoiraghi, S. Oss, **A sequence of experiments and models to grasp the strange nature of light**, GIREP Conference 2018, San Sebastian, Spain
26. T. Rosi, P. Onorato, S. Oss, **Realtà virtuale e simulazioni aumentate nel laboratorio di fisica**, 103rd SIF Conference, 2017, Trento
27. T. Rosi, P. Onorato, S. Oss, **A virtual and augmented reality setup for physics education**, GIREP Conference 2017, Dublin, Ireland
28. T. Rosi, P. Onorato, S. Oss **THE AUGMENTED LABORATORY – 3D, MULTIPLE OBJECT TRACKING**, GIREP Conference 2017, Dublin, Ireland
29. T. Rosi, P. Onorato, S. Oss, M. Malgieri, A. De Ambrosis **Studiare i colori con uno smartphone - national award as the best educational contribution** to the 102<sup>nd</sup> Italian Physical Society Conference, 2016, Padova
30. S. Oss, T. Rosi, A. Brunello, **Didattica della fisica universitaria oltre la fisica**, invited talk, 102<sup>nd</sup> SIF Conference, 2016, Padova.
31. T. Rosi, S. Oss, P. Onorato, M. Malgieri **Fifty shades of colour**, GIREP Conference 2016, Krakow, Poland
32. T. Rosi, P. Onorato, M. Malgieri and S. Oss **Quantitative measurements of RGB and CMYK colours with a homemade spectrophotometer** GIREP Conference 2016, Krakow, Poland
33. T. Rosi, P. Onorato, S. Oss **Discussing fundamental topics of Quantum Physics using visualizations of bound states** GIREP Conference 2016, Krakow, Poland
34. Balzano E., De Ambrosis A., Levrini O., Michelini M., Oss S., Sperandeo Mineo R.M. "TAVOLA ROTONDA: **Formazione degli insegnanti in fisica: stato dell'arte, indicazioni europee, aspetti d'innovazione, problemi aperti e linee di ricerca future**". XCVIII Congresso Nazionale SIF 2012, Napoli, 2012
35. A. Stefanel, M. Michelini, A. Altamore, M. Bochicchio, A. Bonanno, F. Corni, A. De Ambrosis, F. Fabbri, M. Fasano, M. Giliberti, O. Levrini, P. Magnoler, R.M. Mineo Sperandeo, G. Ottaviani, S. Oss, M. Peressi, G. Rinaudo, L. Santi, R. Stella **"The Italian project IDIFO3 (Innovazione Didattica in Fisica e Orientamento"** - The World Conference in Physics Education 2012 - Istanbul, Tk, 2012
36. S. Oss **"Physics on the iPad"**, IV Ogólnopolskie Seminarium „Komputer w Szkolnym Laboratorium Przyrodniczym” - invited lecture - Torun -Poland, 2011
37. S. Oss **"Physics of flight"**, IV Ogólnopolskie Seminarium „Komputer w Szkolnym Laboratorium Przyrodniczym” – invited plenary inaugural talk - Torun -Poland, 2011

38. S. Oss, "**Il nuovo centro della scienza di Trento. Quali fisica raccontare?**", invited talk, XCVI Congresso Nazionale SIF 2010, Bologna, 2010
39. G. Zendri, L.M. Gratton, T. López-Arias S. Oss, "**Flying with the right principles at hand: an interactive lab to understand the physical origin of lift**", special interactive invited poster, MPTL-13, Udine, 2009
40. Oss S. Lopez-Arias T., Gratton L.M., "**Towards the true physics of flight at school**", invited: "International Conference in Physics Education 2009", Bangkok, Thailand, 2009.
41. S. Oss, "**Computer with wings: flight simulators and the physics of flight**" in GIREP-MPTL 2008, Nicosia: 2008,]. ICPE2008, Nicosia-Cyprus, 2008
42. F. Logiurato; B. Danese; S. Oss; L. Gratton, "**Light lectures on light**" in Toward development of physics for all: international conference on physics education 2006: ICPE, Tokyo, 2006
43. B. Danese; F. Logiurato; Gratton L.M.; S. Oss, "**Motion & Electromagnetism for 12 and 13 @ School**" in ICPE 2006 (Tokyo): Proceedings of The International Conference on Physics Education: Toward Development of Physics for All, Tokyo, Japan: Journal of the Physics Education Society of Japan, ICPE, Tokyo, Japan, 2006
44. C. Tarsitani; S. Oss; F. Logiurato, "**Particles and waves: from classical to quantum physics**" in ICPE 2007, Marrakech, Morocco, 2007
45. B. Danese; S. Oss; A. Romano, "**Science on the school bench with simple objects**" in Book of abstracts: GIREP-EPEC conference: Frontiers of physics education, Rijeka: University of Rijeka Faculty of arts and sciences, 2007, p. 85-85. Atti di: GIREP-EPEC 2007, Opatija, Croatia.
46. B. Danese; F. Logiurato; S. Defrancesco; L. Gratton; S. Oss; R. Guardini; R. Tarabelli; N. Capra, "**Atomic Physics for Pupils: a Hands-On Lab**" in Informal learning and Public Understanding of Physics, Third International GIREP Seminar 2005, Ljubljana, Slovenia: University of Ljubljana, Faculty of Mathematics and Physics, Jadranska 19, 1000 Ljubljana, Slovenia, 2006, p. 126-132. - ISBN: 9616619012.
47. F. Logiurato; B. Danese; L. Gratton; S. Defrancesco; S. Oss, "**Laser light through the fog**" in Informal learning and public understanding of physics: selected contributions, Slovenia: University of Ljubljana. Faculty of mathematics and physics, 2006, 3rd international seminar Informal learning and public understanding of physics, Ljubljana.
48. S. Oss, "**Physics and music: bringing together science and art**" in MPTL 2006, Szeged: Szeged University, 2006, MPTL13, Szeged, HU, 2006, invited
49. S. Oss; L. Gratton; S. Defrancesco; F. Logiurato; B. Danese; C. Lavarian; L. Del Longo; M. Grifò; R. Guardini; M. Lanzinger, "**Playing with Einstein**" in Informal learning and Public Understanding of Physics, Third International GIREP Seminar 2005, Selected contributions, Ljubljana, Slovenia: University of Ljubljana, Faculty of Mathematics and Physics Jadranska 19, 1000 Ljubljana, Slovenia, 2006, p. 133-138. - ISBN:9616619012
50. F. Logiurato; B. Danese; L. Gratton; S. Oss, "**Three-Dimensional Wave Behaviour of Light**" in The Foundations of Quantum Mechanics-Historical Analysis and Open Questions, Singapore: WORLD SCIENTIFIC PUBL CO PTE LTD, 5 TOH TUCK LINK, SINGAPORE, SINGAPORE, 596224, 2006, ISBN: 9812568522. Atti di: The Foundations of Quantum Mechanics- Cesena 2004, Cesena, Italy, 2004
51. S. Oss; L.M. Gratton; S. Defrancesco; F. Logiurato; B. Danese; M. Lanzinger; L. Del Longo; C. Lavarian, "**Einstein Toys**" in The First European Physics Education Conference EPEC-1 Bad Honnef, Germany, Bad Honnef, Germany: European Physical Society, 2005. EPEC-1, 2005
52. S. Oss, "**Giochi di fisica per (non solo) fisici**" in Comunicare Fisica, Frascati: INFN, 2005. Frascati (RM), 2005, invited
53. B. Danese, F. Logiurato, S. Defrancesco, L. Gratton, S. Oss, R. Guardini, R. Tarabelli, N. Capra **Teaching about Electrons, Atoms and Molecules: How and Why** 1st European Physics Education Conference, Bad Honnef, DR July 2005
54. S. Oss **Getting Science and Art in Connection: Can Physics and Music Be Brought Together to Provide Educational Tools?** EISTA 2005 – Orlando, FL, USA, 2005, invited
55. S. Oss **Sound of physics: "Ears-on" activities for middle school** EISTA 2005 – Orlando, FL, USA, 2005
56. S. Oss **New educational tools provided by a scientific reading of music** ICPE Durban (SA), 2004, invited