



PERSONAL INFORMATION Peppino Sapia

 Dept. of Mathematics and Computer Science - University of Calabria, 87036 Rende CS (Italy)
 peppino.sapia@unical.it

WORK EXPERIENCE

- 2019–Present **Associate professor of Physics Education and History of Physics**
University of Calabria, Rende CS (Italy)
- 2016–2019 **Senior Researcher (RtdB) in Physics Education and History of Physics**
University of Calabria, Rende CS (Italy)
- 1995–2016 **Adjunct Professor of Physics**
University of Calabria, Rende CS (Italy)
- 2012–2016 **Adjunct Professor of Physics Education and History of Physics**
University of Basilicata, Potenza-Matera (Italy)
- 1992–2015 **Math and Physics Teacher**
Italian Ministry for Education - High Schools Liceo Scientifico

ACADEMIC QUALIFICATION

- 2018 **National Scientific Qualification to function as full professor in Italian Universities in the academic recruitment field 02/D1 "Applied Physics, Physics Education and History of Physics". (D.D. MIUR 1532/2016)**
Italian Ministry for Education, University and Research (MIUR)
- 2013 **National Scientific Qualification to function as associate professor in Italian Universities in the academic recruitment field 02/B2 "Theoretical Physics of Matter". (D.D. MIUR 222/2012)**
Italian Ministry for Education, University and Research (MIUR)

RESPONSIBILITIES

- 2024–Present **Director of the qualification course for secondary school's prospective teachers, activated at the University of Calabria following the Italian law DPCM 04/08/2023, for the disciplinary class "A27 Mathematics and Physics".**
University of Calabria. Rende CS (Italy)
- 2023–Present **Head of the Laboratory of Applied Physics for Science Education and Cultural Heritage.**
Dept. of Mathematics and Computer Science. University of Calabria. Rende CS (Italy)
- 2019–2023 **Head of the Laboratory of Applied Physics for Nanotechnologies, Cultural Heritage and Science Communication.**
Dept. of Biology, Ecology and Earth Sciences. University of Calabria. Rende CS (Italy)

2021–Present	Director of the initiative: “ <i>AgoràLAB: Laboratory for the dissemination of scientific culture for the 21st century citizenship</i> ” University of Calabria, Rende CS (Italy)
2023–Present	Responsible for the local research unit of the Italian national PRIN project <i>ADELANTE: “Adopting Digitally-Enhanced Laboratories in a Network of TEachers”</i> University of Calabria, Rende CS (Italy)
2023–Present	Member of the Permanent Education Commission (CDP) of the Italian Physical Society (SIF).
2019–Present	Member of the University Ethical Committee. University of Calabria., Rende CS (Italy)
2017–2023	Delegate of the Department director for ongoing guidance. Department of Biology, Ecology and Earth Sciences. University of Calabria, Rende CS (Italy)
2017–2023	Responsible for the orientation within the Coordination Council of the Degree Courses in: Biology; Biological Sciences and Technologies; Health Biotechnology. Department of Biology, Ecology and Earth Sciences. University of Calabria, Rende CS (Italy)
2018–Present	Delegate of the University of Calabria for the national G.E.O. Center (Interuniversity Research Center for the study of youth condition, organization of educational institutions and orientation); member of the Governing Council of the G.E.O. Center.
2018–2023	Member of the joint PLS-POT-CISIA Scientific Technical Committee of the Italian national project “ORIENTAZIONE”, aiming to designing and implementing specific MOOCs and tools for the students’ self-assessment and self-learning in the passage from high school to university.
2019–2022	Coordinator, within the Italian “ORIENTAZIONE” project, of the National Commission deputed to drawing up the reference framework for the disciplinary area “Physics”.
2019 (acad.y.)	Delegate of the university’s rector for the campus security, with particular reference to the coordination of measures to prevent terrorist acts (transitional role in a period of high international alarm). University of Calabria., Rende CS (Italy)
2010–2011	Deputy coordinator of the project “Free ideas” implemented in the Calabria region for the dissemination of scientific culture. University of Calabria., Rende CS (Italy)

EDUCATION AND TRAINING

2009–2012	PhD in “Psychology of Programming and Artificial Intelligence” (XXV cycle) earned defending the thesis entitled “I test sull’attitudine al ragionamento scientifico nell’ambito del processo Autovalutazione, Valutazione e Accreditamento” Department of Linguistics - University of Calabria, Rende CS (Italy)
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- 2003–2006 PhD in "Physics - Physics Education" (IXX cycle) earned defending the thesis entitled "Produzione e sperimentazione di strumenti multimediali interattivi a supporto della creazione di percorsi didattici per l'insegnamento/apprendimento della fisica".
Department of Physics - University of Calabria, Rende CS (Italy)
- 1991–1994 PhD in "Physics of Matter" (VI cycle) earned defending the thesis entitled "Studio Mediante Spettroscopia ESR dell'interazione fra Membrane Modello e Molecole Biologicamente Attive".
Department of Physics and National Institute for the Physics of Matter - University of Calabria, Rende CS (Italy)
- 1989 Degree with honors in Physics, earned defending a thesis entitled "Teoria Stocastica della Forma di Riga in Spettroscopie di Risonanza Magnetica Lineari e non Lineari in Mesofasi Ordinate".
University of Pisa, Pisa (Italy)

SCIENTIFIC MEMBERSHIP

- SIF (Italian Physics Society)
- AIF (Italian Association of Physics Teachers)
- EPS (European Physics Society)
- AAPT (American Association of Physics Teachers)
- GIREP (International Research Group on Physics Teaching)
- MPTL (Multimedia in Physics Teaching and Learning)
- AIxIA (Italian Association for the Artificial Intelligence)

RESEARCH ACTIVITY

Physics Education and science communication:

- Development and validation of innovative experiments (aimed at tackling conceptual learning nodes) realized by employing low cost and easy to find equipment, though technologically advanced.
- Development and assessment of interdisciplinary learning paths (targeted to the last years of secondary schools and to the first year of university courses) aimed at semi-quantitatively introducing some cutting-edge topics of the physics of materials having considerable applicative relevance, such as: interaction between fluids and nano-structured surfaces; non-Newtonian fluids; surface diagnostics applied to cultural heritage maintenance.
- Development of multimedia tools aimed at both: the teaching/learning of physics at secondary school level and the communication/dissemination of science topics of broader interest, as well as for teachers training.
- Critical analysis (in a pedagogical or historical perspective) of some fundamental themes of mechanics, electromagnetism, thermodynamics and modern physics.
- Quantitative analysis in science education research.
- Visualization in science education.

Applied Physics for cultural heritage:

- Development of protective coatings for outdoor assets.
- Multispectral imaging of paintings.

Author of over 70 papers on international journals and numerous communications and invited talks to national and international conferences on the following topics: physics education, history of physics, science communication, applied physics for cultural heritage, biophysics.

SELECTED PAPERS

- 1) P. Sapia, "Inflating/deflating drops", *The Physics Teacher* (2024) **62** 570.
- 2) Fazio C., Sands D., Sapia P., Bozzo G., Jeskova Z., Sokolowska D., Battaglia O.R. "Strategies for Active Learning and Assessment of the Learning Processes". In: Fazio C., Logman P. (eds) *Physics Education Today. Challenges in Physics Education*. Springer, Cham (2024).
- 3) P. Sapia, "Geometrical optics of doves", *The Physics Teacher* (2024) **62** 157.
- 4) P. Sapia, A. Bonanno and G. Bozzo, "Newton's cradle and Astro-Blaster: toy hybridization for studying chain collisions", *Eur. J. Phys.* **44** (2023) 045004.
- 5) P. Sapia, F. Napoli and G. Bozzo, "The Lawson's Test for Scientific Reasoning as a Predictor for University Formative Success: A Prospective Study", *Educ. Sci.* **12** (2022) 814.
- 6) P. Sapia, P. Barone, "Hyperspectral Imaging of Artworks: A Custom Assembled Apparatus Endowed with an Open Source Software for Hypercube Analysis". In: R. Furferi et al. (eds) *The Future of Heritage Science and Technologies: ICT and Digital Heritage. Communications in Computer and Information Science*, vol 1645. (2022) Springer, Cham.
- 7) P. Sapia, G. Bozzo, "A toy model for gas viscosity", *Eur. J. Phys.* **43** (2022) 035003.
- 8) P. Sapia, "Surface microtomography for everyone", *Eur. J. Phys.* **42** (2021) 025801.
- 9) P. Sapia, "Spherical harmonic drops", *The Physics Teacher* **58** (2020) 288.
- 10) P. Sapia, "Soap bubble", *The Physics Teacher* **56** (2018) 416.
- 11) P. Sapia, "Superhydrophobic duck feather", *The Physics Teacher* **56** (2018) 336.
- 12) A. Bonanno, G. Bozzo and P. Sapia, "Physics meets fine arts: a project-based learning path on infrared imaging", *Eur. J. Phys.* **39** (2018) 025805.
- 13) A. Bonanno, G. Bozzo and P. Sapia, "An innovative experimental sequence on electromagnetic induction and eddy currents based on video analysis and cheap data acquisition", *Eur. J. Phys.* **38** (2017) 065203.
- 14) G. Bozzo, A. Bonanno and P. Sapia, "A sparkling low-cost revisitation of the historical Hertz's experiment". *Phys. Educ.* **52** (2017) 013005.
- 15) A. Bonanno, G. Bozzo, M. Grandinetti and P. Sapia, "Work-energy theorem and Friction Forces: two experiments". *Phys. Educ.* **51** (2016) 065004.
- 16) A. Bonanno, G. Bozzo, M. Camarca and P. Sapia, "An innovative experiment on superconductivity, based on video-analysis and non-expensive data acquisition", *Eur. J. Phys.* **36** (2015) 045010.
- 17) A. Bonanno, M. Camarca and P. Sapia, "Reaching equilibrium: The role of dissipation in analogous systems, within a thermodynamic-like perspective", *Eur. J. Phys.* **33** (2012) 1851.
- 18) A. Bonanno, G. Bozzo, M. Camarca and P. Sapia, "Using a PC and external media to

- quantitatively investigate electromagnetic induction”, *Phys. Educ.* **46** (2011) 385.
- 19) A. Bonanno, G. Bozzo, M. Camarca and P. Sapia, “Foucault dissipation in a rolling cylinder: a webcam quantitative study”, *Eur. J. Phys.* **32** (2011) 419.
 - 20) A. Bonanno, M. Camarca and P. Sapia, “Magnetic interactions and the method of images: A wealth of educational suggestions”, *Eur. J. Phys.* **32** (2011) 849.
 - 21) A. Bonanno, G. Bozzo, M. Camarca, P. Sapia, “Weighting magnetic interactions”, *Phys. Educ.*, **44** (2009) 570-572.
 - 22) M. Camarca, A. Bonanno and P. Sapia, “Reference frame symmetries and conservation laws: Galilean versus Lorentzian”, *Eur. J. Phys.* **30** (2009) 1137.
 - 23) A. Bonanno, G. Bozzo, M. Camarca, A. Oliva and P. Sapia, “Four physics jars”, *Il Nuovo Cimento*. **31 C** (2008) 601–615.
 - 24) A. Bonanno, P. Sapia, M. Camarca, A. Oliva, “Virtually exploring a pillar of the experimental physics: The Hertz experiment”, *AIP Conference Proceedings*. **1018** (1) (2008) 244–247.
 - 25) M. Camarca, A. Bonanno and P. Sapia, “Revisiting work-energy theorem’s implications”, *Eur. J. Phys.* **28** (2007) 1181.

SELECTED PRESENTATIONS

- 1) G. Bozzo, O.R. Battaglia, C. Fazio, A. Lemmo, M. Michelini, M.A. Zanetti, P. Sapia, “DPFS: Italian national survey on the perception of scientific practice among primary school children”. Communication presented at the 4th World Conference on Physics Education. Krakow, Poland, 26-30 August 2024.
- 2) P. Sapia, G. Bozzo, “Imaging in physics education and in science popularization: an introductory workshop”. Invited workshop given at the 25th International Conference on Multimedia in Physics Teaching and Learning. Wroclaw, Poland, 8-10 September 2022.
- 3) P. Sapia, G. Bozzo, “The physics of color, and its digital modeling, explored through a real remote laboratory (RRL) learning path”. Communication presented within the symposium “Strategies for Active Learning and Assessment of the Learning Processes” at the 3rd World Conference on Physics Education. Hanoi, Vietnam, 13-17 December 2021.
- 4) P. Sapia, G. Bozzo, “Computation in physics education: a toy model for viscosity”. Communication presented at the 3rd World Conference on Physics Education. Hanoi, Vietnam, 13-17 December 2021.
- 5) P. Sapia, G. Bozzo, “Computational skills in STEM Education: a critical overview”. Talk given within the mini-symposium “Applied mathematics in STEM education” at the SIMAI 2020+2021 Conference. Parma, Italy, 30 August -3 September 2021.
- 6) A. Bonanno, G. Bozzo and P. Sapia, “Educational Experiments with Oscillating Drops”. Communication presented at the GIREP-ICPE-EPEC-MPTL 2019 Conference. Budapest, 1-5 July 2019.
- 7) A. Bonanno, G. Bozzo, A. Checchetti and P. Sapia, “An everyday-life-based route to learning about nano-technologies in high schools”. Communication presented at the American Association of Physics Teachers Summer Meeting 2018. Washington D.C., July 28 – August 1 2018.
- 8) G. Bozzo, A. Bonanno, A. Valenti and P. Sapia, “Fluids behaviour in low gravity: A Physics education experience within a young apprenticeship programme”. Communication presented at the GIREP 2016 Conference. Krakow, Poland, 30 August -11 September 2016.
- 9) A. Bonanno, G. Bozzo and P. Sapia, “Learning about ‘impedance’ by video-analysis of a modified Newton’s cradle”. Communication presented at the American Association of Physics Teachers Summer Meeting 2015. University of Maryland, College Park MD, July 25-29 2015.
- 10) P. Sapia, G. Bozzo and R.A. Guerriero, “Integrated use of Scratch and EJS for promoting

coding skills of prospective primary teachers". Communication presented at the MPTL20 2015 Conference. Munich, Germany, 9-11 September 2015.

- 11) P. Sapia, "A high-speed-video learning path on Newtonian and non-newtonian fluids: from physical laws to cutting edge applications". Talk given within the MPTL@AATP panel at the 2014 American Association of Physics Teachers Summer Meeting. Minneapolis, MN, July 26-30 2014.
- 12) M. Barberio, P. Barone, A. Bonanno and P. Sapia, "Cultural heritage and physics education: A multimedia learning proposal". Communication at the MPTL18 2013 Conference. Madrid.
- 13) A. Bonanno, G. Bozzo and P. Sapia, "A high-speed walk through non-Newtonian fluids". Communication presented at the MPTL18 2013 Conference. Madrid 11-13 September 2013.
- 14) A. Bonanno, M. Camarca and P. Sapia, "The Casimir effect: a multimedia interactive tutorial". Communication presented at the MPTL16-HSCI 2011 Conference. Ljubljana 15-17 September 2011.
- 15) A. Bonanno, G. Bozzo, M. Camarca, M. Michelini, P. Sapia, "Foucault dissipation of a magnet falling through a copper pipe studied by means of a PC audio card and a webcam". Communication presented at the International Research Group on Physics Teaching 2010 Conference (GIREP 2010). Reims, France, 22-27/08/2010.
- 16) A. Bonanno, G. Bozzo, M. Camarca, P. Sapia, "Electromagnetic induction and Foucault currents: An experimental activity based on low-cost high-tech materials". Communication presented at the XCVI National Conference of the Italian Physics Society – Bologna – 20-24/09/2010.
- 17) A. Bonanno, G. Bozzo, M. Camarca, M. Michelini, P. Sapia, "Experimental path on magnetic interaction based on low cost materials". Communication presented at the 14th International Conference on Multimedia in Physics Teaching and Learning - Udine 23-25 settembre 2009.