Marisa Michelini

Marisa Michelini is full professor in physics education in Udine University, Italy.

Studies	Physics Degree 1975. Specialization in Computer Science (1976) Specialization in Physics Education (1976) [not jet active PhD in Italy] Specialization in Chemistry (1977)
Academic position and teaching	- Fellow professor in Physics education in Trento University (1977-1979) and in Modena University (1979-1983), teaching *Experiments in Physics, Preparing Educational Activities* in physics degree, *Physics* in Biology degree and *Physics Education* in post graduate Italian School for teachers. - Researcher in Modena University after National Selection (1983-1991), teaching two courses per year: *Experiments in Physics, Preparing Educational Activities, History of Physics, Thermodynamics, History of Quantum Physics* in physics degree and *Physics Education* in post graduate Italian School for teachers. - Associate professor after national selection in Udine University (1992-2000), teaching two courses per year: *Physics* in Agro-Bio-Animal Degrees, Biotechnology Degree, *Physics Education* in Prospective Primary Teacher Degree and in Specialization School for teachers. - Full professor after national and local selection in Udine University (2001- up to now), teaching two courses per year: *Physics* in Biotechnology Degree, *Preparing Educational Activities* in Math Degree, *Physics Education* in Prospective Primary Teacher.

Current responsibilities

In Udine University	• Rector delegate from 2012 for Didactic Innovation up to 2019. • Head of the Research Unit in Physics Education (URDF) from 1992 up to now. • Person in-charge of the Laboratory Centre for Physics Education (CLDF), she founded in 1994.
At national level	• Responsible from 2006 of the university community and of the 6 biannual projects on Didactic Innovation in Physics and Guidance (IDIFO) on modern physics and ICT in Teaching/Learning physics, involving 20 Italian universities and 4 research centers. Responsible of the local and National activities in IDIFO Projects and in particular of 6 biannual Master programs and 6 annual Specialization Courses for Teacher Education in Physics, 4 full immersion summer schools for professional development of in-service teachers and 10 Italian Summer Schools for Talent Students. • Head from 2014 of the Italian University Consortium on Young Education and Guidance (GEO), involving 12 universities, cooperating with the Italian Conference of Rectors and leading the studies on the strategies for development and didactic innovation at university level. • Honorary member from 2012 of the Italian Association for Physics Teaching (AIF). and editor of the peer review Journal “La Fisica nella Scuola”. • President of the national Committee for the Award in physics Education for teachers "A Bastai Prat" from 1992 up to now • Member of the Editorial board of the peer review Journal “Giornale di Fisica” of the Italian Physical Society (1992-2019).
At	• President from 2012 of the International Research Group in Physics Education

international level	(GIREP), election in 2012, re-elected in 2016 and re-elected in 2020. • Committee member from 2011 of the Multimedia Physics Teaching and Learning (MPTL). • Board member from 2017 of the Physics Education Division of the European Physical Society (EPS-PED). • Member of the International Committee of American Association for Physics Teaching (2009-2019). • Scientific referent for PhD programs of ELTE Department in Budapest, Hungary. • Editorial board member of the peer review international Journals of APS and IOP-EPJ and referee of different Physics Education Journals
Responsibilities held	
At international level	• Responsible for the University of Udine in the European Network EUPEN Forum (2002-2008) and later project responsible till 2018. • Executive Committee member of the European Scientific Education Research Association (ESERA) from 2008 up to 2010 • Responsible of the ESERA Summer School for PhD students in 2010 • International referee and committee member for the promotion to the rank of associate professor for the Center for Technological Education di Holon, Israel (1998), of *directeur de recherche* in Paris VII (2015), of associate professor in Lille (2016), of distinguish professor in Rutgers University, USA (2017), for PhD dissertations in 8 EU different universities.
At national level	• Member of the national Committee of the Ministry of Education for the secondary school reform (DM 8.7.85) and for physics curriculum (DM 14.2.86). • Member of the Scientific Committee of the Regional Research Institut of the Ministry of Education in Friuli Venezia Giulia from 1992 up to 2006. • Committe member of the national selection for PhD students in Physics (778 MURST, prot. 282/13.3.98). • Head of the national Master Science Education for teacher professional development: strategic project of the Ministry of Education with 6 universities cooperationg (2006-2008). • Head of the higher education Master for Energy Manager, FixO – Action 3 Strategic plan of Ministry of Labour (2008-2009) • Member of the Permanent Commission for Physics Education of the Italian Physical Society from 2012 up to 2017. • Vice-Director of the University Consortium Young Education and Guidance (GEO) from 1996 up to her election as Director (2014). • Member of the Scientific Committee of the Ministry of Education on *Teaching Experimental Sciences* (ISS Plan) (2006-2016). • Member of the Technical Committee of the Ministry of Education for Guidance (2008-2016). • Committee Member of the Italian Association for Physics Teaching (AIF) (1978-1993), being Vice-President for 6 years (1987-1993). • Editor of the peer review Journal of the Italian Association for Physics Teaching (AIF) “La Fisica nella Scuola” (1978-1993). • Editor of the peer review Journal of the Italian Conference of the Education Research “Università e Scuola” from its foudation (1996) up to 2016.

At local level	• Pro-rector for Guidance and Tutoring from 1994 to 2003 (Rector M Strassoldo) for School-university relationship, for Didactics and Tutoring from 2004 to 2009 (Rector F Honsell), for Young, Education and Guidance from 2010 to 2012 (Rector C Compagno) • Head of the Physics Department of the University of Udine for 7 years (2004-2010). • Responsible and founder in 2004 of the first Italian PhD in Physics Education, with collaborations with Barcelona, Paris VII, Ostrava, San Sebastian, Dresden, Torun and Washington University in Seattle. • Head of the university Master on Innovation on Teaching/Learning, ICT, Documentation and Guidance (60 cts) and of three Specialization Schools on the same topics (15 cts) (2003-2005). • Head from 2003 to 2007 the university School of Specialization for Secondary School Teachers (SSIS) of the Udine University, after the responsibility of its Section of Physics, Mathematics and Computer Science (FIM) from the foundation to the reform (2001-2007). • Head of the Interdepartmental Center for Research in Education (1998-2003) and member of the Committee of the national coordination for research in Education and teacher education CONCURED. • Promoter, head and founder of different institutional structure in the University of Udine: 1) Center for Research in Education (CIRD) and its Physics Education Research Lan (CLDF) (1994); 2) Center for Guidance and tutoring (CORT) (1994); 3) Specialization Course for teacher Education (CAP) having 22 specialization courses (1993) and later of the biannual School for secondary teacher education (SSIS) (2001); 4) Evaluation Nuclei of the Udine University (1995); 5) Committee for the regulation on Didactics in Udine University (1995); 6) Committee for the foundation of the Faculty for Primary Teacher Education in the University of Udine (1997).
Research	The research activity is relative to two main fields: 1) Electrical transport properties of metals in thin films, semiconductor and superconductors: experimental approach by means of resistivity and Hall coefficient measurements (1983-1994). 2) Physics Education Research and Teacher Education Research in scientific area (1976-2019), carried on continuously throughout the career on the following research lines: 1. Content research and conceptual learning in innovative paths, including research and development of instruments and methods, data collection protocols in secondary School curriculum: I) Focusing on laboratory, developing of apparatuses and learning proposals, i.e. on Moessbauer effect, Hall effect, electrical, optical and thermal properties of solids (resistivity, reflectivity, polarization, heat conduction), Quantum Physics, Superconductivity; II) Focusing on original prototypes for hardware and software systems to carry out the experiments online, such as experiments on the electrical, thermal and optical phenomena (Thermograph, Termocrono, Fente, Lucegrafo and H & R) and dynamic modeling (Sigma, SEQU). 2. Development, testing and implementation of research based ICT approaches in overcoming conceptual knots for scientific learning by

	means of empirical research methods: I) Innovative multimedia curriculum units in the field of mechanics, thermodynamics, electrical transport properties in solids, quantum optics and physics for secondary schools and universities; II) Learning Objects for blended e-learning activities; III) Proposal by means of Apps for mobile for experiments and educational paths in classical and modern physics for BYOM approach. 3. Models and strategies for pre-service and in-service scientific teacher education in primary school and in secondary school, developing proposals and testing implementation focusing on learning outcomes in classical and modern physics, and guidance. 4. Models for collaboration between school and university in institutional actions - according to the university research model CRUS. 5. Informal education: empirical research approach for conceptual change analysis in the context of an hands-on exhibition of 250 experiments to do and not just to look *Games Experiments Ideas* (GEI) on: I) prototype experiments at low cost and relative activities, II) exploratory teaching cards for teachers and students, III) Conceptual Laboratories (CLOE-Conceptual Labs for Operative Exploration) and role of operativity in learning processes, IV) multimedia software support in curriculum development for conceptual understanding; 6. Problem solving approach (PSO method) and role of open problem solving in learning different topics; 7. Computer based interactive environments for learning and for teachers professional development; 8. Learning process analysis and building of formal thinking in science education: design and testing of instruments and methods. 9. University teacher Education and strategies for innovation in teaching/learning at university level. 10. Model of Educational Reconstruction research approach for vertical proposals on Modern Physics in Secondary School and study of learning progression by means of Design Based Research for vertical path proposals
	Physics Education Research Projects carried out and scientific responsibility held are:
At international level	a) Responsible of the European project Inter-reg III Italy-Slovenia on materials for basic science education (2004-2006); b) Responsible for Italy in three European projects aimed at teaching electromagnetism and superconductivity: Supercomet2 (2005-2007), Mosem (2007-2009), Mosem2 (2008-2010); c) Responsible for the University of Udine in the EU projects STEPS and STEPS TWO (2009-2011); d) Responsible in-charge for Italy in the EU SECURE project of the 7the Framework Programme (GA 266640) on STEM curriculum http://secure-project.eu/home/ (2011-2013); e) Management Committee; Advisory Board Member and responsible for University of Udine in the EU Project HOPE, involving 70 EU universities from 2013 to 2016 on four main challenges on physics education: 1) Inspiring the young to study physics; 2) New Competences for Physics Graduates, Fostering Innovation and Entrepreneurship; 3) Improvements in Physics Teaching: Meeting Future Global Challenges in Physics Higher Education; 4) Improvements in the Training and Supply

	of Physics School Teachers <http://hopenetwork.eu/content/horizons-physics-education>
At national level	- Leader and scientific responsible of 15 biannual physics education research projects of National relevance, selected by National Centre of Research and Ministry of Education for researches in physics education and teacher education, including the role of the new multimedia technologies in learning processes in STEM and in Physics (1992-2007). - Responsible of two strategic triannual national projects of the Ministry of Education: a) Labtec: innovation in science teaching with new technologies (1999) and b) BRI – Research Grants for teachers on collaborative research school - university (2000). - Project Manager for advanced training in Integrated Energy Management Experts (EGE) selected under Action 3 of the Draft FixO of the Ministry of Labour (2008-2009).
At Regional level	- Responsible of 25 annual projects of the Ministry of Education on diffusion of scientific culture (L6/2000): planning and implementing physics education local action for over 1500 students. - Responsible for 4 projects selected by the Ministry of Education within the Three Year Plan of Development of Universities on guidance and mentoring (1995-2007). - Responsible for 5 Regional Projects on research based scientific paths: a)Exploring Design and Communicate physics (1999-2000), b) Aroles: Learning and Science Education Network (2002-2004), c) Sicuramente: science in road safety education (2009 -2012), d) problem-solving PSOF guidance specification (2011-12), e) art and science in curriculum (2012-2018).
Award	Italian Physical Society Award for Physics Education and Informal Learning research, 1998 IUPAP-ICPE Medal 2018
Congresses and Meetings	Responsible of the organization of the following international Meetings and congresses: - First International Meeting of Editors of Science Education Journals in the World, AIF-LFNS, Gaeta 1993 (24 Countries participants). - International Conference GIREP-ICPE “Teaching the Science of Condensed Matter and New Materials”, Udine 1995 (36 Countries participants) - First International GIREP Seminar “Developing Formal Thinking in Physics, Udine 2001 (25 Countries participants) - International AAPT-EPS-GIREP-ICPE Seminar “Quality Development of Teacher Training ”, Udine 2003 (41 Countries participants). - International Meeting on Frontier of Fundamental Physics FFP6, Udine 2006 (30 Countries participants). - International Conference of MPTL “Multimedia in Physics Teaching and Learning”, Udine 2009 (21 Countries participants). - International Meeting on Frontier of Fundamental Physics FFP9, Udine 2008 (28 Countries participants) - International Meeting on Frontier of Fundamental Physics FFP12, Udine 2011 (35 Countries participants). Responsible of the organization of the following national Congresses: ❑ XXXI Association for Physics Teaching (AIF) Congress, Udine 1992 ❑ LXXIX Italian Physical Society (SIF) National Congress, Udine 1993 ❑ XXXIII Association for Physics Teaching (AIF) Congress, Castellamare di Stabbia

	(NA), 1994. ❑ Responsible of the National Congress of the Conference of Italian Rectors and Ministry of Education on "Instruments and Models for university tutoring and guidance, 1998. ❑ Scientific Responsible of the Section of General Physics, History of Physics and Physics Education in the National Congresses of Italian Physical Society: LXXIX, Udine 1993; XCIV, Genova 2008; XCIX, Trieste 2013. ❑ National Congress CRUI-GEO-MPI on Strategies for University Development, Roma 2015 ❑ GEO National Round Table on Experience in Italian Universities for Innovation in Teaching/Learning – associated to G8 University, Udine 2016 ❑ National Congress CRUI-GEO on Innovation in University Teaching/Learning, Bari 2018 Key-note invited speaker in 28 international Congresses (AAPT, GIREP, EPS, IACPE, ICPE, LAPEN, LASERA, MPTL) and in 39 National Congresses.
Publications	More than 660 publications on books and journals with referees, 257 in English at international level document the research work.