

Curriculum vitae

PERSONAL INFORMATION

Family name, First name: Bertacco Riccardo
Researcher unique ident.: ORCID: 0000-0002-8109-9166, Author ID: 6701607076
Date of birth: 25th July 1968. Nationality: Italy
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FULL TRACK RECORD

165 Papers in international journals (Scopus). 4 chapters of scientific books. 8 patent applications (3 granted patents). H-index: 31 (Scopus) – 35 (Google Scholar). Total citations: 3507 (Scopus) – 4464 (Google Scholar).

SHORT PERSONAL PROFILE

I am a Full Professor of Physics at the Physics Department of Politecnico di Milano. Since 2010 I'm leading the Nanobiotechnology and Spintronics group (NaBiS) of the Physics Department. From 2019 to 2021 I have been the director of Polifab (<http://polifab.polimi.it>), the facility for micro and nanofabrication of Politecnico di Milano, consisting in a clean room of 650 m². I participate in the board of the Joint Research Center with ST Microelectronics. Starting from a background on electron spectroscopy and surface magnetism, my research activity is nowadays focused on spintronics, nanoelectronics, MEMS and on the applications of magnetism to biology and medicine.

EDUCATION

1994: Master degree in Electronic Engineering at Politecnico di Milano (100/100 cum Laude, Supervisor: Prof. L. Braicovich)
2000: PhD in Physics on magnetic thin films investigated by spin resolved electron spectroscopy (Supervisor: Prof. F. Ciccacci)

CURRENT POSITION(S)

2018 April - : Full Professor of Physics at Politecnico di Milano
2019 January – 2021 December: Director of Polifab
2016 April - : Associated researcher of the CNR-IFN Unit of Milano

PREVIOUS POSITIONS

1994 January – July: Electronic designer at BTicino (Varese, Italy)
1994 – 1996: Volunteer in Cameroun in a social project granted by Ministero Affari Esteri
1996 – 1999: PhD in Physics at Politecnico di Milano
1999 – 2005: Assistant professor at the Physics Department of Politecnico di Milano.
2005 – 2018: Associated Professor at the Department of Physics of Politecnico di Milano
2013 - 2018: Deputy Director of Polifab

FELLOWSHIPS AND AWARDS

2001 May - August: visiting researcher at the UMR137 CNRS-Thales (Paris), in the group of Albert Fert, Nobel prize for Physics 2007.
2005 July: invited professor at LMOV, CNRS-Université de Versailles (France)
2017 April: "Art in magnetism award", by IEEE
2018 October: Disruptive Innovation Award (TMek project) – Switch to Product 2018 competition (Deloitte, Bocconi University, Politecnico di Milano)
2019 November: Innovation Awards (Fresh Megnet project) - Switch to Product 2019 competition (Deloitte, CNR, Politecnico di Milano)

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

In my career, I have been the tutor of more than 30 graduate students (roughly 2/year), 15 PhD students and 5 post-docs. All former PhD students are still working in research, both in research institutions (S. Brivio - CNR, A. Cattoni - CNRS, L. Baldrati - Institute of Physics Mainz, S. Varotto – UMR CNRS-Thales, etc..) and in

high-tech companies (M. Monticelli - STM, M. Riva - SAES Getters) where they also coordinate R&D groups. A former PhD student has founded in Denmark a company in the field of biosensing (M. Donolato - www.blusense-diagnostics.com). Another PhD student (G. Redaelli) has been the head of the IIT start-up on graphene.

TEACHING ACTIVITIES

Since 1999 I give annual courses of classical physics and, since 2006, an advanced course on "Nanomagnetism and Spintronics" at Politecnico di Milano. Furthermore I give lectures in PhD schools (2012, 2014, 2016, 2018 editions of the AIMAGN School of Magnetism; PhD course on Lab on Chip 2010-2012-2019, Politecnico di Milano; School "New frontiers in down-scaled materials and devices", Otranto, 2014).

ORGANISATION OF SCIENTIFIC MEETINGS

2012 – June: Chair of the first edition of the conference SuperFOx (Superconductivity and Functional Oxides, 110 participants) held in Como

2014-16-18: Member of the scientific committee of SuperFOx (Roma, Torino, Salerno; 100 people)

2016: Symposia organizer for the conference JEMS – Glasgow (700 participants)

2017: Member of the scientific committee of FISMAT 2017 – Trieste (1000 participants)

2019: Member of the scientific committee of MAGNONICS 2019 – Brindisi (150 participants)

2020: Member of the scientific committee of JEMS 2020 – Lisboa (about 700 participants)

2024: member of the organizing committee of ICM 2024 (Bologna – 2000 participants)

INSTITUTIONAL RESPONSIBILITIES

1999- : Faculty member of Politecnico di Milano

2019-2021: Director of the cleanroom of Politecnico di Milano (Polifab)

2017- : Delegate of Politecnico di Milano for the participation in the Task Force for Research Infrastructures of Conference of CESAER

2018-2023: Member of the Board of the Joint Research Center “MEMS LAB” between ST Microelectronics and Politecnico di Milano.

REVIEWING ACTIVITIES

2012 – PhD Evaluator, Universidade Tecnica de Lisboa, Portugal

2015 – PhD Evaluator, University of Miano Bicocca and University of Genova, Italy

2016 – Evaluator of scientific proposals for the FUNMAT-FIP call (ICMAB-CSIC), Spain

2017 – PhD Evaluator, Royal Holloway, University of London, UK

2018 – Evaluator of scientific proposals for the French National Research Agency (ANR)

2019 - Reviewer of a CoG ERC project

2020 - Reviewer of research projects for the Swiss National Science Foundation

Reviewer of prestigious scientific journals, (e.g. Nature Nanotechnology, Phys. Rev. Lett., Appl. Phys Lett, Phys. Review B, Lab Chip, Langmuir, ACS Nano).

MEMBERSHIPS OF SCIENTIFIC SOCIETIES

2014 – Member of the IEEE Magnetic society

2018 – Founding Member of the Italian Network for Micro and Nanofabrication (It-Fab)

2020 - Member of the General Council of the European Magnetism Association (EMA)

MAJOR COLLABORATIONS

2001- : Unité Mixte de Physique UMR-137 – Thales (Albert Fert): Spintronics

2002- : ICMAB-CSIC (Josep Fontcuberta): Functional oxides

2004- : CNR-SPIN, Chieti, Italy (Silvia Picozzi): DFT calculations

2010 - : Trinity College of Dublin (Stefano Sanvito): Modelling of spin dependent transport

2008 - : CIC-nanoGune, Donostia, Spain (Paolo vavassori): Micromagnetism, magnetic nanoparticles (

2015- : MIT (Geoffrey Stephen Beach): Spintronics

2010- : ICRM-CNR, Milano, Italy (Marcella Chiari): Biosensors Lab on Chip

2017- : Department of Biomedical and Clinical Sciences “Luigi Sacco”, Milano, Italy (S. Antinori): Diagnostic tests for malaria
2019- : Istituto Superiore di Sanità, Rome, Italy (P. Alano): Diagnostic tests for malaria
2019- : Medical Research Council Unit The Gambia (MRCG), London School of Hygiene and Tropical Medicine (U. D’Alessandro): Diagnostic tests for malaria
2019- : CNRS-SPIN – Genova (L. Pellegrino) – FET project OXiNEMS
2019- : University Gabriele d’Annunzio of Chieti-Pescara (S. Della Penna) – FET project OXiNEMS

GRANTED PROJECTS

1. SPINBIOMED – Spintronic biosensors for medicine (Cariplo Foundation, 400 k€, coordinator). 2009-12
2. ECOMAG – Electric control of magnetization in spintronic devices” (Cariplo Foundation, 250 k€, coordinator) . 2011-13
3. NANOMED – Feasibility study for the application of nanotechnology to medical diagnostics in lab-on-chip devices”, (Cariplo Foundation, 50 k€, coordinator). 2011-12
4. LOCSSENS - Innovative platform based on analytical systems for the rapid detection of bacterial and viral contamination in agrifood applications (MIUR- Regione Lombardia, 208.000 €, coordinator of POLIMI unit). 2012-15
5. FIRB Project RBAP115AYN "Oxides at the nanoscale: multifunctionality and applications” (MIUR, NaBiS grant 110.000 €, coordinator of the NaBiS activity). 2012-14
6. POLIFAB - Realization of a facility for micro and nanofabrication at Politecnico di Milano (Politecnico di Milano – 2ML of €, deputy/technical director). 2012-15
7. ESCHILO - Early Stage Cancer diagnosis via Highly sensitive Lab-On-chip multitarget systems (MIUR-Regione Lombardia –150.000 €, coordinator of the NaBiS activity). 2013-16
8. Tid Mekii - Rapid diagnostic test for malaria (Polisocial Award – POLIMI), 90.000 €, 2016-18
9. READy – Network REgionAle per lo sviluppo di metodi Diagnostici in risposta rapida a epidemie emergenti e bioemergenze, (EU-FERS Lombardy Region, 418.000 €, coordinator POLIMI) 2017-19
10. SWING - Patterning Spin-Wave reconfigurable Nanodevices for loGics and computing, (MSCA-IF-2015-GF, 244.000 €, POLIMI coordinator), 2016-19
11. OXiNEMS - Oxide Nanoelectromechanical Systems for Ultrasensitive and Robust Sensing of Biomagnetic Fields (H2020 FETOPEN – RIA, 150.000€, CNR-IFN Unit coordinator), 2019-23
12. MW Processing with spin waves (Huawei, 130.000€, PI), 2020

GRANTED PATENTS

1. BERTACCO R., P. VAVASSORI. “*Spintronic biosensors with active area localized on a magnetic domain wall*”. d PCT/EP2009/054808 (2009) Politecnico di Milano
- 2/3. BERTACCO R., M. DONOLATO, M. GOBBI, M. CANTONI, S. BRIVIO, D. PETTI, P. VAVASSORI. “*Manipulation of magnetic particles in conduits for the propagation of domain walls*”, VI2009A000026(2009); PCT/EP2010/000879(2010) Politecnico di Milano - nanoGune Consolider
4. BERTACCO R. et al. “Device and method for the quantification of corpusculated and non corpusculated blood components, PCT/WO2019016691 (2019).

INVITED TALKS OVER LAST 10 YEARS

25 invited talks, most relevant ones during last 5 years are listed below:

1. “TMek: a quantitative lab-on.chip rapid diagnostic test for malaria”, JEMS 2019, Uppsala, 26 August 2019
2. “TMek: the revolutionary rapid diagnostic test for malaria”, IBCM 2019, Kaliningrad, 18-22 August 2019
3. “Reconfigurable metamaterials for spin computing”, Advances in Magnetism 2018 (AIM 2018), La Thuile, 5-7 February 2018.
4. “Ferroelectric tunnel junctions for memcomputing”, 8th International Workshop on Characterization and Modeling of Memory Devices (IWCM2), Milano, September 28-29, 2017.

5. “Crafting magnetic anisotropy landscapes in exchange-bias multilayers for the manipulation of spin waves”, Intermag 2017, Dublin, April 24-28, 2017
6. “Crafting a magnetic anisotropy landscape at the nanoscale”, EMSA 2016, Torino, July 2016
7. “On-off switching of the interfacial magnetic order at the Fe/BaTiO₃ interface: impact on hybrid magnetic-ferroelectric tunneling junctions”, MMM conference, Beijing, May 2015
8. “Ferroelectric Rashba Semiconductors: a new paradigm for semiconductor spintronics”, Workshop on “Frontier of Spintronics and Magnetic Sensing”, Beijing, May 11 2015

RESEARCH EXPEDITIONS THAT THE APPLICANT PRINCIPAL INVESTIGATOR HAS LED

In April 2019 I lead an expedition of 15 days in endemic zone for malaria (Mbalmayo – Cameroun), with three PhD students, for the preclinical validation of the diagnostic test TMek. I managed the whole procedure with the local Ethical Committee to obtain all the authorization required and took care of the logistics for such an expedition in a country familiar to me but with a critical political situation.

MAJOR CONTRIBUTIONS TO THE EARLY CAREERS OF EXCELLENT RESEARCHERS

During my career I had the honour of mentoring excellent students and some of them are now excellent researchers. Just to mention some examples, my first PhD student, M. Cantoni, is now an Associate Professor of Physics. One member of my group, E. Albisetti, recently got a ERC starting grant with the project B3MORE. Another past PhD student, M. Donolato, is the co-founder of a successful company (www.blusense-diagnostics.com) dealing with the development of lab-on-chip diagnostic devices based on a proprietary technology.

EXAMPLES OF LEADERSHIP IN INDUSTRIAL INNOVATION OR DESIGN

As director of Polifab and member of the board of the Joint Research Centers “MEMS Lab and STEAM” with STMicroelectronics I’m deeply involved in industrial innovation, being responsible of specific projects for the development of MEMS technologies, as well as of the whole joint research activity carried out at Polifab. After the prevalidation of the rapid diagnostic test for malaria TMek, I’m also participating in the acceleration process of the startup TMek.