

Curriculum Vitae

PERSONAL INFORMATION

Valeria Braccini



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Sex F | Date of birth [Redacted] | Nationality Italian

WORK EXPERIENCE

- February 2010 - present **Level III Researcher (permanent)**
CNR-SPIN, Genova, I
- March 2010 – March 2011 **Visiting Scientist / Researcher at**
Applied Superconductivity Center, NHMFL, Tallahassee, FL, USA
- May 2005 – January 2010 **Research Scientist (fixed-term)**
at CNR – INFM LAMIA, Genova, I
on 'Development of MgB₂ superconductors for high-field applications' in the framework of the EU-FP6 STRP "HIPERMAG" 'Nano- and micro-scale engineering of higher-performance MgB₂ composite superconductors for macro-scale applications'
- February 2004 – April 2005 **Post-doctoral Fellow**
University of Genova, I
on: "Synthesis and properties of magnesium diboride superconducting samples"
- July 2003 – January 2004 **Post-doctoral Fellow as Research Associate**
Applied Superconductivity Center - University of Wisconsin, Madison-WI (USA)
- April 2003 – July 2003 **Research Grant**
INFM, Genova, I
on: "Preparation of pure and doped MgB₂"
- March 2002 – March 2003 **Research Intern**
Applied Superconductivity Center - University of Wisconsin, Madison-WI (USA)
- Career breaks* *I have been on maternity leave for the birth of my three children in the following periods: May - October 2007, November 2008 - September 2009; April – December 2014.*

EDUCATION AND TRAINING

- April 2003 **PhD in Physics**
University of Genova, I
Dissertation title: "Superconducting behaviour of bulk MgB₂: dependence of critical temperature, irreversibility line and upper critical field on the normal state properties"
- July 1999 **Degree (Laurea, 4 years curriculum) in Physics, magna cum laude**
University of Genova, I

RESEARCH ACTIVITIES

Starting during my PhD thesis and afterwards, I have acquired multidisciplinary competencies particularly in superconductivity and more in general in condensed matter physics and material science, from the preparation of various materials (oxides and intermetallics) under different forms (polycrystalline, thin films, tapes and wires) to the study of their physical properties (structural, morphological, magnetic and transport properties).

I started during my degree thesis work and for part of my PhD with the study of artificial superconducting materials, i.e. thin film Pulsed Laser Deposition of multilayers of pure and doped infinite phases.

After the superconductivity was discovered in Magnesium Diboride (MgB₂) in 2001, I started an intensive work on this novel material. During my PhD I developed an original procedure to synthesize polycrystalline high-purity MgB₂, leading to an international patent, and I worked at the production of powders for tapes preparation, their fabrication through the Powder-In-Tube (PIT) method and the

characterization of tapes and thin films through electromagnetic measurements. I spent part of my PhD and post-doc at the ASC of the UW – Madison, working in the group of Prof. D.C. Larbaestier. My research work has been devoted to the alloying of high purity polycrystals and the extensive study of the very high-field properties of such polycrystals and thin films. In particular, I led a collaboration between several universities in the US and Europe, collecting and measuring at NHMFL samples with very different properties reaching record upper critical values.

After my return in Genova, I kept investigating MgB₂. As far as the fundamental physics aspects, I worked at the electromagnetic characterization of doped and neutron irradiated MgB₂, while on the applicative side I was active in the fabrication and characterization of MgB₂ tapes in the framework of the EU-FP6 STRP “HIPERMAG”, in industrial collaborations with ASG and Columbus Superconductors, within the Project FIRB RBIP06M4NJ and the project funded by the MAE for the bilateral cooperation between Italy and US. In particular, one of the best results was the achievement after doping of one of the highest critical current values in magnetic field reported in the literature on MgB₂ practical conductors, which demonstrated the possibility of a commercial use of MgB₂. The paper production has been very high in these years: I published 44 papers on MgB₂, either on bulk, tapes and films, with a total of 2031 citations.

During the year spent at ASC-NHMFL, my research work has been regarding the properties relevant to the high field, low temperature magnet use in commercial IBAD-MOCVD Coated Conductors prepared with the incorporation of BaZrO₃ (BZO) nanorods, through the deep study of the critical current over their full angular range up to fields of 31 T. I worked in collaboration with SuperPower Inc. and the three papers we published jointly led to 217 citations.

When I returned back to CNR, I started working on Fe-based superconductors, and collaborated to the activity on Bi-2212 wires. In particular, I worked on the Fe(Se,Te) phase: starting from the transport properties characterization of polycrystals, I then moved to a wide activity on thin films, which spanned from the deposition through Pulsed Laser Ablation on a variety of substrates (single crystals, bicrystals, metallic templates), to the characterization of the structural and superconducting properties, to the study of the grain boundaries, to the influence of intrinsic and extrinsic defects on the phase diagram as well as on the vortex dynamics. More recently, I focused on an original idea of developing metallic templates for the fabrication of simple Coated Conductors, either without or with very simple buffer layers and I was involved in the development and study of Bi-2212 multifilamentary wires through an innovative technique developed at SPIN. All such activities have been performed in collaborations with many research groups in Italy (within SPIN with the Research Units of Salerno and Napoli, with CNR-IMM, with the Universities of Genova, Salerno, RomaTre, Tor Vergata, Politecnico di Torino, with ENEA Frascati, with Eni SpA) and worldwide (NHMFL and ASC in Tallahassee, FL, HFML Nijmegen, IFW Drsedon, KIT Karlsruhe, Kyushu University, CERN, CEA Grenoble), and within several projects (between them the EU-Japan NMP “SUPER-IRON”, the Addendum FCC-GOV-CC-0086 to the Memorandum of Understanding for the FCC study with CERN, the PRIN 201785KWLE HIBiSCUS, the JRA CNR – Eni), leading to 41 papers with 1465 citations.

RESEARCH PROJECTS

PI of Projects

I have been **Principal Investigator** of the following Projects:

- **Responsible for CNR** of the Sottoprogetto 4 of the JRC Fusione “Sviluppo di superconduttività: materiali e processi produttivi, in particolare per materiali ad alta T_c” within the JRA CNR – Eni (2019-2024)
- **Responsible for CNR-SPIN Unit** of the project HIBiSCUS – High performance-low cost Iron BaSed Coated condUctorS for high field magnets - PRIN 201785KWLE (2019-2023)
- **Responsible for CNR-SPIN** of the IEEE Sponsorship of the International Workshop IBS2app (2020)
- **Responsible of the Work Unit** “Development of IBS conductors” in the Addendum FCC-GOV-CC-0086, EDMS 1750320 / KE 3507 to the Memorandum of Understanding for the FCC study with CERN (2017-2020)
- **Responsible** of the Project AD003.029 “Superconduttori a base di Ferro depositati su substrati metallici” within the MIUR-funded Project “Tomografo MRI Interventivo” (2016-2018)
- **Responsible** of the Project Premiale 2012 AD001.097 - Tecnologie integrate ed ecosostenibili per la produzione, l'accumulo e l'utilizzo dell'energia (2014–2016)

Participation in Projects

I participated to the following Projects:

- FP7-NMP-2011-EU-Japan “SUPER-IRON, Exploring the potential of Iron-based Superconductors” (2011-2013)
- MIUR-funded PRIN “Studio, definizione e sviluppo di un cavo in MgB₂ con proprietà elettriche e termiche adatte al suo utilizzo in un limitatore di corrente” (2009-2010)
- MAE bilateral cooperation Italy-USA funded project on “MgB₂: from microscopic mechanisms to large scale applications” (2008-2009)

- FP6-NMP EU-FP6 STRP NMP3-CT-2004-505724 "Nano- and micro-scale engineering of higher-performance MgB₂ composite superconductors for macro-scale applications (HIPERMAG)" (2004-2008)

CONFERENCES

Conference participation

I gave many talks at the main international conferences/workshops on superconductivity, especially applied superconductivity. Among them, I gave the following **invited talks**:

- in symposium E2 of the Material Research Meeting 2021 (MRM2021), Yokohama, Japan
- at ICSM 2020, 7th International Conference on Superconductivity and Magnetism, Milas-Bodrum, Turkey
- at EUCAS 2019, 14th European Conference on Applied Superconductivity, Glasgow, UK

Conference Organization Tasks

- **Chair of the Materials sub-committee**, on the Scientific Programme Committee (SPC) for the 16th European Conference on Applied Superconductivity EUCAS2023 (Bologna, Sep 2023)
- **Chair of the Symposium QT11 — Superconducting Materials and Applications of 2022 MRS Spring Meeting and Exhibit** (Honolulu, Hawaii, USA, May 2022)
- **Member of the Materials Program Committee** of the Applied Superconductivity Conference ASC 2020 (Virtual, Oct 2020) and ASC 2018 (Seattle, WA, USA, Oct 2018)
- **Chair and Member of the Scientific and Organizing Committee** of the 1st International workshop on "Iron-based Superconductors: advances towards applications" (Santa Margherita Ligure, Genova, Feb 2020)
- **Member of the Organizing Committee** of SuperFox2020, 5th Conference on Superconductivity and Functional Oxides (Santa Margherita Ligure, Genova, Feb 2020)
- **Member of the "Wires Tapes and Conductors" Program Committee** of the 12th European Conference on Applied Superconductivity EUCAS 2015 (Lyon, F, Sep 2015)
- **Member of the Organizing Committee** of the 11th European Conference on Applied Superconductivity EUCAS 2013 (Genova, Sep 2013)

MANAGEMENT TASKS

- Since 2016: Member of the Italy Chapter of the IEEE CSC Council on Superconductivity
- 2016 – 2020: Member of the CNR-SPIN Executive Board
- Since 2021: Member of the Editorial Board for Smart Materials for the journal Materials
- 2019 – 2021: Member of the Advisory Board of Supercond. Sci. Technol.
- Guest Editor of the Focus Issue "Iron-Based Superconductors 2020: Advances Towards Applications" in Supercond. Sci. Technol.
- Technical Editor of Vol 32 Issue 4 (2022), Vol 28 Issue 4 (2018), Vol 24 Issue 3 (2014), Vol 23 Issue 3 (2013) of IEEE Trans. Appl. Supercond.
- Referee for Institute of Physics (IOP), American Institute of Physics (AIP), Elsevier and Institute of Electrical and Electronic Engineers (IEEE) journals

HIGHER EDUCATION and TRAINING SKILLS

- Contract for teaching the "Superconductivity" Course (cod. 61865, SSD FIS/03, 6 CFU), Master in Physics of UniGe, for the Academic Years 2021/22, 2020/21, 2019/2020
- Holder of the teaching course "Applied Superconductivity" for the PhD School in Physics at UniGe, Academic Year 2016/17
- Supervisor of 3 PhD Thesis in Material Science, 1 Master Thesis in Physics, 1 Master Thesis in Material Science, 1 Degree Thesis in Material Science
- External Examiner of a PhD Thesis in Engineering Sciences, University of Southampton, Faculty of Engineering and the Environment

OUTREACH

- 2022: member of the Organizing Committee of the event "Gender Asymmetries: The case of STEM" (<https://asimmetriedigenere.unige.it/>) held in Genova on 17/06/2022
- 2019 – 2021: Member of the Working Group "Superconductivity Events – Genova 2020" for the organization of training and dissemination events – i.e. EEASISCHOOL3 post-graduate school of Applied Superconductivity, EASITRAIN young researchers' workshop on superconductivity and cryogenics, Exhibition of the Itinerant Exhibition of CERN: "THE CODE OF THE UNIVERSE a photographic journey of discovery", exhibition on superconductivity at Festival della Scienza - within the EASITrain project - H2020-MSCA-ITN-2017

doi: 10.1063/1.1384905

IF: 3.791, citations: 315

4. **V Braccini**, D Marré, A Mollica, G Grassano and A S Siri
Deposition of (Ba,La)CuO₂/CaCuO₂ superconducting multilayers by pulsed laser ablation
International Journal of Modern Physics B 14 (2001) 2713
doi: 10.1142/S0217979200002818

IF: 1.404, citations: 1**2000:**

1. **V Braccini**, D Marré, G Grassano and A S Siri
Superconducting artificial multilayers based on (Ba,Ca)/CuO₂ grown by pulsed laser ablation
Proceedings of SPIE - The International Society for Optical Engineering 4058 (2000) 203
doi: 10.1117/12.397859

Citations: 1**1999:**

1. D Marré, **V Braccini**, A Canesi, S Gariglio, I Pallecchi, M Putti, A S Siri, F Arciprete, G Balestrino, P G Medaglia and G Petrocelli
Epitaxial growth and characterisation of artificial and superconducting superlattices deposited by pld
International Journal of Modern Physics B 13 (1999) 1061
doi: 10.1142/s0217979299000953

IF: 1.404, citations: 0

- Book Chapters I have co-authored 3 Book chapters, between them: A Malagoli and **V Braccini** "MgB₂ wires fabricated using the ex situ technique", Chapter 4b in "MgB₂ superconducting wires, Basics and applications", ed. by R. Flukiger, published by World Scientific in Applications of Superconductivity and Related Phenomena, vol. 2 (2016)
- Book I Pallecchi, **V Braccini**, A Malagoli "I materiali superconduttori per le applicazioni su larga scala" ed. by inriga edizioni (2022)
- Patent I am Inventor of the International Patent "A method for synthesizing magnesium diboride (MgB₂) in bulk form"; Pub. n. WO03043936 (2003); Inventors: **V Braccini**, P Manfrinetti, A Palenzona; Applicants: **V Braccini**, P Manfrinetti, A Palenzona, INFN (IT); Classification: International C01B35/04; C01B35/00; (IPC1-7): C01B35/04; European: C01B35/04; Application n.: WO2002IB05158 20021121 Priority n.: IT2001TO01098 20011123

Genova, August 3rd, 2022

Valeria Braccini