CV of SAMUELE SANNA

EDUCATION

2005-2006: Attendance of the full first year of the SISS school for the abilitation to teach Physics and Mathematics at the High School, University of Cagliari.
***06.05.2002*:** PhD in Physics – University of Cagliari, Department of Physics, ITALY
Dissertation: "*The correlation between electric, magnetic and structural properties of the 123 HTc superconductors*"
***January–May 2001*:** Stage at the Physics Department of the University of Parma, ITALY, on "*NMR and μSR spectroscopy on HTc superconductors*", funded by INFM (Italian Institute for Matter Physics)
***04.06.1998*:** Master of Physics cum laude, University of Cagliari, Department of Physics, ITALY

CURRENT POSITION: Assistant Professor at the Physics Department of the University of Pavia

PROFESSIONAL EXPERIENCE:

Research Positions:

***September 2006-December 2009*:** CNISM Reserch Associate at the Physics Department of the University of Parma.
April 2003 –August 2006: post-doc fellow, employed by the University of Cagliari on: "Electronic and magnetic properties on metal transition oxides".
January 2002 – January 2003: post-doc fellow, employed by INFM on: *Spin and charge ordering in HTc* $YBa_2Cu_3O_{6+x}$. (Cagliari and Parma Univ.).

International Large Facilities Access:

Many experiments at Large Scale Facilities, as principal investigator for many of them – namely at ISIS (UK) and PSI (CH) for μSR, at ILL (FR) for Neutron Diffraction, and recently at ESRF (FR) for EXAFS and at BESSY (DE) for XANES.

Journal Reviewing

Physical Review Letters, Physical Review B, Physica B

Educational Activities:

Supervisor of several Master thesis, graduate students and post-docs since 2005
2013- today: Superconductivity, within the Course of Complements of Matter Structure
2011-2014: Lectures General Physics (part II)
2009-today: Lectures on Introduction to the Physics of Solids
2006/2008: Assistant to the courses of General Physics (part I and II)
2005/2006: Lectures on Experimental Magnetism for Master students
2002/2004: Assistant to the courses of Physics Laboratory (part II and IV)

SCIENTIFIC ACTIVITY

My **main research interest** has been the experimental study of High Tc superconducting compounds (mainly Cu- and Fe-based). Until 2009 I dealt mainly with the synthesis of polycrystal superconductors and in studying the correlation of their magnetic, structural and transport properties. In the period 1997-2000 during my PhD, I contributed to improve a topotactic technique, under the supervison of Prof. P. Manca, for controlling oxygen order in the compounds of the YBCO family. From 2001, due to the premature death of Prof. Manca, I continued my experimental activity in the synthesis and characterization laboratories at the Physics Dept. of the Cagliari University in *completely independent conditions*. Thanks to sample quality and to their well defined oxygen order they have been the subject of numerous national and international collaborations, with many approved experiments at international Large Scale Facilities (ISIS, PSI, ILL, ESRF, BESSY). This activity was integrated with the regular frequentation of the Phys. Dep. of Parma University.

My research is not focused on a single experimental technique, but it is guided by the scientific problem at hand. This philosophy stimulated many collaborations and, besides the synthesis of samples, I directly employed **several experimental techniques,** such as XRD and neutron diffraction, conductivity and thermopower, SQUID megnetometry, NQR, μSR and, more recently, XAS.

In 2004-2005 I also partially dealt with the electrical and magnetic characterisation of charge-transfer salts based on cationic and anionic platinum dithiolenes.

During my stay in Parma (2006-2008) I built-up a synthesis lab for the solid state synthesis of materials and I continued my research activity on cuprates, with several experiments in International large Facilities. In 2008 I started to investigate the new Fe-As superconductors, in particular dealing with their synthesis (in quarzt tube and under high pressure conditions) and muSR experiments.

Since 2011 I started to deal also with new molecular magnets (PRIN project as coordinator) and more recently I started to employ the NMR technique in the Hydrogen Storage Research (Unit responsible- Cariplo Foundation since April 2014).

I am author or co-author of more than 60 publications.

INVITED TALKS

- 23 Giugno **2015**: "*Interplay between magnetism and superconductivity in itinerant superconductors*", Technische Universität Dresden, Germany.
- 14 June **2015**: "Tuning the quantum critical point by Mn impurities and chemical pressure in $LaFeAsO_{0.89}F_{0.11}$", International SUPERSTRIPES Conference, 13-18 June 2015 Ischia.
- 18 July **2014, "**Phenomenological behaviour of the magnetic penetration depth in 1111: a μSR study" WORKSHOP $N_{\top}$ M2014 NMR, μSR, Mössbauer spectroscopies in the study of Fe-based and other unconventional high-Tc superconductors, Leibniz-IFW Dresden, Germany, 17 – 18 July 2014
- 13 June **2014**, "Impurity Effect on the Interplay Between Magnetism and Superconductivity in 1111 Iron-Pnictides", CIMTEC 2014 - 13th International Ceramics Congress & 6th Forum on New Materials, Montecatini Terme, Italy, June 8-20, 2014.
- 30 April **2014**, "Tuning the Superconducting and Magnetic Properties of Optimally Electron-doped 1111 Iron-Pnictides by Ru and Mn Impurities", 4th International Conference on Superconductivity and Magnetism- ICSM2014, Antalya between 27th April -2nd May, 2014.
- 13 December **2012**, "Effect of spinless and magnetic impurities on the interplay between magnetism and superconductivity in optimally electron-doped oxypnictides", IFW Institute of Dresda (Germany)
- 20 March **2012**, "Correlated Trends of Magnetism and Superconductivity in Oxypnictides", International workshop on "Multifunctional Advanced Materials: Probe and Theory", Salerno.

- **2011**- September, “μSR investigation of the interplay between magnetim and superconductivity: from cuprates to oxypnictides” International workshop JUMP2011, Paul Sherrer Institute, Villigen (CH).
- **2011**-March, “Magnetic properties of superconductors”, Facultad de Ingenierıa Mecanica y Electrica - Universidad Autonoma de Nuevo Leon, Monterrey, Mexico
- **2010**-October, “Competing orders in superconducting pnictides”, International Workshop “Emergent trends in advanced correlated materials”, Capri.
- **2010**-September, “Competing orders in high Tc superconductors”, Conferenza Nazionale di Fisica, SIF, Bologna.
- **2009**-September, ”Competition of magnetism and superconductivity: from cuprates to pnictides as seen by muSR”, International Workshop on Strongly Correlated Materials: “Superconductors by the Mediterranean Sea: Classic and Novel Materials, Electronic States and Critical Properties”, Alghero, Italy, Sept 7-11 (2009).
- **2008**-Dicember, “muSR results on the magnetic and superconducting properties of SmFeAsO1-xFx”, International STRIPES Conference, Roma.
- **2008**-May, “Perspective of high-pressure synthesis of Fe-based superconductors”, National workshop on Fe-based layered superconductors, CNR, Roma
- **2007**-April, “Evidence for dual band behaviour in underdoped Y1-xCaxBa2Cu3O6+y” presso Dipartimento di Fisica, Università di Cagliari.
- **2004**-January, “Internal fields in the coexisting superconducting and magnetically ordered state of YBa2Cu3O6+x” presso Dipartimento di Fisica, Università di Parma.
- **2001**-Dicember, “Oxygen-ordering related phenomena in oxygen-equalized pair samples of YBa2Cu3O6+k” presso Dipartimento di Fisica, Università Roma “La Sapienza”

Principal results obtained

Accurate investigation of the tetragonal-to-orthorhombic phase transitions [PRB2000, PRB2001] and, within unprecedented detail, the antiferromagnetic-superconducting boundary [SSComm.2003, PRL2004, ISIS HIGHLIGHTS 2004, PRB2010a] of YBCO superconductors. The influence of cationic disorder in the cluster spin glass magnetic regime has been clarified (PRB2008, PRB2010RapidA).

Detailed study of the coexistence of static magnetism and superconductivity at the highly debated boundary transition of oxypnictides [PRB2009; PRB2010RapidB, PRB2011Rapid,] and for impurity-substituted optimally doped compounds (PRL2011, PRB2012, PRB2013). NMR and muSR study of the role of rare earth and Fe fluctuations [PRB2010RapidC, PRL2011].

NMR study on Storage and Diffusion of Hydrogen in graphene [J. Phys. Chem. C 2014].

Funding ID

Period	Current Research Grants: Title	Funded by	Amount (Euros)	My partecipation
Jan-Dec 2002	Investigation of structure-related phenomena in cuprates	National Young researcher funding (Cagliari University) 2001	2.000	Principal investigator.
Jan 2006 -Jan 2008	*Coexistence of magnetism and metallicity in high-T_c superconducting oxides*	PRIN–MIUR 2005 (Italian Ministry of Scientific Research)	60.000	Coordinator for the experimental part. This project joins theory and experiment. The principal investigator was a theoretician (Vincenzo.Fiorentini@dsf.unica.it).
Jan 2007 -Jan 2009	*Search for universal critical parameters in cuprate high-Tc superconductivity*	PRIN–MIUR 2006 (Italian Ministry of Scientific Research)	90.000	Co-investigator, coordinating the sample preparation work and the μSR experiments. The principal investigator was Prof. R. De Renzi.
2010-Oct2012	Topological effects and entanglement in magnetic molecular clusters and chains	PRIN-MIUR 2008	234.000	National Coordinator
2012-2014	Microscopic studies of dissipative process in new Fe-based superconductors	Cariplo Foundations	90.000	Co-investigator. The principal investigator is Prof. P.Carretta
2014-2016	Carbon based nanostructures for innovative hydrogen storage systems"	Cariplo Foundations	90.000	Unit Responsible