

PERSONAL INFORMATION and CONTACTS

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CURRICULUM VITAE DI FRANCESCA TELESIO

CURRENT POSITION

JANUARY 2016- **POST-DOCTORAL RESEARCHER** (Assegnista) in the framework of EU ERC

Advanced Grant PHOSFUN

Istituto Nanoscienze -CNR and Scuola Normale Superiore

NEST laboratory, Pisa (Italy); Supervisor: Dr. Stefan Heun

Principal investigator of the CNR-Istituto Nanoscienze SEED project 2017 SURPHOS "Surface Properties of black Phosphorus investigated by Scanning Tunnelling Microscopy".

Device fabrication and investigation of exfoliated black phosphorus (bP) by low temperature magnetotransport. Sample preparation and supervision of scanning tunneling microscopy experiments on exfoliated bP. Study of exfoliated bP functionalized with metal nanoparticles. Device fabrication and measurements on field effect transistors based on bP/polymer nanocomposites.

WORK EXPERIENCE

JANUARY 2015 - **POST-DOCTORAL RESEARCHER** (Assegnista)

DECEMBER 2015 Università degli Studi di Genova, Physics department; Supervisor: Dr. Daniele Marrè

Investigation of complex oxides, in particular Iridates and Heusler compounds with particular interest in thermoelectric and magnetic properties.

EDUCATION

2012-2014 **PHD IN PHYSICS**

University of Genova, Italy, with University fellowship

Defense date: March 6th, 2015

Thesis title: "Novel functionalities in the $\text{LaAlO}_3/\text{SrTiO}_3$ interface"

Supervisors: Prof. Daniele Marrè (University of Genova) and Dr. Ilaria Pallecchi (CNR-SPIN)

External supervisor: Prof. Agnes Barthélémy (University of Paris Sud, CNRS-Thales)

The PhD has been carried out in collaboration with CNR-SPIN (Institute for Superconductors and Innovative Materials of Italian National Research Council).

Investigation of thermoelectric and spin transport properties of the 2 dimensional conducting system formed at Lanthanum Aluminate/Strontium Titanate interface:

- *thermopower measurements under gate voltage at low temperature,*
- *planning and realization of experiments in order to investigate both equilibrium and non equilibrium spin properties of Lanthanum Aluminate/Strontium Titanate, integrated with the epitaxial ferromagnetic oxide Lanthanum Strontium Manganite.*

Teaching experience:

Mechanics (1st semester of General Physics course) for Chemical and Electrical Engineers, academic years 2012/2013 and 2013/2014

Electromagnetism (1st semester of General Physics course) for Naval Engineers, academic year 2012/2013

Stages with high school students (2012, 2014)

2009-2011 MASTER DEGREE IN PHYSICS (LAUREA SPECIALISTICA)

October 27th, 2011, evaluation 110/110 cum laude, at Università degli Studi di Genova

Curriculum: Condensed Matter Physics

Thesis title: "Study of spin diffusion length in crystalline oxides heterostructures"

Supervisor: Dr. Daniele Marrè

Characterizing courses of condensed matter curriculum for master degree:

- Mesoscopic systems and nanostructures
 - Laboratory of Matter Structure 1 (cryogenic and vacuum techniques)
 - Magnetic materials
 - Polymers for electronics
 - Electronics laboratory
 - Superconductivity
 - Group theory
 - Green's functions in quantum mechanics
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2006-2009 BACHELOR DEGREE IN PHYSICS

October 13th, 2009, evaluation 110/110 cum laude, at Università degli Studi di Genova

Thesis title: "Simulation of two-dimensional islands growth in hexagonal symmetry"

Supervisor: Prof. Riccardo Ferrando

PERSONAL SKILLS

TECHNICAL COMPETENCES	• Microfabrication: exfoliation of 2D materials (also in protected environment such as glove box), electron beam lithography, optical lithography, reactive ion etching, metal evaporation, sputtering, lift-off, ion milling and chemical etchings
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	<ul style="list-style-type: none"> ▪ Microscopy: optical microscopy, scanning electron microscopy (SEM), atomic force microscopy (AFM) ▪ Electrical transport and magnetotransport measurements, with magnetic field up to 14T at low temperatures (down to 250 mK) ▪ Thermopower measurements, also under gate voltage and in magnetic field ▪ Vacuum systems, both for low and high vacuum ▪ Data acquisition electronics, with both DC, AC techniques and modulation techniques (lock-in) and analog to digital converters ▪ Thin film depositions with Pulsed Laser Deposition (PLD) and sputtering techniques; in situ monitoring of films growth by RHEED ▪ XRD on powders and thin films ▪ Raman spectroscopy ▪ Data analysis
LANGUAGES	<ul style="list-style-type: none"> ▪ Italian: native language ▪ English: fluent (B2 in the European Framework of Reference for Languages) ▪ French: basic (A1 in the European Framework of Reference for Languages) ▪ LIS – Italian Sign Language: basic
COMPUTER SKILLS	<ul style="list-style-type: none"> ▪ Data analysis: OriginPro and basic knowledge of Igor ▪ C++: basics, Monte Carlo and Molecular Dynamics simulations, basic knowledge of interfaces with external instruments using Root package ▪ LabView: interfaces with external instruments (nanovoltmeters, waveform generators...), feedback systems ▪ Comsol Multiphysics: finite elements simulations in particular about electrical transport measurements ▪ Mathematica: basic knowledge ▪ Matlab: basic knowledge, focused on modeling feedback systems ▪ Operating systems: Windows, Ubuntu Linux ▪ Good command of Microsoft Office tools and TeX
ORGANISATIONAL / MANAGERIAL SKILLS AND TRAINING	<ul style="list-style-type: none"> ▪ Coordinator of CNR Seed project 2017 SURPHOS (January 2017-June 2018) ▪ Organization of the workshop "Phosphorene and 2D Companions" held in Rome, 8th May 2017, with more than 80 participants ▪ Coordination with researchers in other cities to perform joined experiments both in our respective institutions and in international facilities ▪ Organization of instrumentation maintenance and improvement, evaluation of technical specifics required for materials, offering procedures, direct contact with suppliers companies ▪ 6-17 July 2015, Genova, Italy. "SoSMSE-School on Science Management for Scientists and Engineers"

PUBLICATIONS 12 publications, *h-index* 5, 63 total citations (58 without self-citations), 60 citing papers (55 without self-citations). Source: Web of Science.

- "Giant oscillating thermopower at oxide interfaces", I. Pallecchi, [F. Telesio](#), D. Li, A. Fête, S. Gariglio, J.-M. Triscone, A. Filippetti, P. Delugas, V. Fiorentini and D. Marré, *Nature Communications* 6, 6678, (2015), DOI: 10.1038/ncomms7678
- "Unexpected observation of simultaneous Kondo scattering and ferromagnetism in Ta alloyed anatase TiO₂ thin films", T. P. Sarkar, K. Gopinadhan, M. Motapothula, S. Saha, Z. Huang, S. Dhar, A. Patra, W. M. Lu, [F. Telesio](#), I. Pallecchi, Ariando, D. Marré, T. Venkatesan, *Scientific Reports* 5, 13011, (2015), DOI: 10.1038/srep13011
- "Nano-patterning process based on epitaxial masking for the fabrication of electronic and spintronic devices made of La_{0.67}Sr_{0.33}MnO₃/LaAlO₃/SrTiO₃ heterostructures with in situ interfaces", [F. Telesio](#), L. Pellegrino, I. Pallecchi, D. Marré, E. Esposito, E. Di Gennaro, A. Khare and F. Miletto Granozio, *Journal of Vacuum Science and Technology B* 34, 011208, (2016), DOI: 10.1116/1.4938484
- "Thermoelectric behaviour of Ruddlesden-Popper series Iridates", I. Pallecchi, M. T. Buscaglia, V. Buscaglia, E. Gilioli, G. Lamura, [F. Telesio](#), M. R. Cimberle and D. Marré, *Journal of Physics: Condensed Matter* 28, 065601, (2016), DOI: 10.1088/0953-8984/28/6/065601
- "Large phonon-drag enhancement induced by narrow quantum confinement at the LaAlO₃/SrTiO₃ interface", I. Pallecchi, [F. Telesio](#), D. Marré, D. Li, S. Gariglio, J.-M. Triscone and A. Filippetti, *Physical Review B* 93, 195309, (2016), DOI: 10.1103/PhysRevB.93.195309
- "Dephasing in strongly anisotropic black phosphorus", N. Hemsworth, V. Tayari, [F. Telesio](#), S. Xiang, S. Roddaro, M. Caporali, A. Ienco, M. Serrano-Ruiz, M. Peruzzini, G. Gervais, T. Szkopek, S. Heun, *Physical Review B* 94, 245404, (2016), DOI: 10.1103/PhysRevB.94.245404
- "Decoration of exfoliated black phosphorus with nickel nanoparticles and its application in catalysis", M. Caporali, M. Serrano-Ruiz, [F. Telesio](#), S. Heun, G. Nicotra, C. Spinella, M. Peruzzini, *Chemical Communications* 53, 10946, (2017) doi: 10.1039/c7cc05906j
- "Study of equilibrium carrier transfer in LaAlO₃/SrTiO₃ from an epitaxial La_{1-x}Sr_xMnO₃ ferromagnetic layer", [F. Telesio](#), R. Moroni, I. Pallecchi, D. Marre, G. Vinai, G. Panaccione, P. Torelli, S. Rusponi, C. Piamonteze, E. di Gennaro, A. Khare, F. Miletto Granozio, A. Filippetti, *Journal of Physics Communications* 2, 025010, (2018), DOI: 10.1088/2399-6528/aaa943
- "Balanced electron-hole transport in spin-orbit semimetal SrIrO₃ heterostructures", N. Manca, D. J. Groenendijk, I. Pallecchi, C. Autieri, L. M. K. Tang, [F. Telesio](#), G. Mattoni, A. McCollam, S. Picozzi, A. D. Caviglia, *Physical Review B* 97, 81105, (2018), DOI: 10.1103/PhysRevB.97.081105
- "Polymer-Based Black Phosphorus (bP) Hybrid Materials by in Situ Radical Polymerization: An Effective Tool To Exfoliate bP and Stabilize bP Nanoflakes", E. Passaglia, F. Cicogna, F. Costantino, S. Coiai, S. Legnaioli, G. Lorenzetti, S. Borsacchi, M. Geppi, [F. Telesio](#), S. Heun, A. Ienco, M. Serrano-Ruiz, M. Peruzzini, *Chemistry of Materials* 30, 2036, (2018), DOI: 10.1021/acs.chemmater.7b05298
- "Hybrid nanocomposites of 2D black phosphorus nanosheets encapsulated in PMMA polymer material: new platforms for advanced device fabrication", [F. Telesio](#), E. Passaglia, F. Cicogna, F.

Costantino, M. Serrano-Ruiz, M. Peruzzini, S.; Heun, *Nanotechnology* 29, 295601, (2018), DOI: 10.1088/1361-6528/aabd8d

- "STM study of exfoliated few layer black phosphorus annealed in ultrahigh vacuum", Abhishek Kumar, F. Telesio, S. Forti, A. Al-Temimy, C. Coletti, M. Serrano-Ruiz, M. Caporali, M. Peruzzini, F. Beltram, S. Heun, *2D Materials* 6, 15005, (2019), DOI: 10.1088/2053-1583/aadd20
- "Non-Classical Longitudinal Magneto-Resistance in Anisotropic Black Phosphorus", F. Telesio, N. Hemsworth, W. Dickerson, M. Petrescu, V. Tayari, Oulin Yu, D. Graf, M. Serrano-Ruiz, M. Caporali, M. Peruzzini, M. Carrega, T. Szkopek, S. Heun, and G. Gervais, Submitted, ArXiv: 1808.00858
- "Enhanced ambient stability of exfoliated black phosphorus decorated with nickel nanoparticles", M. Caporali, M. Serrano-Ruiz, F. Telesio, S. Heun, A. Verdini, M. Dal Miglio, A. Goldoni, M. Peruzzini, In preparation

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- CONFERENCES
- NanoMeeting2018, 29-30 October 2018, Pisa (Italy) Invited oral presentation for closing of the SEED project SURPHOS: *"Surface properties of black phosphorus investigated by scanning tunnelling microscopy"*.
 - 34th International conference on the physics of semiconductors (ICPS), 29 July – 3 August 2018, Montpellier (France). Oral presentation: : *"Strong anisotropic in-plane magneto-transport in a few-layer bP FET"*.
 - 23rd International Conference on High Magnetic Fields in Semiconductor Physics (HMF23), 22-27 July 2018, Toulouse (France). Oral presentation: *"Strong anisotropic in-plane magneto-transport in a few-layer bP FET"*.
 - European-MRS Spring Meeting, 18-22 June 2018, Strasbourg (France). Oral presentation: *"Hybrid 2D black phosphorus/polymer materials: new platforms for device fabrication"*.
 - NanoInnovation 2017, September 26 – 29, 2017, Rome (Italy). Invited oral presentation: *"Dephasing in Strongly Anisotropic Black Phosphorus"*.
 - Materials.it 2016, 12 – 16 December 2016, Aci Castello, Catania (Italy). Oral presentation: *"Dephasing in strongly anisotropic black phosphorus"*.
 - XXII AIV (Italian Vacuum Association) Conference, 20-22 May 2015, Genova (Italy) Oral presentation: *"Novel functionalities of LaAlO₃/SrTiO₃ for device applications"*.
 - SuperFOx, second conference on superconductivity and functional oxides 24-26 September 2014, Università La Sapienza, Rome (Italy) Poster: *"Spin Seebeck effect in Lanthanum Strontium Manganite"*.
 - MAMA-Trend : Trends, challenges and emergent new phenomena in multi-functional materials, 20-23 May 2013, Sorrento (Italy) Poster: *"Electrical spin injection in all-oxide crystalline heterostructures"*
 - ICSFS16, 16th edition of the International Conference on Solid Films and Surfaces July 2012, Genova (Italy) Poster: *"Electrical spin injection in all-oxide crystalline heterostructures"*
 - SuperFOx, First conference on Superconductivity and Functional Oxides, 19-22 June 2012, Como (Italy) Poster: *"Electrical spin injection in all-oxide crystalline heterostructures"*

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- WORKSHOPS
- TO-BE (Toward Oxide-Based Electronics) fall meeting 22-23 September 2014, Università La Sapienza, Rome (Italy)
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Poster: *"Novel functionalities in LaAlO₃/SrTiO₃ interface"*

- VI workshop of DISF Working group - "Credere e sapere: tradizione, fede e fiducia nell'attività dell'uomo di scienza" ("Know and believe: tradition, faith and confidence in scientific man activity"). 25-26 May 2013, Rome (Italy)

Oral presentation: *"Il ruolo della fiducia nelle collaborazioni internazionali e nel sistema attuale di pubblicazione di articoli accademici in ambito scientifico"* - *"The role of confidence in international cooperation projects and in actual peer review system for scientific papers publications"*

RESEARCH IN X-Ray Magnetic Circular Dichroism at Swiss Light Source (Paul Scherrer Institute), Villigen
INTERNATIONAL (Switzerland), 2-7 October 2014. Beamtime obtained after selection.
FACILITIES "Transfer of spin polarization in two-dimensional electron systems at oxides interfaces"

- SCIENTIFIC SCHOOLS
- ISOE13-International School on Oxides Electronics.
4-10 September 2013, Cargèse (France)
Poster: *"Novel functionalities in LaAlO₃/SrTiO₃ interface"*
 - European School of Magnetism 13- Magnetism for Energy.
24 February - 8 March 2013 Cargèse (France)
Poster :Electrical spin injection in all-oxide crystalline heterostructures
 - SISN School – School of the Italian Society of Neutron Spectroscopy; 28 June – 5 July 2010
During the last days of the school a neutron diffraction experiment has been carried out at ILL Grenoble
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"AUTORIZZO IL TRATTAMENTO DEI MIEI DATI PERSONALI, AI SENSI DEL D.LGS. 196 DEL 30 GIUGNO 2003".