CURRICULUM VITAE – ALESSIO GIAMPIETRI

Education and training

September 2017 - August 2020	**Post Doc** Spectromicroscopy Beamline, Elettra-Sincrotrone Trieste S.C.p.A.
January 2014 - February 2017	**Ph.D. School in Physics, Astrophysics and Applied Physics** Università degli Studi di Milano and Università Cattolica del Sacro Cuore **Ph.D. thesis:** Growth, local structural and electronic properties, and band alignment at $SrTiO_3$-based all-oxide heterojunctions **Tutor:** Prof. Luigi Sangaletti
October 2011 - July 2013	**Master degree in Physics - Laurea Magistrale** Università Cattolica del Sacro Cuore **Thesis:** Proprietà elettroniche di eterostrutture a base di ossidi isolanti **Supervisor:** Prof. Luigi Sangaletti **Final grades:** 110/110 cum laude
October 2008 - September 2011	**Bachelor degree in Physics - Laurea Tiennale** Università Cattolica del Sacro Cuore **Thesis:** Spettroscopia di fotoemissione da pnictidi superconduttori a base di Fe - Ir - As - O e terre rare **Supervisor:** Prof. Luigi Sangaletti **Final grades:** 110/110 cum laude

Career summary

Within his PhD research activity, Dr. Alessio Giampietri mainly worked on the growth and characterization of oxide thin films. The principal subjects of his bachelor and master degree theses were the study of iron pnictides, $LaAlO_3/SrTiO_3$ and $Al_2O_3/SrTiO_3$ interfaces by X-ray photoemission spectroscopy (XPS) and X-ray photoelectron diffraction (XPD) techniques, while the PhD thesis research activity was mainly focused on the growth of oxide heterostructures by RF magnetron sputtering, namely $BiFeO_3$, Al_2O_3 and CuO epitaxial films grown on $SrTiO_3$, and on the band alignment analysis. The ability to tailor the film and substrate properties by various treatments (thermal annealing, chemical etching, ion sputtering, …) was necessary for the production of high quality samples. The surface and interface properties of these heterostructures were studied by XPS, XPD, μ-Raman spectroscopy, atomic force microscopy (AFM) and piezoresponse force microscopy (PFM). Furthermore, the experience at several beamtimes and the attendance to a Synchrotron-radiation school helped Dr. Giampietri to learn the basics of synchrotron radiation techniques (mainly X-ray absorption spectroscopy, X-ray dichroism and resonant photoemission). During the Post Doc on the spectromicroscopy beamline, Dr. Giampietri improved his knowledge of the angle resolved photoemission spectroscopy (ArPES) technique and studied several 2D materials and single crystals within the support activity of users in beamtimes. The internal research activity was principally focused on the study of twisted bilayer graphene, a material which is currently a hot topic of modern physics.

Experimental skills

- Experience in UHV systems
- Thin film growth by RF magnetron sputtering deposition
- X-ray photoemission spectroscopy (XPS) and X-ray photoelectron diffraction (XPD)
- Angle resolved photoemission spectroscopy (ArPES)
- Synchrotron radiation based techniques: X-ray absorption (XAS), resonant photoemission (ResPES), X-ray linear dichroism (XLD) and X-ray magnetic circular dichroism (XMCD)
- Atomic force microscopy (AFM, contact and semi-contact modes) and piezoresponse force microscopy (PFM)
- μ-Raman spectroscopy and magneto optical Kerr effect (MOKE)

Computational skills

- Software for data analysis (Igor pro, Gwyddion)
- High-quality typesetting system (LaTeX)
- Software for crystal visualization (VESTA) and ab-initio density functional theory (ABINIT-basic level)

Publications

Refereed publications

(1) P. Zhang, R. Noguchi, K. Kuroda, C. Lin, K. Kawaguchi, K. Yaji, A. Harasawa, S. Nie, H. Weng, V. Kandyba, **A. Giampietri**, A. Barinov, Q. Li, G. D. Gu, S. Shin, T. Kondo, *Observation and control of the weak topological insulator state in* $ZrTe_5$, Nat. Commun. **12** (2021) 406

(2) R. Noguchi, M. Kobayashi, Z. Jiang, K. Kuroda, T. Takahashi, Z. Xu, D. Lee, M. Hirayama, M. Ochi, T. Shirasawa, P. Zhang, C. Lin, C. Bareille, S. Sakuragi, H. Tanaka, S. Kunisada, K. Kurokawa, K. Yaji, A. Harasawa, V. Kandyba, **A. Giampietri**, A. Barinov, T. K. Kim, C. Cacho, M. Hashimoto, D. Lu, S. Shin, R. Arita, K. Lai, T. Sasagawa, T. Kondo, *Evidence for a higher-order topological insulator in a 3D material built from van der Waals stacking of bismuth-halide chains*, Nat. Mater. (2021)

(3) A. J. Graham, J. Zultak, M. J. Hamer, V. Zolyomi, S. Magorrian, A. Barinov, V. Kandyba, **A. Giampietri**, A. Locatelli, F. Genuzio, N. Teutsch, T. Salazar, N. D. M. Hine, V. I. Fal'ko, R. V. Gorbachev, N. R. Wilson, *Ghost anti-crossings caused by interlayer umklapp hybridization of bands in 2D heterostructures*, 2D Mater. **8** (2020) 015016

(4) S. Lisi, X. Lu, T. Benschop, T. A. de Jong, P. Stepanov, J. R. Duran, F. Margot, I. Cucchi, E. Cappelli, A. Hunter, A. Tamai, V. Kandyba, **A. Giampietri**, A. Barinov, J. Jobst, V. Stalman, M. Leeuwenhoek, K. Watanabe, T. Taniguchi, L. Rademaker, S. J. van der Molen, M. Allan, D. K. Efetov and F. Baumberger, *Observation of flat bands in twisted bilayer graphene*, Nat. Phys. (2020)

(5) S. Dash, H. Enomoto, T. Kajita, K. Ono, K. Horiba, M. Kobayashi, H. Kumigashira, V. Kandyba, **A. Giampietri**, A. Barinov, F. Stramaglia, N. L. Saini, T. Katsufuji and T. Mizokawa, *Temperature-dependent evolution of Ti 3d spectral features at surface of* $Ba_xTi_8O_{16+\delta}$, Phys. Rev. B **100** (2019) 125153

(6) T. Sugimoto, E. Paris, K. Terashima, A. Barinov, **A. Giampietri**, T. Wakita, T. Yokoya, J. Kajitani, R. Higashinaka, T. D. Matsuda, Y. Aoki, T. Mizokawa and N. L. Saini, *Inhomogeneous charge distribution in a self-doped $EuFBiS_2$ superconductor*, Phys. Rev. B **100** (2019) 064520

(7) P. Nguyen, N. C. Teutsch, N. Wilson, J. Kahn, X. Xia, A. J. Graham, V. Kandyba, **A. Giampietri**, A. Barinov, G. Constantinescu, N. Yeung, N. Hine, X. Xu and N. R. Wilson, *Visualizing electrostatic gating effects in two-dimensional heterostructures*, Nature **572** (2019) 220-223

(8) M. Hamer, J. Zultak, A. V. Tyurnina, V. Zólyomi, D. Terry, A. Barinov, A. Garner, J. Donoghue, A. P. Rooney, V. Kandyba, **A. Giampietri**, A. J. Graham, N. C. Teutsch, X. Xia, M. Koperski, S. J. Haigh, V. I. Fal'ko, R. Gorbachev and N. R. Wilson, *Indirect to direct gap crossover in two-dimensional InSe revealed by ARPES*, ACS Nano **13** (2019) 2136-2142

(9) R. Noguchi, T. Takahashi, K. Kuroda, M. Ochi, T. Shirasawa, M. Sakano, C. Bareille, M. Nakayama, M. D. Watson, K. Yaji, A. Harasawa, H. Iwasawa, P. Dudin, T. K. Kim, M. Hoesch, V. Kandyba, **A. Giampietri**, A. Barinov, S. Shin, R. Arita, T. Sasagawa and T. Kondo, *A weak topological insulator state in quasi-one-dimensional bismuth iodide*, Nature **566** (2019) 518-522

(10) G. Drera, **A. Giampietri**, A. Febbrari, M. Patrini, M. C. Mozzati and L. Sangaletti, *Band offset and gap tuning of tetragonal $CuO - SrTiO_3$ heterojunctions*, Physical Review B **99** (2019) 075124

(11) V. Kandyba, A. Al-Mahboob, **A. Giampietri**, J. T. Sadowski and A. Barinov, *Tuning electronic properties by oxidation-reduction reactions at graphene-ruthenium interface*, Carbon **138** (2018), 271-276

(12) **A. Giampietri**, G. Drera, L. Sangaletti, *Band alignment at the heteroepitaxial perovskite oxide interfaces: Experiments, Methods, and Perspectives,* Advanced Materials Interfaces **4** (2017) 1700144

(13) G. Drera, C. Cepek, L. L. Patera, F. Bondino, E. Magnano, S. Nappini, C. Africh, A. Lodi-Rizzini, N. Joshi, P. Ghosh, A. Barla, S. K. Mahatha, S. Pagliara, **A. Giampietri**, C. Pintossi, and L. Sangaletti, *Identification of Ni_2C electronic states in graphene-Ni(111) growth through resonant and dichroic angle-resolved photoemission at the C K-edge*, Phys. Rev. B **96** (2017) 165442

(14) **A. Giampietri**, G. Drera, I. Píš, E. Magnano, L. Sangaletti, *Tracking the amorphous to epitaxial transition in RF-sputtered cubic BFO-STO heterojunctions by means of X-ray photoelectron diffraction*, Applied Physics Letters **109** (2016) 132903

(15) G. Drera, **A. Giampietri**, I. Alessandri, E. Magnano, F. Bondino, S. Nappini, *Grain size and stoichiometry control over RF-sputtered multiferroic $BiFeO_3$ thin films on silicon substrates*, Thin Solid Films, **589** (2015) 551-555

(16) G. Salvinelli, G. Drera, **A. Giampietri**, L. Sangaletti, *Layer-Resolved Cation Diffusion and Stoichiometry at the $LaAlO_3/SrTiO_3$ Heterointerface Probed by X-ray Photoemission Experiments and Site Occupancy Modeling*, ACS applied materials & interfaces **7** (2015) 25648-25657

Publications in preparation

(1) M. J. Hamer, **A. Giampietri**, V. Kandyba, F. Genuzio, A. Locatelli, R. V. Gorbachev, A. Barinov, and M. Mucha-Kruczyński, *Moiré superlattice effects and band structure evolution in near-30-degree twisted bilayer graphene*, submitted to Nano Letters

(2) Y. Matsuzawa, T. Morita, M. Arita, **A. Giampietri**, V. Kandyba, A. Barinov, A. Takahashi, Y. Nagakubo, T. Adachi, Y. Koike, A. Fujimori, N. L. Saini, T. Mizokawa, *Fermi surface geometry and inhomogeneous electronic states in $Pr_{1.3-x}La_{0.7}Ce_xCuO_4$ (x = 0.05) with reduced superconducting volume fraction*, submitted to Journal of the Physical Society of Japan

PhD Thesis

Title: Growth, local structural and electronic properties, and band alignment at $SrTiO_3$-based all-oxide heterojunctions.
Tutor: Prof. L. Sangaletti; *Coordinator:* Prof. F. Ragusa; *Referee:* Prof. P. Galinetto and Dr. A. Verdini

Presentations at conferences and workshops

EMRS 2016 Fall Meeting 19-22 September 2016, Warsaw	*Oral presentation* - Novel multifunctional applications of RF-sputtered $BiFeO_3/SrTiO_3$: the influence of long range crystal order probed by X-ray photoelectron diffraction
TRENDOXIDES2015 12-18 November 2015, Brescia	*Poster presentation* - Epitaxial growth of $BiFeO_3$ thin films by RF sputtering: effects of substrate termination and grain-size control
XIII School on Synchrotron Radiation: Fundamentals, Methods and Applications 14-25 September 2015, Grado (GO)	*Poster presentation* - Epitaxial growth of $BiFeO_3$ thin films by RF sputtering: effects of substrate termination and grain-size control
SuperFOx 2014 24-26 September 2014, Roma	*Poster presentation* - Characterization of multiferroic $BiFeO_3$ polycrystalline thin films grown by RF sputtering

Partecipation at schools

Online Symposium on Emergent Phenomena in Moiré Materials	6-17 July 2020, Barcelona
XXVI Elettra Users' Meeting – SciSyn X and TREES workshops	3-5 December 2018, Trieste
Labview (Basic Level) – Training Course	26 April-18 May 2018, Trieste
TRENDOXIDES2015	12-18 November 2015, Brescia
XIII School on Synchrotron Radiation: Fundamentals, Methods and Applications	14-25 September 2015, Grado (GO)
Synchrotron-based spectromicroscopy	26 February 2014, Milano

References

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