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Spin-momentum locking in oxide interfaces and in Weyl semimetals

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Curriculum Vitæ

I was born in Capua, Italy, on March 23rd 1989. I spent my childhood and most of my youth in Calvi Risorta, a town in the south of Italy where I attended primary school. I received the secondary education with a focus on scientific-oriented studies at the “Liceo Scientifico Leonardo Da Vinci”.

In September 2007, I enrolled in the Physics Department at “Sapienza, University of Rome”, where I completed my bachelor’s studies in 2011 with the thesis *Statistical physics of systems with long-range interactions* (advisor Andrea Gabrielli). Then I started a master in Condensed Matter Physics at the same University, where I graduated cum laude in January 2014 with the thesis *Inhomogeneous quantum Hall states in oxide interfaces with strong Rashba spin-orbit interaction* (advisors Marco Grilli and Sergio Caprara). After my graduation I continued this research project for another half a year.

In October 2014 I started my employment at Leiden University, as a Ph.D. student in the group of Carlo Beenakker. The results of my research are described in this thesis. For the study of oxide interfaces I collaborated with experimental physicists in the group of Andrea Caviglia at the Kavli Institute of Nanoscience in Delft. My research on Weyl semimetals was performed in collaboration with Jakub Tworzydło from Warsaw University.

In the past four years I had the opportunity to attend several schools and workshops, to present my work in the Netherlands, France, Ukraine, Italy, Germany, and Spain.

I served as a teaching assistant to the bachelor’s course “Solid-state physics” and to the master’s course “Quantum theory”.

In the years 2017–2018 I was Leiden’s representative at the PhD Student Council of the Dutch Research School of Theoretical Physics.

List of publications

- M. Diez, A.M.R.V.L. Monteiro, G. Mattoni, E. Cobanera, T. Hyart, E. Mulazimoglu, N. Bovenzi, C.W.J. Beenakker, and A.D. Caviglia. *Giant negative magnetoresistance driven by spin-orbit coupling at the LAO/STO interface*. Phys. Rev. Lett. **115**, 016803 (2015).
- N. Bovenzi, F. Finocchiaro, N. Scopigno, D. Bucheli, S. Caprara, G. Seibold, and M. Grilli. *Possible mechanisms of electronic phase separation in oxide interfaces*. J. Supercond. Nov. Magn. **28**, 1273 (2015).
- N. Bovenzi, S. Caprara, M. Grilli, R. Raimondi, N. Scopigno, and G. Seibold. *Density inhomogeneities and Rashba spin-orbit coupling interplay in oxide interfaces*. J. Phys. Chem. Solids <https://doi.org/10.1016/j.jpccs.2017.09.013> (2017).
- N. Bovenzi and M. Diez. *Semiclassical theory of anisotropic transport at $\text{LaAlO}_3/\text{SrTiO}_3$ interfaces under in-plane magnetic field*. Phys. Rev. B **95**, 205430 (2017). [Chapter 2]
- N. Bovenzi, M. Breitzkreiz, P. Baireuther, T.E. O'Brien, J. Tworzydło, I. Adagideli, and C.W.J. Beenakker. *Chirality blockade of Andreev reflection in a magnetic Weyl semimetal*. Phys. Rev. B **96**, 035437 (2017). [Chapter 3]
- N. Bovenzi, M. Breitzkreiz, T.E. O'Brien, J. Tworzydło, and C.W.J. Beenakker. *Twisted Fermi surface of a thin-film Weyl semimetal*. New J. Phys. **20**, 023023 (2018). [Chapter 4]
- M. Breitzkreiz, N. Bovenzi, and J. Tworzydło. *Phase shift of cyclotron orbits at type-I and type-II multi-Weyl nodes*. Phys. Rev. B **98**, 121403(R) (2018). [Chapter 5]