

Luca Nessi

Curriculum Vitae

Room 13-2154
77 Massachusetts Avenue
Cambridge, MA 02139
USA
✉ lnessi@mit.edu



Personal information

place of birth Como (Italy)

date of birth 30th November 1994

Work activity

- Jan 2023 – **Rocca post-doctoral fellow**, *Physics Department, Massachusetts Institute of Technology*, 77 Massachusetts Avenue, Cambridge, MA 02139, USA, Supervisor: Prof. Riccardo Comin
now
- Nov 2021 – **Post-doctoral researcher**, *Physics Department, Politecnico di Milano*, Piazza Leonardo da Vinci 32, 20133 Milano, Italy, Supervisor: Prof. Christian Rinaldi
Dec 2022

Education

- Nov 2018 – **Ph.D. in Physics**, *Politecnico di Milano*, Piazza Leonardo da Vinci 32, 20133 Milano, Italy, Supervisor: Prof. Matteo Cantoni, defended *cum laude* in March 2022
Oct 2021
Thesis: *Group-IV tellurides as a playground for spin and angle-resolved photoemission spectroscopy experiments*
- Mar 2021 – **Visiting Ph.D. student**, *ETH Zürich*, Department of Materials, HPP N, Hönggerbergring 64, 8093 Zürich, Switzerland, Supervisor: Prof. Pietro Gambardella
May 2021 and Sep 2021
- Sep 2017 – **Bachelor of Music in saxophone**, with M^o Franco Brizzi, *Conservatorio "Giuseppe Verdi" di Como*, Via Luigi Cadorna 4, 22100 Como, Italy, 110/110 *cum laude*
Nov 2020
- Sep 2016 – **Master degree in Engineering Physics**, *Politecnico di Milano*, Piazza Leonardo da Vinci 32, 20133 Milano, Italy, 110/110 *cum laude*, Grade average: 29.61/30
Oct 2018
- Sep 2013 – **Bachelor degree in Engineering Physics**, *Politecnico di Milano*, Piazza Leonardo da Vinci 32, 20133 Milano, Italy, 110/110, Grade average: 28.03/30
Jul 2016
- Sep 2008 – **High School diploma**, *Liceo scientifico "Paolo Giovio"*, Via Pasquale Paoli 28, 22100 Como, Italy, 96/100
Jul 2013

Research interests

My research interests are focused on the realization of multifunctional materials and heterostructures in which magnetic and electric properties are linked together. In particular, I am interested in manipulating the ferromagnetic order using electrical techniques (i.e., magneto-electric coupling, spin-orbit torques, ...). During my PhD activities I synthesized **calchogenides materials**, such as **Sn_xGe_{1-x}Te alloys** by molecular beam epitaxy to study the interplay between *ferroelectricity* and

the **spin polarized band structure** of such materials both from the fundamental point of view, via spectroscopic techniques, and exploiting these functionalities in devices. Currently, I am working on the new discovered class of materials of **2D magnets**, such as **CrI₃** and **Fe_xGeTe₂** both from the fundamental perspective of studying their basic properties and from a more technological point of view in functional heterostructures.

List of publications

- 2021 S. Varotto, **L. Nessi**, *et al.*, *Room-temperature non-volatile control of spin-to-charge conversion in the ferroelectric semiconductor GeTe*, Nature Electronics 4, pages 740–747 (2021), doi: [org/10.1038/s41928-021-00653-2](https://doi.org/10.1038/s41928-021-00653-2).
- M. Asa, C. Rinaldi, **L. Nessi**, *et al.*, *Epitaxy and controlled oxidation of Chromium ultrathin films on ferroelectric BaTiO₃ templates*, Journal of crystal growth 558, 126012 (2021), doi: [10.1016/j.jcrysgro.2020.126012](https://doi.org/10.1016/j.jcrysgro.2020.126012).
- 2020 M. Ghirardello, V. Otero, D. Comelli, L. Toniolo, D. Dellasega, **L. Nessi**, *et al.*, *An investigation into the synthesis of cadmium sulfide pigments for a better understanding of their reactivity in artworks*, Dyes and Pigments, 108998 (2020), doi: [10.1016/j.dyepig.2020.108998](https://doi.org/10.1016/j.dyepig.2020.108998).
- 2018 S. Varotto, **L. Nessi**, *et al.*, *Investigation of charge-to-spin conversion in GeTe*, Proc. SPIE 10732, Spintronics XI, 107320C (2018), doi: [10.1117/12.2320502](https://doi.org/10.1117/12.2320502).

Two more manuscripts (first author) regarding Sn_xGe_{1-x}Te alloys and the design of a spin filtering device for spectroscopic experiments are in preparation for the submission.

Conferences and doctoral schools

Participation to **9** international conferences in the field of Magnetism and Experimental Physics (JEMS 2019, AIMagn Colloquium, JEMS 2020, JEMS 2022, Trends in MAGnetism 2021, MMM 2020, MMM 2022, 106° and 108° Congresso SIF), presenting **6** oral contributions and several posters.

Participation to two doctoral schools: IDEA League Summer School at the Wallenberg Centre for Quantum Technologies, Chalmers University, Göteborg, Sweden (founded by IDEA League after selection between PoliMi PhD students (2 grants)) and School on Nanotechnologies, in the Nanoinnovation2020 Conference, Roma, Italy (virtual form).

Grants & awards

- 2022 Progetto Rocca for post-doctoral fellows, with the project *2D van der Waals materials for beyond-CMOS computing*.
- 2021 IDEA League Student Grants 2021, with the project *Towards full electric control of magnetism by spin-orbit torque in devices based on the Ferroelectric Rashba Semiconductor GeTe*.

Technical skills

Four years experience in the *cleanroom* facility Polifab of Politecnico di Milano, especially working on **optical lithography** and **deposition of materials** through molecular beam epitaxy (MBE) and magnetron sputtering techniques. Experience in crystals synthesis through chemical vapour transport (CVT) and in fabrication of van der Waals heterostructures exfoliation of layered crystals

and creation of heterostructures through *pick-up* technique in glovebox.
Expertise in **spectroscopic** (XPS, UPS, SARPES – active participation in **5** beam-times at Elettra Synchrotron Light Source (Basovizza, Trieste, Italy) at Advanced Photoelectric Effect (APE) beamline) (one of them *granted* by Elettra Synchrotron), **structural** (diffraction: LEED, XPD and morphological: AFM, PFM) and **magnetic** characterization (VSM, MOKE and magnetotransport measurements also at cryogenic temperatures). Experience in (linear) **optical measurements** such as Kerr and Faraday effect and linear and circular dichroism (LD and CD).

Teaching activities

Co-supervisor of **2** Master theses in Engineering Physics, **1** Master thesis in Electronic Engineering and **2** Bachelor theses in Engineering Physics.

Teaching assistant (**2** courses) and tutor (**3** courses) for undergraduated course in fundamental Physics (Mechanics and Electromagnetism) (**100** hours of experience).

Languages

Italian	Native	Mother tongue
English	Advanced	C1 , TOEIC Certification: 855/990, 27/04/2016
French	Basic	A2 , three years classes
Arabic	Basic	A1 , private lessons from September 2022
German	Basic	A1 , one semester class in spring 2021

(CV updated: 08/06/2023)