

# ANTONIO CARETTA

## CURRICULUM VITAE

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### PERSONAL DETAILS

Date of birth: April 2, 1984  
Place of birth: Pordenone (PN), Italy  
Citizenship: Italian



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### ADDRESS

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### WORK EXPERIENCE

5/2014–today        Researcher at the MAGNEDYN beamline at Fermi-Elettra Free Electron Laser - Synchrotron facility, Trieste (Italy). Beside the participation to all MAGNEDYN beamtimes, I developed the beam-line transport of the synchronized infrared pulses at the optical board at MAGNEDYN beamline (for full details visit my Home Page). This set-up was successfully commissioned in 2018, with the first pump-probe experiment at MAGNEDYN. I contributed to the design of the safety features of MAGNEDYN hutch, necessary for users. During 2016 and 2017 I contributed to the first successful RIXS and XMCD experiments at FERMI. In particular I developed and optimized the acquisition software, fundamental for the data collection and data analysis at FERMI.

My scientific interest is focussed on femtosecond time-resolved experiments, with particular interest on RIXS, magneto-optical experiments (visible and XUV regime), Mott-Hubbard systems and Phase-Change material memories. I developed a set-up for visible femtosecond experiments (for full details visit my Home Page), proved fundamental for preparatory experiments at MAGNEDYN. This set-up can perform single-shot experiments, as recently done on phase-change nanoparticles. I have several year experience with teaching at university courses (Italy and The Netherlands), as well as tutoring PhDs and students.

In the future I want to develop new XUV detection schemes in order to improve the acquisition efficiency at FERMI, and to extend the available pulse wavelength at MAGNEDYN board with the construction of a VIS-IR OPA. I will be eligible to SIR/ERC starting grants until 2021/22. If compatible with my activities, I will apply for such funding grants.

1/2009–5/2014      PhD in Physics at the Zernike Institute for Advanced Materials, Groningen University, The Netherlands.  
Thesis title: *“Spin and phonon dynamics in layered Cu-based organic-inorganic hybrids”*.  
Supervisor: Prof. P.H.M. van Loosdrecht.

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## EDUCATION

- 10/2006–10/2008 Master's Degree in Physics at the University of Trieste, Italy. Awarded with 110/110.
- 9/2003–9/2006 Bachelor's Degree in Physics at the University of Trieste, Italy. Awarded with 106/110.
- 09/1998–06/2003 High school at Istituto Magistrale e Licei Sperimentali "G. Leopardi-E. Majorana" of Pordenone (PN), Italy. Achieved 100/100.
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## LANGUAGE KNOWLEDGE

Italian	Native
English	Fluent
Dutch	Basic
Spanish	Basic

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## COMPUTER SKILLS

- Operative systems Unix-like (basic), Windows (basic), Macintosh (basic).
- Programming Python (advanced: instrument control, data acquisition, data analysis, data plotting), Fortran (basic), C (basic), C++ (basic), Mathematica (basic), ROOT (basic), Labview (basic).
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## LAB EXPERTISES

- VIS-UV Raman and THz spectroscopy, time-resolved magneto-optics (Faraday, Kerr), transmittivity/reflectivity experiments.
- X-ray FEL experiments, EXAFS and RIXS spectroscopy, time-resolved optical pump-XAS probe spectroscopy.
- Laser sources Coherent tunable Ti:sapphire oscillator MIRA 900 (ps and fs resolution), Spectra-Physics Hurricane Ultrafast amplifier and similar, KMLabs Cascade Cavity-Dumped Ti:sapphire Laser.
- Cryogenics High magnetic field (7 T) and low temperatures (1.5 K) (Oxford Microscopy Cryostat – MicrostatHe2 and SpectromagPT).
- Vacuum UHV systems (vacuum chambers, baking technology, vacuum pumps, gauges, leak detection). Design, assembling and commissioning of a UHV cryo-chamber embedded in a GMW electromagnet.
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## BEAMTIMES

- 2018 FERMI, MAGNEDYN, Time-Resolved RIXS on CuGeO<sub>3</sub> and Cu<sub>2</sub>O.
- 2018 FERMI, MAGNEDYN, Time-Resolved XMCD on Ni films.
- 2018 FERMI, MAGNEDYN, Laser commissioning.
- 2018 DIAMOND, B18, EXAFS on Phase-Change Material Nanoparticles.
- 2017 FERMI, MAGNEDYN, Magnet commissioning.
- 2017 FERMI, MAGNEDYN, Beamline optics commissioning.
- 2016 SLS, microXAS, Time-resolved XAS on Phthalocyanine.

2016	FERMI, TIMEX, Time-Resolved RIXS on CuGeO <sub>3</sub> .
2016	FERMI, TIMEX, RIXS on KCoF <sub>3</sub> .
2016	DIAMOND, B18, EXAFS on Phase-Change Material Superlattice.
2015	ALS, MERIX, RIXS on KCoF <sub>3</sub> and CuGeO <sub>3</sub> .
2014	ELETTRA, BACH, Time-resolved XAS on Phthalocyanine.
2014	DIAMOND, B18, EXAFS Phase-Change Material Superlattice.
2014	SOLEIL, SAMBA, EXAFS on Phase-Change Material Superlattice.

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## CONFERENCES

2018	<b>OSS</b> (Oxide Superconductor Spintronics, Amalfi, Italy), <u>invited presentation</u> .
2017	<b>4th ICUSD</b> (International Conference on Ultrafast structural dynamics, Trieste, Italy).
2016	<b>EPCOS</b> (European Phase-Change and Ovonic Symposium, Cambridge, UK), <u>invited presentation</u> .
2014	<b>EPCOS</b> (European Phase-Change and Ovonic Symposium, Marsille, France).
2013	<b>MAMA-trends</b> (Multifunctional Materials, Sorrento, Italy), <u>oral presentation</u> .
2013	<b>FOM</b> (Fundamental Research on Materials, Veldhoven, The Netherlands), <u>oral presentations</u> .
2012	<b>FOM</b> (Fundamental Research on Materials, Veldhoven, The Netherlands), <u>poster presentations</u> .
2012	<b>Gordon Conference</b> (Ultrafast Phenomena in Cooperative Systems, Galveston TX, United States), <u>poster presentation</u> .
2011	<b>FOM</b> (Fundamental Research on Materials, Veldhoven, The Netherlands), <u>poster presentations</u> .
2010	<b>Gordon Conference</b> (Ultrafast Phenomena in Cooperative Systems, Galveston TX, United States), <u>poster presentation</u> .
2010	<b>FOM</b> (Fundamental Research on Materials, Veldhoven, The Netherlands), <u>poster presentations</u> .
2009	<b>FOM</b> (Fundamental Research on Materials, Veldhoven, The Netherlands), <u>poster presentations</u> .

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## PUBLICATIONS

- (in preparation) A. Caretta, M. Malvestuto, M. Dell'Angela, et al. Cu d-d transition studied by RIXS scattering experiments in CuGeO<sub>3</sub> at a seeded FEL FERMI.
- (in preparation) A. Caretta, B. Casarin, M. Malvestuto et al. Ultrafast threshold fluence orbital-order melting in half-doped manganites: how a full optical probe can outmatch time-resolved Resonant X-Ray Scattering.
- Barbara Casarin, A. Caretta et al. Ultralow-Fluence Single-Shot Optical Crystalline-to-Amorphous Phase Transition in Ge-Sb-Te Nanoparticles. **Nanoscale** 10, 1039, 16574-16580, 2018.
- Giovanni Vinai, Barbara Ressel, Piero Torelli, et al. Giant magneto-electric coupling in 100 nm thick Co capped by ZnO nanorods. **Nanoscale**, 10, 1326-1336, 2018.
- Marco Malvestuto, Roberta Ciprian, A. Caretta, Barbara Casarin, and Fulvio Parmigiani. Ultrafast magneto-dynamics with free-electron lasers. **Journal of Physics: Condensed Matter**, 30(5), 053002, 2018.
- A. Caretta, et al. High-resolution resonant inelastic extreme ultraviolet scattering from orbital and spin excitations in a Heisenberg antiferromagnet. **Phys. Rev. B**, 96(184420), Nov 2017.
- M. Dell'Angela, F. Hieke, M. Malvestuto et al. Extreme ultraviolet resonant inelastic x-ray scattering (RIXS) at a seeded free-electron laser. **Scientific Reports**, 6(38796), December 2016.
- Marco Malvestuto, A. Caretta, Barbara Casarin, et al. Ultrafast Ge-Te bond dynamics in a phase-change superlattice. **Phys. Rev. B**, 94:094310, September 2016.

9. Roberta Ciprian, Piero Torelli, Angelo Giglia et al. New strategy for magnetic gas sensing. **RSC Adv.**, 2016.
10. A. Caretta, B. Casarin, M. Malvestuto et al. Interband characterization and electronic transport control of nanoscaled GeTe/Sb<sub>2</sub>Te<sub>3</sub> superlattices. **Phys. Rev. B**, 94:045319, July 2016.
11. B. Casarin, A. Caretta, J. Momand et al. Revisiting the local structure in Ge-Sb-Te based chalcogenide superlattices. **Scientific Reports** 6(22353), 2016.
12. C. Svetina, N. Mahne, L. Raimondi et al. MagneDyn: the beamline for magneto dynamics studies at FERMI. **J. Synchrotron Rad.** 23, 98-105, 2016.
13. A. Caretta, M. Donker, D. Perdok, et al. Measurement of the acoustic-to-optical phonon coupling in multicomponent systems. **Physical Review B - Condensed Matter and Materials Physics**, 91(5), 2015.
14. A. Caretta, M. Donker, A. Polyakov, T. Palstra, and P. Van Loosdrecht. Photoinduced magnetization enhancement in two-dimensional weakly anisotropic Heisenberg magnets. **Physical Review B - Condensed Matter and Materials Physics**, 91(2), 2015.
15. A. Caretta, R. Miranti, R. Havenith, et al. Low-frequency Raman study of the ferroelectric phase transition in a layered CuCl<sub>4</sub>-based organic-inorganic hybrid. **Physical Review B - Condensed Matter and Materials Physics**, 89(2), 2014.
16. S. Giriya-pura, B. Zhang, R. De Groot, et al. Anionogenic mixed valency in K<sub>x</sub>Ba<sub>1-x</sub>O<sub>2-δ</sub>. **Inorganic Chemistry**, 53(1), 2013.
17. A. Caretta, R. Miranti, A. Arkenbout, et al. Thermochromic effects in a Jahn-Teller active CuCl<sub>6</sub><sup>4-</sup> layered hybrid system. **Journal of Physics Condensed Matter**, 25(50), 2013.
18. S. Riyadi, B. Zhang, R. De Groot, et al. Antiferromagnetic S=1/2 spin chain driven by p-orbital ordering in CsO<sub>2</sub>. **Physical Review Letters**, 108 (21), 2012.
19. A. Polyakov, A. Arkenbout, J. Baas, et al. Coexisting ferromagnetic and ferroelectric order in a CuCl<sub>4</sub>-based organic-inorganic hybrid. **Chemistry of Materials**, 24(1), 2012.
20. M. Wojtaszek, N. Tombros, A. Caretta, P. Van Loosdrecht, and B. Van Wees. A road to hydrogenating graphene by a reactive ion etching plasma. **Journal of Applied Physics**, 110(6), 2011.
21. S. Riyadi, S. Giriya-pura, R. De Groot, et al. Ferromagnetic order from p-electrons in rubidium oxide. **Chemistry of Materials**, 23(6), 2011.
22. A. Simoncig, A. Caretta, B. Ressel, L. Poletto, and F. Parmigiani. Damping of the tunneling mechanism in high-order harmonic generation processes induced by femtosecond visible laser pulses. **Applied Physics Letters**, 95(4), 2009.

For the full list of publications, see google scholar:

[https://scholar.google.com/citations?hl=en&user=8c\\_9OZoAAAAJ&view\\_op=list\\_works](https://scholar.google.com/citations?hl=en&user=8c_9OZoAAAAJ&view_op=list_works).

## TEACHING

1. (Teaching, 2017/18, AFC) Teaching, physics bachelor degree “*Elettrodinamica, Ottica e Relatività*” (Prof. Fulvio Parmigiani), Università di Trieste, Dipartimento di Fisica, Italia.
2. (Teaching, 2016/17, AFC) Teaching, physics bachelor degree “*Elettrodinamica, Ottica e Relatività*” (Prof. Fulvio Parmigiani), Università di Trieste, Dipartimento di Fisica, Italia.
3. (Teaching, 2012) Work-classes, physics bachelor degree “*Structuur der Materie*” (Prof. Paul H. M. Loosdrecht), Groningen University (RuG), Zernike Institute of Advanced materials, The Netherlands.
4. (Teaching, 2013) Work-classes, physics bachelor degree “*Structuur der Materie*” (Prof. Paul H. M. Loosdrecht), Groningen University (RuG), Zernike Institute of Advanced materials, The Netherlands.
5. (Teaching, 2014) Work-classes, physics bachelor degree “*Structuur der Materie*” (Prof. Paul H. M. Loosdrecht), Groningen University (RuG), Zernike Institute of Advanced materials, The Netherlands.
6. (Teaching, 2009) Exercise-classes on Raman Spectroscopy, physics bachelor/master degree, course “*Photons and Matter*” (Dr. Maxim S. Pchenitchnikov), Groningen University (RuG), Zernike Institute of Advanced materials, The Netherlands.

7. (Teaching, 2010) Exercise-classes on Raman Spectroscopy, physics bachelor/master degree, course “*Photons and Matter*” (Dr. Maxim S. Pchenitchnikov), Groningen University (RuG), Zernike Institute of Advanced materials, The Netherlands.
8. (Teaching, 2011) Exercise-classes on Raman Spectroscopy, physics bachelor/master degree, course “*Photons and Matter*” (Dr. Maxim S. Pchenitchnikov), Groningen University (RuG), Zernike Institute of Advanced materials, The Netherlands.

For the full list of student guidance and examination experiences, visit:

<https://www.elettra.eu/PEOPLE/index.php?n=AntonioCaretta.GuidanceExperience>.

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## OTHER EXPERIENCES

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| Consultancy      | I contributed to the development of a start-up on biomass electrolysis, winner of the first phase of Innovation Factory (AREA di Ricerca, Trieste) funding project.                     |
| Consultancy      | I contributed to preparation of the winning project HEAD of HARPO company (Trieste), concerning the study of lime putty.  |
| Outdoor guidance | I organize and guide outdoor alpine activities (rock-, ice- climbing, alpine ski). These activities are reported in specialized photography journals (Cover UK Climbing November 2011). |
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## REFERENCES

### **Prof. Fulvio Parmigiani**

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Group leader, T-ReX Laboratory  
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### **Dr. Marco Malvestuto**

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