

EUROPEAN
CURRICULUM VITAE
FORMAT



PERSONAL INFORMATION

Name **MATTEO ARCHIMI**
Address [REDACTED]
Telephone [REDACTED]
E-mail [REDACTED]
Nationality ITALIAN
Date of birth [REDACTED]

WORK EXPERIENCE

- Dates (from – to) From 17/02/2016 to 05/03/2019
- Name and address of employer University of Pisa, Department of Physics, Largo Bruno Pontecorvo 3, 56127 Pisa, Italy
- Type of business or sector Research
- Occupation or position held PhD student in Physics in the group of Dr. Oliver Morsch
- Main activities and responsibilities
 - Managing a complex experiment aimed to prepare and study ultracold atomic gases;
 - Study of many body physics using atoms excited to high quantum states (Rydberg atoms);
 - High precision spectroscopy and experiments with ultracold atomic samples.

- Dates (from – to) From 15/12/2015 to 16/02/2016
- Name and address of employer Istituto Nazionale di Ottica CNR-INO, Largo E. Fermi 6, 50125 Firenze, Italy
- Type of business or sector Post graduate traineeship at Sede Secondaria "Adriano Gozzini" di Pisa, Area della Ricerca CNR - via G. Moruzzi 1 - 56124 Pisa (PI), Italy
- Occupation or position held Post graduate trainee student in the group of Dr. Andrea Fioretti, Bando n. INO/TIROCINIO/4/2015/PI, title of the project: "Costruzione e caratterizzazione di una Trappola magneto-ottica per atomi di Disprosio". (Prot. N. 0010380 of 09/12/2015, RIF: 003642-004824).
- Main activities and responsibilities
 - Setup and characterization of a magneto-optical trap for Dysprosium atoms;
 - Alignment of a resonator cavity for an enhanced Optical Dipole Trap for Dysprosium BEC.

- Dates (from – to) From 02/11/2017 to 28/02/2018
- Name and address of employer University of Pisa, Department of Physics, Largo Bruno Pontecorvo 3, 56127 Pisa, Italy
- Type of business or sector "Assegni per l'incentivazione delle attività di tutorato, didattiche-integrative, propedeutiche e di recupero", (Prot. N. 0002119 / 2017 of 23/10/2017).
- Occupation or position held Graduate teaching assistant for the course of "Laboratorio di fisica 2" for the Bachelor's degree in physics held by Prof. Francesco Fuso.
- Main activities and responsibilities
 - Assistance in teaching undergraduate students during the exercises in the didactic laboratory.

- Dates (from – to) From 01/06/2017 to 30/09/2017
- Name and address of employer University of Pisa, Department of Physics, Largo Bruno Pontecorvo 3, 56127 Pisa, Italy.
- Type of business or sector "Assegni per l'incentivazione delle attività di tutorato, didattiche-integrative, propedeutiche e di

Pisa, 30/05/2013

[REDACTED]

- Occupation or position held
recupero", (Prot. N. 0001057 / 2017 of 29/05/2017).
Graduate teaching assistant for the course of "Laboratorio di fisica 2" for the Bachelor's degree in physics, held by Prof. Francesco Fuso.
- Main activities and responsibilities
 - Assistance in teaching undergraduate students during the exercises in the didactic laboratory.
- Dates (from – to)
From 20/10/2016 to 20/12/2016
- Name and address of employer
University of Pisa, Department of Physics, Largo Bruno Pontecorvo 3, 56127 Pisa, Italy.
- Type of business or sector
"Assegni per l'incentivazione delle attività di tutorato, didattiche-integrative, propedeutiche e di recupero", (Prot. N. 0002077 / 2016 of 19/10/2016).
- Occupation or position held
Graduate teaching assistant for the course of "Laboratorio di fisica 2" for the Bachelor's degree in physics held by Prof. Francesco Fuso.
- Main activities and responsibilities
 - Assistance in teaching undergraduate students during the exercises in the didactic laboratory.

EDUCATION AND TRAINING

- Dates (from – to)
From 17/02/2016 to 05/03/2019
- Name and type of organization
University of Pisa, Pisa, Italy
- Title of qualification awarded
PhD in Physics
- Title of the thesis
Experimental studies of the blackbody induced population migration in dissipative Rydberg systems, supervisor Dr. Oliver Morsch.
- Dates (from – to)
From 22/06/2012 to 24/07/2015
- Name and type of organization
University of Pisa, Pisa, Italy.
- Title of qualification awarded
Master of Science in Physics, Condensed matter physics course, 109/110
Diploma n. 297686 released by University of Pisa on 16/09/2015.
- Title of the thesis
Real-space measurement of the mechanical effect of the van der Waals-force on Rydberg atoms, supervisor Dr. Oliver Morsch.
- Dates (from – to)
From 27/08/2008 to 21/07/2012
- Name and type of organization
University of Pisa
- Title of qualification awarded
Bachelor of Science in Physics, 109/110
Diploma n. 269531 released by University of Pisa on 17/09/2012.
- Title of the thesis
Quasicristalli (language: italian), supervisor Prof. Emilio Doni.
- Dates (from – to)
From 09/2003 to 07/2008
- Name and type of organization
Liceo Scientifico "Renato Donatelli" Terni (TR), Italy.
- Title of qualification awarded
High School Diploma, Piano Nazionale Informatico (PNI) course, 100/100 cum laude.
Diploma. n. 345579 released by Liceo Scientifico "Renato Donatelli" Terni, on 10/11/2008.

PHD THESIS

- PhD Thesis Title
Experimental studies of the blackbody induced population migration in dissipative Rydberg systems
- Supervisor
Dr. Oliver Morsch (oliver.morsch@df.unipi.it)
- Abstract
Ultracold atoms experiments represent ideal quantum simulators. Rydberg atoms, i.e., atoms excited to highly excited states, represent a suitable framework for simulating certain types of physics, such as absorbing state phase transitions since they can naturally implement dissipation through spontaneous decay and the blackbody induced transitions to neighboring states. In my thesis I have developed an experimental method for measuring the individual as well as the ensemble lifetimes of high-lying Rydberg states, where the application of traditional techniques results impractical. For this purpose, a detailed characterization of the apparatus and of the detection system has been necessary. This measurement allows also a high precision investigation of the blackbody spectrum.

PISA, 30/05/2019

PUBLICATIONS

- [A3] *Experimental signatures of an absorbing-state phase transition in an open driven many-body quantum system*, Ricardo Gutiérrez, Cristiano Simonelli, Matteo Archimi, Francesco Castellucci, Ennio Arimondo, Donatella Ciampini, Matteo Marcuzzi, Igor Lesanovsky, and Oliver Morsch, Phys. Rev. A **96**, 041602(R) (2017) (<https://doi.org/10.1103/PhysRevA.96.041602>)
- [A2] *De-excitation spectroscopy of strongly interacting Rydberg gases*, C. Simonelli, M. Archimi, L. Asteria, D. Capecchi, G. Masella, E. Arimondo, D. Ciampini, O. Morsch, Phys. Rev. A **96**, 043411 (2017) (<https://doi.org/10.1103/PhysRevA.96.043411>)
- [A1] *Van der Waals explosion of cold Rydberg clusters*, R. Faoro, C. Simonelli, M. Archimi, G. Masella, M. M. Valado, E. Arimondo, R. Mannella, D. Ciampini, O. Morsch, Phys. Rev. A **93**, 030701(R) (2016) (<https://doi.org/10.1103/PhysRevA.93.030701>)

ARTICLES IN PREPARATION

- [AP1] *Measurement of the target state lifetime and ensemble lifetime of high lying Rydberg states in cold atomic systems*, M. Archimi, C. Simonelli, L. Di Virgilio, A. Greco, M. Ceccanti, I. I. Beterov, I. I. Ryabtsev, E. Arimondo, D. Ciampini, O. Morsch, in preparation (2019).
- [AP2] *Direct measurement of the deviation of the blackbody spectrum due to geometry using Rydberg atoms*, M. Archimi, C. Simonelli, L. Di Virgilio, A. Greco, M. Ceccanti, L. Schachter, E. Arimondo, D. Ciampini, O. Morsch, in preparation (2019).

CONFERENCE CONTRIBUTIONS (TALKS, POSTERS, BOOKS OF ABSTRACT, CONFERENCE PROCEEDINGS)

(THE SYMBOL (*) MEANS THAT I PERSONALLY
PRESENTED THE WORK)

- [C16] ECAMP13, 13th European Conference on Atoms, Molecules and Photons, 8-12/04/2019 Firenze, Italy
Individual and Ensemble Lifetimes of High-Lying Rb Rydberg states, Matteo Archimi, Cristiano Simonelli, Lucia Di Virgilio, Alessandro Greco, Matteo Ceccanti, Donatella Ciampini, Ilya Beterov, Igor Ryabtsev, Oliver Morsch, (**Poster and Book of abstract**)
- [C15] CNR-INO Annual Symposium 2019, Focusing optics on environmental and health challenges, 03-05/04/2019, CNR Research Area Sesto Fiorentino (FI), Italy
Individual and Ensemble Lifetimes of High-Lying Rb Rydberg states, M. Ceccanti, M. Archimi, C. Simonelli, L. Di Virgilio, A. Greco, D. Ciampini, O. Morsch (**poster**)
- [C14] International Workshop on Strongly interacting, open many-body systems with Rydberg atoms, 30/09/2018-03/10/2018, Heraklion, island of Crete, Greece
Driven dissipative dynamics in an open many body quantum system, M. Archimi, (**talk(*) and book of abstract(*)**)
- [C13] Young Atom Opticians (YAO) conference 2018, 25/06/2018-29/06/2018 University of Strathclyde, Glasgow, Scotland, UK
Measurements of the lifetimes of high lying Rydberg states, Matteo Archimi, Cristiano Simonelli, Donatella Ciampini, and Oliver Morsch (**poster(*) and book of abstract(*)**, pag. 96)
- [C12] CNR-INO Annual Symposium 2018, Extreme Light-Matter Interaction 15-16/03/2018, Pisa, Italy
Absorbing state phase transition in a cold Rydberg gas, M. Archimi, R. Gutiérrez, C. Simonelli, F. Castellucci, E. Arimondo, D. Ciampini, M. Marcuzzi, I. Lesanovsky, O. Morsch, (**poster(*)**)
- [C11] MPAGS Summer School Granada: Quantum Matter - Out of Equilibrium School, 27-31/08/2017, Granada, Spain,

PISA, 30/05/2019

Driven dissipative dynamics of an interacting Rydberg gas, C. Simonelli, R. Gutiérrez, M. Archimi, F. Castellucci, E. Arimondo, D. Ciampini, M. Marcuzzi, I. Lesanovsky and O. Morsch, (2017) (**talk and poster**)

- [C10] Young Atom Opticians (YAO) conference 2017, 16/07/2017-21/07/2017, Ecole Normale Supérieure, Paris, France
Driven dissipative dynamics in an open many body quantum system, Matteo Archimi, Cristiano Simonelli, Donatella Ciampini and Oliver Morsch, (**talk(*)** and **book of abstract(*)**) pag. 65)
- [C9] EGAS 49th Conference of the European Group on Atomic Systems, 17-21/07/2017, Durham University, Durham, UK
Experimental signatures of an absorbing-state phase transition in a cold Rydberg gas, C. Simonelli, M. Archimi, F. Castellucci, E. Arimondo, D. Ciampini, R. Gutierrez, M. Marcuzzi, I. Lesanovsky and O. Morsch (**talk, book of abstract and conference proceeding**)
- [C8] CLEO/Europe-EQEC 2017, 25-29/06/2017, Munich, Germany
Experimental signatures of an absorbing-state phase transition in an open driven many-body quantum system, C. Simonelli, M. Archimi, F. Castellucci, D. Ciampini, E. Arimondo, R. Gutierrez, M. Marcuzzi, I. Lesanovsky, and O. Morsch (**talk, book of abstract and conference proceeding**)
- [C7] Annual Symposium 2016, From a quantum perspective 27-28/10/2016, Florence, Italy
Absorbing state phase transition in an open driven quantum system, M. Archimi, C. Simonelli, R. Gutiérrez, F. Castellucci, E. Arimondo, D. Ciampini, M. Marcuzzi, I. Lesanovsky, O. Morsch, (**talk and poster(*)**)
- [C6] DOQS Workshop on Many-body Dynamics and Open Quantum Systems, 30/08/2016-02/09/2016, Glasgow UK
Dissipative and non-dissipative many-body dynamics in a cold Rydberg gas, C. Simonelli, M. Archimi, L. Asteria, D. Capecchi, G. Masella, F. Castellucci, E. Arimondo, D. Ciampini and O. Morsch, (**poster**)
- [C5] International School of Physics "Enrico Fermi", Summer Course 198: Quantum Simulators, 22-27/07/2016, Varenna, Italy
From Coffee to Epidemic Spreading: the strange case of Directed Percolation, M. Archimi, Conference Proceedings (**talk(*)**), "quantum science slam" and **conference proceeding(*)**
Proceedings of the International School of Physics "Enrico Fermi" Course 198 "Quantum simulators" Edited by T. Calarco, R. Fazio and P. Mataloni (IOS, Amsterdam; SIF, Bologna) 2018, DOI 10.3254/978-61499-856-3-1, pagg 1-5)
- [C4] Frontiers in ultracold Fermi gases – 90 years after the "birth" of fermions in Florence, 21-23/03/2016, Arcetri, Florence, Italy
Effects of strong interactions in cold Rydberg gases, M. Archimi, C. Simonelli, G. Masella, R. Faoro, M.M. Valado, R. Mannella, E. Arimondo, D. Ciampini, O. Morsch, (**poster(*)**)
- [C3] Young Atom Opticians (YAO) conference 2015, 19-24/04/2015, ETH Zurich,
Correlated excitation dynamics in an ultra cold Rydberg gas, C. Simonelli, M.M. Valado, R. Faoro, M. Archimi, G. Masella, R. Mannella, D. Ciampini, E. Arimondo, and O. Morsch, (**poster**)
- [C2] Coherence iCoRD conference, 28/06/2015-03/07/2015, University of Durham, Durham, UK
Strongly correlated excitation dynamics in an ultra cold Rydberg gas, M. M. Valado, C. Simonelli, R. Faoro, M. Archimi, G. Masella, L. Asteria, E. Arimondo, D. Ciampini, and O. Morsch, (**talk and conference proceedings**)
- [C1] CLEO/Europe-EQEC 2015, 21-25/06/2015, Munich, Germany
Van-der-Waals Explosion of Cold Rydberg Aggregates, Faoro, R., C. Simonelli, M. Archimi, G. Masella, M. M. Valado, R. Mannella, D. Ciampini, E. Arimondo, and O. Morsch (**talk, book of abstract and conference proceeding**)

AWARDS

- | | |
|------|---|
| 2018 | Accepted speaker to the International Workshop on Strongly interacting, open many-body systems with Rydberg atoms, 30/09/2018-03/10/2018, Heraklion, island of Crete, Greece. |
| 2018 | President of the OSA Student Chapter of the University of Pisa (31/10/2018-today). |
| 2017 | Winner of "Assegni per l'incentivazione delle attività di tutorato, didattiche-integrative, propedeutiche e di recupero", (Prot. N. 0002119 / 2017 of 23/10/2017). |
| 2017 | Accepted speaker to the Young Atom Opticians conference 2017, 16/07/2017-21/07/2017, Ecole Normale Supérieure, Paris, France. |
| 2017 | Winner of "Assegni per l'incentivazione delle attività di tutorato, didattiche-integrative, propedeutiche e di recupero", (Prot. N. 0001057 / 2017 of 29/05/2017). |
| 2016 | Winner of "Assegni per l'incentivazione delle attività di tutorato, didattiche-integrative, propedeutiche e di recupero", (Prot. N. 0002077 / 2016 of 19/10/2016). |
| 2016 | Accepted to the International School of Physics "Enrico Fermi" Summer School on Quantum Simulators, course 198, Varenna (LC), Italy, and participated to the quantum Science Slam. |
| 2015 | Winner of Bando n. INO/TIROCINIO/4/2015/PI, at CNR-INO Pisa, title of the project: "Costruzione e caratterizzazione di una Trappola magneto-ottica per atomi di Disprosio". (Prot. N. 0010380 of 09/12/2015, RIF: 003642-004824). |
| 2015 | Winner of the scholarship for the three-years PhD course in Physics, XXXI cycle, at University of Pisa. |
| 2008 | Awarder in the national bulletin of excellences for the high school degree. |
| 2008 | Winner of the architectonic contest "Sabrina Minestrini" of the academic year 2007/2008, for the architectural project of the municipal swimming pool of the city of Terni. |

MOTHER TONGUE

ITALIAN

OTHER LANGUAGES

ENGLISH

- | | |
|------------------|-----------|
| • Reading skills | EXCELLENT |
| • Writing skills | EXCELLENT |
| • Verbal skills | EXCELLENT |

TEACHING EXPERIENCE

- | | |
|---------------------------------------|---|
| Academic Year 2016/2017 and 2017/2018 | Graduate teaching assistant for the course of "Laboratorio di fisica 2" for the Bachelor's degree in physics, held by Prof. Francesco Fuso; |
| Academic Year 2018/2019 | Volunteer assistant for the exams of the course "Fisica 2" for the Bachelor's degree in physics, held by Prof. Donatella Ciampini; |
| 2016-now | Laboratory training for master students during their master's degree thesis; |
| 2016-now | Outreach activities and guided laboratory tours for undergraduate and graduate students in physics |
| 2014-now | Private lessons for High school students, undergraduate and graduate students. |

PISA, 30/05/2019



**ORGANISATIONAL SKILLS
AND COMPETENCES**

Founder member and president (from 01/11/2018 to now) of the Optical Society of America (OSA) Student Chapter of the University of Pisa. Among our activities:

- _ Cycle of seminars "*Soft Skills Academy*" in the academic years 2017/2018-2018-2019 for undergraduate and graduate students, Department of Physics, University of Pisa, Pisa;
- _ "The Elevator Pitch Competition", 3 minutes-1 slide talks held by PhD and graduate students in physics about their research activity, 31/05/2019, Department of Physics, University of Pisa, Pisa;
- _ Seminar "*Groundbreaking Lasers: understanding the 2018 Nobel Prize in physics*", 16/11/2018, Department of Physics, University of Pisa, Pisa;
- _ "*Shed Light on Atoms Pisa (SLAP)*" workshop, 23/10/2017, Department of Physics, University of Pisa, Pisa;
- _ Outreach and teaching activities for high school, undergraduate and graduate students.

**TECHNICAL SKILLS
AND COMPETENCES**

- _ Experience in managing a complex experiment aimed to prepare and study ultracold atoms;
- _ Experience with high precision spectroscopy techniques on atomic systems;
- _ Experience with frequency stabilization of laser sources for atomic physics experiments;
- _ Experience with charged particle beams detection;
- _ Setup and alignment of laser systems, optics and optoelectronic devices, optical detectors and spectrometers;
- _ Experience with technical laboratory electronic instrumentation, oscilloscopes and data acquisition DAQ devices;
- _ Experience with in-situ imaging of atomic systems with CCD camera devices;
- _ Knowledge and experience with software for data analysis and numerical analysis (Igor Pro, Origin Pro, SciDAVis, MATLAB, Wolfram Mathematica, LabVIEW)
- _ Knowledge of solid modeling computer-aided design (CAD) and computer-aided engineering (CAE) computer programs (AutoCAD, SolidWorks, COMSOL Multiphysics);
- _ Knowledge of photo editing software and vector graphics editors (Adobe Photoshop, GIMP, Inkscape);
- _ Advanced competences in computer hardware, software and OS;
- _ Programming languages: C, C++, Python, LabVIEW, html.

**AUTHORIZATION OF THE
TREATMENT OF PERSONAL DATA**

In compliance with the GDPR and the Italian Legislative Decree no. 196 dated 30/06/2003, I hereby authorize you to use and process my personal details contained in this document;

I declare that what is reported in this Curriculum Vitae is true according to the D.P.R. 445/2000.

PISA, 30/05/2019

[Redacted Signature]