

## PERSONAL INFORMATION Michele Pini

## EDUCATION AND TRAINING

November 2016 – Ongoing

**PhD in Theoretical and Experimental Physics**

Università di Camerino, Camerino (Italy)

**Supervisors:** Prof. Giancarlo Calvanese Strinati ([giancarlo.strinati@unicam.it](mailto:giancarlo.strinati@unicam.it)), Prof. Pierbiagio Pieri ([pierbiagio.pieri@unicam.it](mailto:pierbiagio.pieri@unicam.it))**Subject:** Comparative study of many-body  $t$ -matrix theories with different degrees of self-consistency for a Fermi gas throughout the BCS-BEC crossover.

March 2014 – October 2016

**Master's degree (Laurea Magistrale) in Physical and Astrophysical Sciences – Curriculum Physics of Matter**

Università di Firenze, Firenze (Italy)

**Grade: 110/110 cum laude****Average exams grade: 30/30****Master Thesis****Title:** Signatures of magnetic crystals in a three-leg ladder system with synthetic gauge fields**Supervisor:** Dr. Davide Rossini ([davide.rossini@sns.it](mailto:davide.rossini@sns.it))**Co-supervisor:** Prof. Leonardo Fallani ([fallani@lens.unifi.it](mailto:fallani@lens.unifi.it))**Purpose of the thesis:** The purpose of the thesis was a theoretical study on the experimental feasibility of magnetic crystals that arise in three-leg ladder fermionic systems in the presence of a synthetic gauge field. In particular, I studied the effects of the harmonic trapping potential and of the interactions between particles. The study was performed by means of DMRG (Density Matrix Renormalization Group) simulations.**Additional information:** This thesis was originated from a collaboration between the experimental group of Leonardo Fallani at the University of Florence and the theoretical group of Rosario Fazio at Scuola Normale Superiore in Pisa.

September 2010 – March 2014

**Bachelor's degree (Laurea Triennale) in Physics and Astrophysics**

Università di Firenze, Firenze (Italy)

**Grade: 110/110 cum laude****Thesis****Title:** Ultracold atoms in optical lattices: numerical solutions and applications in quantum computation**Supervisor:** Prof. Leonardo Fallani ([fallani@lens.unifi.it](mailto:fallani@lens.unifi.it))**Purpose of the thesis:** The purpose of the thesis was the calculation of the maximally localized Wannier functions for an optical lattice and of the parameters of the Bose-Hubbard model in order to study the experimental feasibility of a quantum C-phase gate operating on two nearest neighbour sites of the lattice. The program performing the calculation was written in Wolfram Mathematica language.

September 2005 – June 2010

**Secondary school - Liceo Scientifico Castelnuovo (PNI)**

Firenze (Italy)

**Grade: 100/100**

PNI (Piano Nazionale Informatica) class included more hours of Math and Physics than other classes.

PERSONAL SKILLS

Mother tongue(s) Italian

Other language(s)	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	B2	C1	B2	B2	C1
Cambridge ESOL Level 1 Certificate – Council of Europe Level B2					

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2 Proficient user  
[Common European Framework of Reference for Languages](#)

**Scientific skills**

- Good knowledge of *t*-matrix diagrammatic theories for the study of a Fermi gas through the BCS-BEC crossover acquired during the PhD.
- Good knowledge of DMRG (Density Matrix Renormalization Group) and TEBD (Time Evolution Block Decimation) methods acquired during the master thesis.
- Good knowledge of the Monte Carlo method and the Metropolis algorithm acquired during the Computational Laboratory class.
- Wide and specialized knowledge of ultracold atoms physics acquired during the “Atomic Physics” and “Physics of Ultracold Atoms” classes.
- Basic experimental skills on spectroscopy and laser characterization acquired during the “Atomic Physics Laboratory” class.

**Communication skills**

- Ability to perform PowerPoint presentations in English to review a scientific paper, acquired during the “Laser and Applications” class.
- Scientific discussions and relationships established during the master thesis with the following scientists:
  - Dr. Marcello Dalmonte, researcher at the Institute for Quantum Optics and Quantum Information in Innsbruck.
  - Dr. Luca Taddia, researcher at Scuola Normale Superiore in Pisa.
  - Dr. Simone Barbarino, PhD student at Scuola Normale Superiore in Pisa.

Digital competence

SELF-ASSESSMENT				
Information processing	Communication	Content creation	Safety	Problem solving
Proficient user	Proficient user	Independent user	Proficient user	Independent user

Levels: Basic user - Independent user - Proficient user  
[Digital competences - Self-assessment grid](#)

ECDL (European Computer Driving Licence) Certificate

- Good knowledge of Fortran 90 programming acquired during the PhD.
- Good knowledge of C programming acquired during Informatics and Computational Laboratory classes.
- Good knowledge of Wolfram Mathematica programming acquired during both bachelor and master theses.
- Excellent knowledge of LaTeX acquired during both bachelor and master thesis.
- Good command of Office suite (word processor, spread sheet, presentation software).

**Job-related skills**

- Capability to explain physics topics to undergraduate students acquired while giving private lessons.

**Other skills**

- Classified up to the national level of selection of the Olympics of Mathematics as a member of the team of Liceo Scientifico Castelnuovo (2010).

Driving licence B, A2