europass Curriculum vitae

PERSONAL INFORMATION

Luigi Camerano Spelta Rapini

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2021–Today Master Degree in Physics — EQF level 7

University of L'Aquila- Department of Physical and Chemical Sciences
2nd level-cycle degree/Master of Science
Curriculum: Condensed matter physics

2018–2021 Bachelor Degree in Physics — EQF level 6

University of L'Aquila- Department of Physical and Chemical Sciences
1st level-cycle degree/Bachelor
Thesis: Adiabatic and diabatic evolution of Hydrogen in magnetic field
Supervisor: Gianni Profeta.
Date and Grade: 31/07/2021, 110/110 cum laude.

2013-2018 5-years Pre-university studies

Secondary school diploma: Liceo scientifico 'Galileo Galilei'
Italian secondary school diploma
Grade: 100/100.

ACADEMIC ACTIVITIES

Bachelor thesis
– Adiabatic and diabatic evolution of Hydrogen in magnetic field.
Insights: The bachelor thesis concerns the study of time evolution in quantum mechanics. In particular the failure of the adiabatic approximation is studied for a simple system such as Hydrogen in magnetic field. Particular attention has been paid to topological effects governing the adiabatic regime (Berry phase, Chern number, etc...) and their consequences in condensed matter phases. Finally the concept of 'driving Hamiltonian' introduced by Berry (2009) has been applied to the studied system.

Master thesis
– Polaronic and Mott insulating phases in Vanadium trihalides.
Insights: Polaronic and Mott insulating phases in Vanadium trihalides: I'm studying, with Prof. Gianni Profeta, Prof. Luca Ottaviano and Dr. Dario Mastrippolito, polaronic and Mott insulating phases in Vanadium trihalides (VCl3 and VI3) both theoretically and experimentally. From a theoretical point of view polarons are a big challenge for DFT calculation since they involve electronic correlation, electron-phonon coupling, mixed valence and in our case also magnetic effects. We submitted some results and we are waiting for the referees reply.

Further activities

- **Title**:Anderson localization and the lack thereof in one dimensional model for vibrofluidized granular matter (Master degree).
  Insights: One-dimensional model for vibrofluidized granular matter is studied. In particular the robustness of the model against quenched disorder is analyzed. We showed that quenched disordered in our model does not create only localized states contrary to the one dimenional Anderson model in condensed matter physics. Possible extensions of this work could be the description of the emergence of a drift velocity in the granular media from a one dimensional model (see Plati works) and the description of granular shear flows.
- **Title**:Topological phases of matter: bulk boundary correspondence (Master degree).
  Insights: Overview of topological phases and edge states: SSH and Haldane model. Weyl semimetal as a realization of a 3D bulk boundary correspondence
- **Title**:Near-Ambient-Pressure XPS (NAPXPS) and Scanning Tunneling Microscopy (STM) (Master degree).
  Insights: I followed the course of advanced physics laboratory with Prof. Luca Ottaviano. I did XPS and NAPXPS measurement in Prague with Dr. Dario Mastrippolito on 2D metal trihalides, in particular on 2D CrCl3 and VCl3.
  I'm partecipating the preparation of a STM setup in the laboratory of Prof. Luca Ottaviano at the university of L'Aquila.
- **Title**:Continous Time Random Walk: ergodic and non-ergodic systems. With G.Profeta (Bachelor degree).
  Insights: Time and ensemble averages are studied varying the waiting time distribution. Ergodic and non-ergodic regime are studied.
- **Title**:Nonlinear effects and instability of the solutions of Ginzburg-Landau equation (Master degree).
  Insights: Cubic Ginzburg-Landau equation are studied and solved using FFT embedded with RK4 (split step method). Modulational instability, background instability, parameter space for existence of solitons are studied.

Publication

- 1) **Title**:Polaronic and Mott insulating phase of layered magnetic vanadium trihalide VCl3
  Under review with *Physical Review Letters* Mastrippolito, D., Camerano, L., Swiatek, H., Smid, B., Klimczuk, T., Ottaviano, L., & Profeta, G. (2023). arXiv preprint arXiv:2301.06501.'
- 2) **Title**:On the Mott-insultating ground state of Vanadium trihalides
  L. Camerano, G. Profeta *in preparation*
- 3) **Title**:Anderson localization and the lack thereof in one dimensional model for vibrofluidized granular matter
  L. Camerano, A. Plati, S. Ciuchi in preparation
- 4) **Title**:Berry phase for hydrogen atom: geometric and dynamical phases
  L. Camerano, G. Profeta *in preparation*

Summer schools

- PRACE summer of HPC.
  Project: "Heat transport in novel nuclear fuels". **Insights**: DFT calculations using VASP package on varius material (Mo, Th_2C_3, $NaCl$). Spin-orbit and magnetic calculations. Phonon calculations using phonopy package and thermal conductivity.

Poster

- **Coarse-grained description for non-equilibrium systems and transport phenomena**
  Place:CNR, Rome, **Date**: July 4-6 2022; **Insights**: Author and presentator of the poster: Anderson localization and the lack thereof in one dimensional model for vibrofluidized granular matter, with Prof. Sergio Ciuchi and Dr. Andrea Plati
- **Polaronic phases in vanadium trihalides**
  Place:Bressanone, **Date**: July 5-7 2023; **Insights**: Author and presentator of the poster: Polaronic phases in vanadium trihalides, with Prof. Gianni Profeta, Prof. Luca Ottaviano and Dr. Dario Mastrippolito

Seminars/Workshops

- **Coarse-grained description for non-equilibrium systems and transport phenomena**
  Place:CNR, Rome, **Date**: July 4-6 2022
- **Challenges to designing room temperature superconductors.**
  Place: GSSI, L'Aquila, **Date**: 26-29 July 2022;
- **CMT@BRIXEN**
  Place: Casa della gioventù universitaria (Bressanone-Brixen), **Date**: 5-7 July 2023;

Collaborations

– **CNR-SPIN**
Guest scientist at the U.O.S L'Aquila of Consiglio Nazionale delle Ricerche – Institute SPIN in L'Aquila, Italy, for a period of 4 days starting from 4th June till 7th June. The research activity will be carried out within the project two-dimensional magnets. Dr. Camerano Spelta Rapini main duties will be to give a seminar focused on his recent research activity, to work on new polaronic phases of VCl3, and to discuss with the staff at the conference CMT@Brixen, in Bressanone, Bolzano about his recent discoveries

SKILLS AND EXPERIENCES

Mother tongue: Italian

Other languages

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	B2	B2	B2	B2	B2

Communication skills

– Team work: I have worked in various type of teams from the university to sport clubs.
– Mediating skills: I have and had the opportunity to work and study with people from different countries.
– Intercultural skills: I have experiences in the PRACE European project, in the international

Programming Languages

– **Fortran 90**: High level;
– **Python**: Medium level;
– **MATLAB**: Base level.

Computer skills

– **Unix systems**: High level;
– **Windows**: High level;
– **LaTeX**: High level;
– **Microsoft office packages**: High level;
– **LibreOffice packages**: High level.
– **VASP**
– **Vesta**
– **IGOR**

OTHER SKILLS

Driving licence: B