Curriculum Vitae Giacomo Sesti

PERSONAL INFORMATION
Date of birth: 26/07/93
Nationality: Italian
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EDUCATION

2015 Bachelor degree in Physics at Università degli Studi di Modena e Reggio Emilia
Thesis Title: Trasporto di Carica Coerente in Stati di Edge: Separazione degli Stati mediante Profili di Potenziale supervisors: P. Bordone

2016 -2017 Exchange student at Radboud University in Nijmegen through the Erasmus program

2017 Master degree in Physics at Università degli Studi di Modena e Reggio Emilia
Thesis Title: Time-Evolution of Magnetic Vector Fields through Disorder-Averaged Green Functions in Layered Antiferromagnets supervisors: C.M. Bertoni and M. Titov (Radboud University Nijmegen)

2022 PhD in "Strongly interacting exotic electronic states in carbon nanostructures at low dimensionalities" http://www.nano.cnr.it

WORK EXPERIENCE

2017 Tutor of the course of "Metodi Matematici per la Fisica" in the degree course in Fisica at Università degli Studi di Modena e Reggio Emilia

2018 Fellowship at "Istituto di Nanoscienze"(NANO) of the "Consiglio Nazionale delle Ricerche"(CNR) in "Strongly interacting exotic electronic states in carbon nanostructures at low dimensionalities" http://www.nano.cnr.it

2018-2019 Tutor of the course of "Termodinamica statistica" in the degree course in Fisica at Università degli Studi di Modena e Reggio Emilia

2021 Tutor of the course of "Fisica Generale" in the degree course in Ingegneria del veicolo at Università degli Studi di Modena e Reggio Emilia

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RESEARCH PROJECTS

In the course of my PhD, my research has been focused on investigating the possible appearance of an excitonic insulator phase in narrow-gap carbon nanotubes and the main physical properties of this phase. The excitonic insulator phase is a peculiar state of matter where the electronic sea undergoes an excitonic instability and a reconstructed ground state made of excitons is formed.

Narrow-gap carbon nanotubes are an optimal system to display this phase as the energy required to excite electrons is small, while at the same time the electron-hole binding energy is enhanced due to the small dimensionality of the tubes and the presence of a poor screening. Instrumental for my research has been the development of an extensive study of screening properties of narrow-gap carbon nanotubes done combining effective mass approaches with first principle computations. The presence of the excitonic phase is enquired at the change of nanotubes geometrical properties, their radii and chiral angles. Other main outcome of the research has been the study of the nanotubes transport gap with the magnetic field as it allows to experimentally test the formation of an excitonic insulator phase.

Currently, I moved to carry out first-principle studies of excitonic and plasmonic properties of semimetals and their relationship with the excitonic instability. Only a very sensible study allows to determine the many-body excitations of these systems. This is, however, rather complex requiring a correct assessment of quasi-particle correction. Typically, in first-principle studies, an accurate assessment of quasi-particle correction is achieved through very dense sampling of the Brillouin zone, which is very computational demanding. So, I moved to develop methods to speed up the computation of quasi-particle corrections for metals and semimetals.