MARIO CRETÌ

PhD student

ABOUT ME

I am a PhD student in theoretical high-energy physics with a focus on condensed matter physics. Specifically, I have worked on theoretical and numerical studies (using programs such as Quantum Espresso and Python) on topological matter. During my PhD, I also collaborated with STMicroelectronics, a company in the electronics sector, interested in innovations related to topological materials.

EDUCATION

Bachelor Degree in Physics with grade 110/110 cum Laude

2016-2019
Thesis title: Periodical Solution of Sine-Gordon
Equation and its Applications in Physics.
Thesis Supervisor: Luigi Martina.
University of Salento.

Master Degree in Theoretical Physics with grade 110/110 cum Laude.

2019-2021
Thesis title: Correction to General Relativity from the
Conformal Anomaly.
Thesis Supervisor: Claudio Corianò.
University of Salento.

High school diploma with grade 100/100 cum Laude. Liceo Scientifico Leonardo Da Vinci, Maglie, LE.

2011-2016

LANGUAGE

- Italian (Mother Tongue)
- English (fluent)

21/01/1997

EXPERIENCE

PhD Student, INFN associate *Jan. 2022-present*
PhD Student at Ennio De Giorgi Department, Unisalento.

IIT bimolecular Center associate, Arnesano *Jan. 2022-present*

CNR-Nanotech associate, Lecce. *Jan. '24-present*

STMicroelectronics apprenticeship, Lecce. *Feb. '24-Aug.'24*

Researcher at CMCC, Lecce. *Feb. '25-present*

SKILLS

CODING

I am quite confident in coding. The languages I have primarily worked with are Python and C++. Regarding numerical computation, I have strong skills in Quantum Espresso, Mathematica, and Z2Pack.

MACHINE LEARNING

I attended several lectures on machine learning as part of a second-level master's program as an auditor. While this is not the field I have worked in, I have both the conceptual and computational tools to specialize in it.

PROBLEM SOLVING

As a theoretical physicist, I have developed extensive mathematical and physical skills, ranging from analysis to topology, from Quantum Mechanics to Path Integral theory. This background allows me to easily approach any problem that requires the creation of a mathematical model. These skills have been essential in writing research papers.

SKILLS

Teamwork

Teamwork is a must for anyone involved in research. In my case, I have also been fortunate, as a theoretical physicist, to collaborate with the research and development team at STMicroelectronics. This experience required me to learn how to establish a productive working relationship, despite starting from very different areas of expertise.

Publications

- "Quantum Field Theory and its Anomalies for Topological Matter", C. Corianò, M. Cretì, S. D'Agostino, EPJ Web Conf., DOI: 10.1051/epjconf/202227000026, eprint: 2209.10808.
- "Dimensional Regularization of Topological Terms in Dilaton Gravity", C. Corianò, M. Cretì, M. M. Maglio, R. Tommasi, S. Lionetti, PoS CORFU2021, DOI:10.22323/1.406.0025, eprint: 2205.03535.
- "Broken Scale Invariance and the Regularization of a Conformal Sector in Gravity with Wess-Zumino actions", C. Corianò, M. Cretì and M. M. Maglio, Phys. Lett. B, 843.
- "Three- and Four- Gravitational Wave Interactions in the 4d Einstein Gauss-Bonnet Theory and Lovelock Theories", C. Corianò, M. Cretì, S. Lionetti and M. M. Maglio, Nucl.Phys.B 998,116420 e-Print:2302.02103.
- "4D Einstein Gauss-Bonnet Gravity without a Dilaton", C. Corianò, M. Cretì, M. M. Maglio, R. Tommasi, S. Lionetti, PoS CORFU2022, DOI:10.22323/1.436.0099, eprint: 2305.19554.
- "Axion-like Quasiparticles and Topological States of Matter: Finite Density Corrections of the Chiral Anomaly Vertex", C. Corianò, M. Cretì, R. Tommasi, https://arxiv.org/abs/2402.03151.
- "Semiclassical Lensing and Radiative Lens Equations", C. Corianò, M. Cretì, L. Torcellini,17th Marcel Grossmann Meeting, 2409.04875.

Publications

- "Axion-like Interactions and CFT in Topological Matter, Anomaly Sum Rules and the Faraday Effect", C. Corianò, M. Cretì, S. Lionetti, R. Tommasi, D. Melle, Adv. Phys. Res., 2403.15641.
- "Gravitational chiral anomaly at finite temperature and density", C. Corianò, M. Cretì, S. Lionetti, R. Tommasi, Phys. Rev. D, 2409.04875.

Workshop

I have attended several workshops in theoretical physics, and at one of them, I also presented a poster. Additionally, I participated in the AI Week of 2024 due to the growing interest in artificial intelligence within the academic community.

REFERENCES

Claudio Coriano
Professor at Unisalento
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