

PhD in Information Technology and Electrical Engineering

Università degli Studi di Napoli Federico II

PhD Student: Roberto Tricarico

XXXII Cycle

Training and Research Activities Report – Second Year

Tutor: Prof. Carlo Forestiere



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PhD in Information Technology and Electrical Engineering – XXXII Cycle

Roberto Tricarico

1. Information

- Roberto Tricarico, Laurea Magistrale in Ingegneria Elettronica (Master Degree in Electronic Engineering) – Università degli Studi di Napoli Federico II
- XXXII Cycle- ITEE – Università degli Studi di Napoli Federico II
- Athenaeum Fellowship
- Tutor: Prof. Carlo Forestiere

2. Study and Training activities

- Courses (credits in brackets)
 - Fisica dello Stato Solido 2 (Solid State Physics 2) – Master Degree in Physics (8).
 - Plasmonics and Metamaterials – Ad hoc course (4).
 - Elettromagnetismo e Relatività –Ad hoc course (4).
- Seminars (credits in brackets)
 - Approssimazioni di problemi alle derivate parziali e applicazioni (1).
 - The power of Trefftz Approximations: Applications in Electromagnetics (0.2).
 - Non-Asymptotic and Nonlocal Homogenization of Periodic Electromagnetic Structures (0.2).
 - IBM Q: building the first universal quantum computers for business and science (0.4).
 - Tailoring Waves at the extreme with metamaterials (0.5).
 - Near-zero-index photonics (0.5).
 - How to Produce a scientific paper (0.4).
 - Tomografia e Imaging: Principi, Algoritmi e Metodi Numerici, Pasquale Memmolo, October 29 (0.4).
 - International School of Plasmonics and Nano-Optics, Cetraro, June 15-18 (3).
 - PhD school "Ferdinando Gasparini", Napoli, October 15-19 (3).

3. Credits Summary

	Credits year 1								Credits year 2								Credits year 3								Total	Check		
	Estimated	1	2	3	4	5	6	Summary	Estimated	1	2	3	4	5	6	Summary	Estimated	1	2	3	4	5	6	Summary				
Modules	30	8	3	11	0	0	8	30	20	0	8	4	0	0	4	16	0								0	46	30-70	
Seminars	10	0.4	0	0.4	6	3	0	9.8	10	0	2.3	3.5	0	3.8	0	9.6	0								0	19.4	10-30	
Research	20	3	5	3	3	6	1	21	30	8	3	3	8	7.4	5	34.4	60								0	55.4	80-140	
	60	11	8	14	9	9	9	60.8	60	8	13.3	10.5	8	11.2	9	60	60	0	0	0	0	0	0	0	0	0	100.8	180

4. Research activity

- Title
Classical and Quantum Electromagnetic Theory of Nanoparticles
- Study
Classical and Quantum Plasmonics
- Research description

I'm involved in all the activities of the research group. In general, we study the electromagnetic scattering by plasmonic and dielectric nanoparticles and by two dimensional materials. We continue to develop the Material-Independent Modes decomposition introduced in 2016 as a clever way to design Photonic

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nanostructures. My personal main interest is in the quantum electrodynamic analysis of standard plasmonic structures, having the goal to understand how this modern vision can give relevant corrections to the classical electromagnetic scattering theory, considering that, nowadays, the structures are becoming smaller and smaller.

d) Collaborations

We collaborate with the Electrical Engineering group from the University of Cassino (Prof. Tamburrino), but we also collaborate with groups from physics (Profs. d'Ambrosio, Tagliacozzo, Pepe, Tafuri).

5. Products

a) Publications

- i. C. Forestiere, G. Miano, G. Rubinacci, A. Tamburrino, R. Tricarico, S. Ventre, "Material-Independent Modes of Arbitrarily Shaped Homogeneous Scatterers", IEEE Transactions on Antennas and Propagation.
- ii. C. Forestiere, G. Miano, M. Pascale, R. Tricarico, chapter title: "A full-retarded spectral technique for the Fano-resonance analysis in a dielectric nanosphere", Springer book: "Fano Resonances in Optics and Microwaves".

b) Publications under review

- iii. C. Forestiere, G. Miano, M. Pascale, R. Tricarico, "Electromagnetic modes and resonances of two-dimensional bodies", Physical Review B.
- iv. C. Forestiere, G. Miano, M. Pascale, R. Tricarico "Quasi-one-dimensional electromagnetic resonators", IEEE Transactions on Antennas and Propagation.
- v. C. Forestiere, G. Miano, M. Pascale, R. Tricarico, "Directional Scattering Cancellation for an Electrically Large Dielectric Sphere", Optics Letters.
- vi. C. Forestiere, G. Miano, M. Pascale, R. Tricarico, chapter title: "Material Independent Modes for the design of electromagnetic scattering", World Scientific Publishing book: "Compendium on Electromagnetic Analysis".

6. Conferences

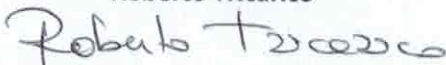
a) Details

- i. Plasmonica2018, Firenze, July 4-6

b) Presentation made

- i. Radiative Decay Rates in Plasmon Nanoparticles (Poster), Firenze

Roberto Tricarico



Prof. Carlo Forestiere

