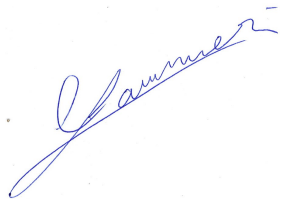
PhD in Information Technology and Electrical Engineering
Università degli Studi di Napoli Federico II

PhD Student: Mohamed Mammri

Cycle: 39

Training and Research Activities Report

Year: First



Tutor: prof. Francesco G. Della Corte

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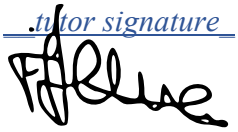

Co-Tutor:

Date: October 31, 2024

Training and Research Activities Report

PhD in Information Technology and Electrical Engineering

Cycle: **Author:**

1. Information:

- **PhD student:Mohamed Mammri**
- **DR number:DR997216**
- **Date of birth:07/04/1996**
- **Master Science degree: Applied Physics University: University of Algiers 1**
- **Doctoral Cycle:39**
- **Scholarship type:PNRR – company co-funded (ex DM 11772023)**
- **Tutor:** Francesco G. Della Corte
- **Co-tutor: Francesca Parasecolo (OpenFiber), Stefano Vergari (OpenFiber)**

2. Study and training activities:

Activity	Type[1]	Hours	Credits	Dates	Organizer	Certificate[2]
Training on the facilities related to characterization of optoelectronic devices	Tutorship			February	CNR-ISASI	N
Matrix Analysis for Signal Processing with MATLAB Examples.	Courses	14	3	30/04/24 – to 28/05/24	University	Y
Machine Learning for Engineering (FG A-Z)	Course	35	6	First semester	University	Y
Getting started with PIC design in IPKISS	Tutorship	2	0.4	25/4/2024	Luceda Photonics	N
Innovation and Entrepreneurship	Course	12	4	12/6 to 26/6	University	Y
Machine Learning for for Science and Engineering Research	Course	22	5	8 to 19 july	University	Y
PIC Design in Luceda: Designing AWGs with Luceda AWG Designer	Tutorship	2	0.4	25/7	Luceda Photonics	N
Onboarding session on circuit layout design with Luceda IPKISS	Tutorship	2	0.4	1/7	Luceda Photonics	N
Presentation of conference paper “Single Mode rib and polarization independent waveguide design	Seminar	6	1.2	13/9	European Optical Society Annual Meeting	Y

using Machine Learning techniques"						
European Optical Society Annual Meeting Conference 2024	**Seminar**	**24**	**4.8**	**8/9 to 12/9**	**European Optical Society Annual Meeting 2024**	**Y**
Design and Simulation of adiabatic photonic switch based on thermo-optic	**Research**					
Laboratory activities in	**Research**				**CNR_ISASI**	**N**
Numerical Methods For Thermal Analysis, Modeling, And simulation: Application to Electronic Devices And systems	**Course**	**15**	**4**		**University**	**Y**
Presentation of a published paper	**Tutorship**	**1**	**0.2**	**18/09**		**N**
Presentation of thesis	**Seminar**	**4**	**0.8**	**23/2**	**University of Batna 1, Algeria**	**Y**
Learning in nonstationary environments	**Seminar**	**2**	**0.4**	**15/09**	**University of Napoli**	**Y**

1) Courses, Seminar, Doctoral School, Research, Tutorship
2) Choose: Y or N

2.1. Study and training activities - credits earned

	Courses	Seminars	Research	Tutorship	Total
Bimonth 1			**5**		**5**
Bimonth 2		**0.8**	**5**		**5.8**
Bimonth 3	**3**	**0.4**	**5**		**8.4**
Bimonth 4	**6**		**5**		**11**
Bimonth 5	**9**	**0.8**	**5**		**14.8**
Bimonth 6	**4**	**6.6**	**5**		**15.6**
Total	**22**	**8.6**	**30**		**60.6**
Expected	**20 - 40**	**5 - 10**	**10 - 35**	**0 – 1.6**	

3. Research activity:

Photodiode characterization: this photodiode is implemented to energize the photonic integrated circuit with a power-over-fiber approach. The photodiode is charachterized by providing lazer light for different power and telecommunication window wavelength. Herein, we used waveglength between 1.52 um to 1.62 um. While a DC-DC converter where used to stabilize the photodiode output voltage.

Photolithography experiments: in order to fabricate the photonic integrated circuit, several experiments were realized to find out the adequate recipes and the limitation of the minimum feature size that can be achieved. In particular, we have used Laser writer and mask aligner, we applied a thin film of photoresist on a Silicon substrate using spin coating technique, we used the mask aligner machine to transfer different patterns with different sizes on our substrate., then we repeated the experiment by using the laser writer to apply a designed adiabatic splitter using CAD software, the lazer writer machine transfer the designed patterns with different power doze and resolution on our substrate. Then the results were characterized using microscope and profilometer, and AFM, to find out what are the adequate parameters to have the best results.

Study of passive optical network architectures.

Deposition of thin titanium dioxide on graphene layer: in this experiment we have deposit TiO2 layers with different thicknesses on several graphene materials, aiming to find the appropriate thickness of TiO2 for fabricatinc graphene capacitor which then be using of switching operation in our optical switch.

4. Research products:

-Conferences papers:

-Mohamed Mammeri, Babak Hashemi, Teresa Crisci, Stefano Vergari, Fabrizio Gradassi, Maurizio Casalino, Francesco Giuseppe Della Corte Single Mode rib waveguide design using Machine Learning techniques, European Optical Society Annual Meeting 2024(accepted)

- Babak Hashemi, Teresa Crisci, Mohamed Mameri, Stefano Vergari, Fabrizio Gradassi, Maurizio Casalino, Francesco Giuseppe Della Corte, Design and Simulation of a silicon electro-optic microring switch with a graphene modulating layer, European Optical Society Annual Meeting 2024(accepted)

- Teresa Crisci, Babak Hashemi, Mohamed Mammeri, Stefano Vergari, Fabrizio Gradassi, Maurizio Casalino, Francesco Giuseppe Della Corte, Graphene-boosted ultra-wide band reconfigurable optical switch for SOI-based telecom applications: a numerical study, European Optical Society Annual Meeting 2024 (accepted)

-Submit a conference paper to 2025 IEEE Silicon Photonics Conference (SiPhotonics).

-Submit a conference paper 2024 IEEE Photonics Conference (IPC).

-Research paper: Stability forecasting of perovskite solar cells utilizing various machine learning and deep learning techniques. M. Mammeri, H. Bencherif, L. Dehimi, A. Hajri, P. Sasikumar, A. Syed & Hind A. AL-Shwaiman. Journal of Oprics (published)

5. Conferences and seminars attended

-Tutorials:

-Getting started with PIC design in IPKISS, Luceda Photonics. Online,25.april.
- PIC Design in Luceda: Designing AWGs with Luceda AWG Designer. Online, 25.Jul
- Onboarding session on circuit layout design with Luceda IPKISS. Online, 25.Jul

-Conferences:
-European Optical Society Annual Meeting 2024.(EOSAM), Napoli.07 to 13 Sept. (presenting paper).

-Seminar: Learning in nonstationary environments. University of Napoli Federico II. 15 Sep.

6. Activity abroad:

7. Activity in partner companies:

Since July 1st , training activities developed at OpenFiber about the simulation of integrated optical devices and study of passive optical network architectures.

8. Tutorship