



PhD in Information Technology and Electrical Engineering

Università degli Studi di Napoli Federico II

PhD Student: Salvatore Perna

XXIX Cycle

Training and Research Activities Report – Second Year

Tutor: Claudio Serpico – co-Tutor: Massimiliano d’Aquino

Add the following items according to our meeting we had.

Concerning the structure of the document, use the Section number as is. Use the sub-contents indicated with a letter only as a suggestion for your content (a free form text is preferable)

1. Information
 - a. Salvatore Perna, MS title – University
 - b. XXIX Cycle- ITEE – Università di Napoli Federico II
 - c. ICT e Componentistica Elettronica
 - d. Claudio Serpico and Massimiliano d’Aquino
2. Study and Training activities
 - a. Gasparini School 2014-2015
 - b. Seminars
 - i. Gallium Nitride for power applications: benefits, challenges, and state of the art
 - ii. Gielis Transformations in the Natural Sciences and Technology
 - c. International course of Spanish language(Salamanca)
3. Partecipation to Programma Star L2- Mobilità giovani ricercatori
4. Research activity 1
 - a. Vortex dynamics in magnetic thin films
 - b. Study theoretically and numerically the magnetic vortex soliton motion in extended but confined thin ferromagnetic layer excited by pumping spin polarized current.
 - c. University of Salamanca, Department of Applied Physics, Prof. Luis Lopez Diaz
5. Research activity 2
 - a. Hybrid heat + microwave magnetic field assisted switching of nanomagnets
 - b. Theoretical and numerical study of novel switching strategy in order to increase the energetic efficiency of the information writing process
6. Research activity 3
 - a. Modelling of nonlinear oscillators concerning the study of the synchronization with a weak external source
 - b. Theoretical study of the synchronization of nonlinear oscillators
7. Research activity 4
 - a. Study of switching property of spin valve devices with second order uniaxial magnetic anisotropy
 - b. Theoretical and numerical study of the dynamical property of magnetization excited by spin polarized current in spin valve nanodevices
8. Products
 - i. Publications
 1. [Heteroclinic tangle phenomena in nanomagnets subject to time-harmonic excitations](#)
 2. [Analytical solution of precessional switching in nanomagnets driven by hard-axis field pulses](#)
 3. [Chaotic dynamics and basin erosion in nanomagnets subject to time-harmonic magnetic fields](#)
 4. [Analysis of reliable sub-ns spin-torque switching under transverse bias magnetic fields](#)
 5. [Noise-induced bifurcations in magnetization dynamics of uniaxial nanomagnets](#)

- ii. List those in preparation
 - 1. Theory of vortex microwave assisted synchronization in extended point contact geometry (in collaboration with University of Salamanca)
 - 2. Analysis of Thermal Fluctuations and Chaotic Dynamics for Magnetic Nanoparticles
 - 3. Normal form of nonlinear oscillator model relevant to spin torque nano-oscillator theory
 - 4. Influence of the second order uniaxial anisotropy on the dynamical proprieties of magnetic tunnel junctions
 - 5. Influence of the second order uniaxial anisotropy on the dynamical proprieties of magnetic tunnel junctions (in collaboration with University of Messina)
- b. Patents
- 9. Conferences and Seminars
 - a. Joint Magnetism and Magnetic Materials - INTERMAG Conference, San Diego 11-15 January 2016
 - i. Oral Presentation : Normal form of nonlinear oscillator model relevant to spin torque nano-oscillator theory
- 10. Activity abroad
 - a. University of Salamanca, Department of Applied Physics
 - i. Period : 31/03/2015 to 01/12/2015
 - ii. Tutor in loco : Luis Loped Diaz
 - iii. This research activity has been supported by Programma Star L2
- 11. Tutorship
 - a. Matlab Course (Prof.ssa. D'Alesso)

	Credits year 1								Credits year 2							
	Estimated	1	2	3	4	5	6	Summary	Estimated	1	2	3	4	5	6	Summary
Modules	20		3					3		3		12				15
Seminars	5	0.2	0.4		6.6		1.7	9.9						0.4	0.6	1
Research	35	8	8	8	8	8	7.1	47.1		8	8	5	8	8	7	44
	60							60		11	8	17	8	8.4	7.6	60