

Florence, 29/09/2023

Request of Approval: 13/2023

Dear colleagues,

I am asking your approval for the opening of one research scholarship:

title: “Role of optical and structural nonlinearities in cryptographic protocols based on physical unclonable functions” (Dr Francesco Riboli is the Supervisor); I propose the following commission: Dr Francesco Riboli, Dr Sara Nocentini, Dr Lorenzo Pattelli and Prof. Camilla Parmeggiani as substitute.

Requirements: Bachelor's degree in Physics, knowledge of photonics elements, complex systems, and programming basics in Matlab and/or Python

The aim of the project is to study the role of both optical and structural nonlinearity in Optical Physical Unclonable Functions (O-PUFs), that are cryptographic primitives realized with complex photonic systems. The idea is to understand whether the cryptographic keys generated in nonlinear O-PUFs are more resilient with respect to the linear O-PUF and possibly immune to machine learning attacks. The study will be carried out on a numerical level using finite difference time domain calculations that solves exactly Maxwell's equations. Different types of disorder will be investigated by varying the nonlinearity coefficient. The numerical results will be compared with experimental data from an experiment currently underway within the AFOSR project.

The fellowship will last 9 months starting from 01/11/2023 to 31/07/2024. The amount of the fellowship is € 9.000,00 + IRAP charged on AFOSR project funds.

Approved by:

Alberto Bramati
Elisabetta Cerbai
Paolo De Natale
Paolo Foggi
Saida Guellati
Theodor W. Haensch
Femius Koenderink
Alessandro Tredicucci