ANNA MARINI

◇ 12/11/1995

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EDUCATION

Istituto Nazionale di Fisica Nucleare *Nov. 2022 - present*
Postdoc researcher for the POKER (POsitron resonant annihilation into darK mattER) experiment

Università degli Studi di Genova *Nov. 2019- Oct. 2022*
Ph.D. course in Material Science and Technology with a thesis called "Development of new materials for next-generation astroparticle physics experiments".
Supervisors: Prof S. Tosi, Dott. G. Testera

Università degli Studi di Genova *Sept. 2017 - Oct. 2019*
Master's Degree in Material Science and Technology
Thesis title: "Patterning di Idrazoni Fotocromici"
Advisors: Prof. S. Tosi, Eng. A. Bianco
Co-advisor: Prof. D. Comoretto
Thesis done in collaboration with National Institute of Astrophysics (INAF) at Merate (Lecco), Politecnico di Milano, Physics Department of Università di Genova and il Chemistry Department (110/110 and honors).

Università degli Studi di Genova *Sept. 2014 - Sept. 2017*
Degree in Material Science at Physic's Department at Università degli Studi di Genova.
Thesis title: "Studio delle performace della grafite termo-pirolitica nei rivelatori a pixel di Silicio del progetto CT-PPS dell'esperimento CMS del CERN"
Advisors: Prof. S. Tosi, Dott. F. Ravera
Thesis conducted at INFN-Genova and CERN to conduct in-situ tests. (104/110)

Liceo Classico Statale C. Colombo *July 2014*
High School graduation 80/100

RESEARCH ACTIVITY AS POSTODOCTORAL RESEARCHER

2022 - present
During my postdoctoral activity I collaborated on the characterization of $PbWO_4$ crystals for the realization of an electromagnetic calorimeter for the POKER experiment, for which I helped test some power boards for the calorimet photosensors. I am also a member of the NA64 collaboration, to which I contribute with analysis of data acquired with positron beams at the CERN SPS accelerator. I also characterized photomultiplication devices for reading the light signals of the NA64 electromagnetic calorimeter.

RESEARCH ACTIVITY DURING PHD

2019
During the first year of my Ph.D., I collaborated on the construction of a pipeline for the identification of celestial bodies in astrophysical images and their recognition using star catalogs. The work was done in the Python language.

2019
During the first year of my Ph.D., I also started a collaboration with the INFN grant PESCE (Plastic Economic Scintillator in a Cryogenic Environment), whose aim was to test the light yield efficiency of some commercial organic scintillators, coupled with PMTs, at cryogenic temperatures (liquid nitrogen

and liquid helium). These devices had never been tested in these thermal ranges. I worked on characterizing the scintillators, taking care of the cryogenic part, data analyses, and correlation with the slow monitoring parameters. This activity led to the development of a data analysis routine in Python, and C++ using in both cases the CERN-Root toolkit.

2020-2022
From the beginning of the second year of my Ph.D., I started collaborating in the DarkSide-20k experiment for the realization of a hybrid material (polymethylmethacrylate loaded with gadolinium oxide) for the realization of a neutron detector for the experiment. I had the opportunity to deepen my laboratory skills from a chemical and physical point of view, testing and characterizing prototypes of this material even at cryogenic temperatures. The techniques I consolidated my experience on are Differential Scanning Calorimetry (DSC), Dynamic Light Scattering (DLS), Thermo-Gravimetric Analysis (TGA), Infrared Spectroscopy Fourier-Transformed (FTIR), Calcination, Scanning Electron Microscope (SEM), tensile tests and viscosimetric tests. This project led to a patent request number 102021000028130 to realize polymethylmethacrylate loaded with gadolinium oxide nanograins.

RESEARCH ACTIVITY DURING MASTER DEGREE

During my master degree I studied three fotochromic molecules, whose characteristic is to change their appearance colour once subjected to UV or visible light. I performed several spectroscopic techniques (IR, Raman and UV-Vis) and others optical characterisations like ellipsometry. All the experimental activities were supported by theoretical calculations based on a quantum mechanical approach, such as Density Functional Theory (DFT) calculations, that I performed with software provided me by Politecnico di Milano infrastructures. The thesis activity involved the production of thin films in polymeric matrix containing the photochromic molecules, therefore during this work I also started to use the Differential Scanning Calorimetry for the characterisation of the polymeric matrix. So I then began to become familiar with Differential Scanning Calorimetry (DSC) and the Spin Coating processes to obtain thin films.

RESEARCH ACTIVITY AS UNDERGRADUATE

During my bachelor degree thesis I performed a study on an industrial material called thermo-pyrolytic graphite, in order to extimate its performances as heat sink in silicon pixel detectors for the CT-PPS project for the CMS experiment at CERN. I was capable to find an alternative to this material and some in-vivo tests were performed in August 2017 at the Linear Accelerator, at CERN.

TALKS AND CONFERENCES

- Poster presentation at the Paris International School on Advanced Computational Materials Science (2022) (PISACMS), *Neutron tagging with Gd_2O_3 loaded PMMA for the DarkSide-20k experiment*, Sorbonne.

- Talk at International Committee for Radionuclide Metrology - Low-Level Radioactivity Measurement Techniques (2022) (ICRM-LLRMT), *"Neutron tagging with gadolinium loaded PMMA"*, LNGS

- Poster presentation at OpenReadings 2021 - *Gadolinium loaded organic detector for the DarkSide experiment*

- Giornata Interazionale dello Spazio (DIFI) (2021) - *Dalla simulazione al laboratorio: come nasce un materiale per le applicazioni aerospaziali*

- Seminary for St. Andrews Physics Society (2021) - *Photochromic Hydrazones - an overview*

- Talk at SIF (2020) *Spettroscopia ellissometrica di film fotocromici*

PUBLICATIONS

- A. Marini *et al.* - **Characterization of the performances of commercial plastic scintillators in cryogenic environments**, *JINST*, https://doi.org/10.1088/1748-0221/18/05/P05036, (2023)

- B.Mravec *et. al.* - **Structural and Spectroscopic Properties of Benzoylpyridine-Based Hydrazones**, *ChemPhysChem*, https://doi.org/10.1002/cphc.202000941, (2021)

- D. Ricci *et. al.* - **Commissioning and improvements of the instrumentation and launch of the scientific exploitation of OARPAF, the Regional Astronomical Observatory of the Antola Park**, *Journal of Astronomical Telescopes, Instruments, and Systems*, https://doi.org/10.1117/1.JATIS.7.2.025003, (2020)

- L. Cabona *et. al.* - **Cerberus: A three-headed instrument for the OARPAF telescope**, *SPIE proceedings*, https://doi.org/10.1117/12.2562058 (2020)

- B. Mravec *et. al.*, **Photoswitching hydrazones based on benzoylpyridine**, *Physical Chemistry Chemical Physics*, DOI https://doi.org/10.1039/C9CP05049C, (2019)

DIDACTIC EXPERIENCE

- Academic year 2021-2022: Didactic tutor for the annual course of General Physics (I and II module) for the three-year degree course in Materials Science

- Academic year 2020-2021: Didactic tutor for the annual course of General Physics (I and II module) for the three-year degree course in Materials Science

- Academic year 2022-2023: Didactic tutor for the Physics Department stage activity

OUTREACH

- Finalist for local selection for FameLab (2023)

- Sharper - European Researchers Night - *Il lato oscuro della materia* (2022)

- Lesson for Università della Terza Età (UniGe) - *Physics in Wonderland: studiare l'universo dalle profondità della Terra* (2022)

- Sharper - European Researchers Night - *Alla ricerca della materia oscura* (2021)

PATENTS

Currently waiting for approval of patent request number 102021000028130

INTEREST AND OTHER ACTIVITIES

In addition to academic study, I am interested in languages (I obtained the First Certificate in 2013) and in the world of expressive art, such as singing and theater. I attended Luca Bizzarri's Centro di Formazione Artistica (CFA) for two years (until 2019)