

Maria Florencia Nardone

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Education

University of North Carolina at Chapel Hill

May 2026

B.S. in Physics — GPA: 3.6

Relevant Coursework: Electromagnetism I & II, Electronics I & II, Analog & Digital Circuit Design, Embedded Systems, Signal Processing, Power Electronics, Data Acquisition, PCB Design

Scholarships & Awards

National Society for Black and Hispanic Physicists Presentation Award (Fall 2025)

NSF REU Fellowship, U. Michigan (Summer 2025) · DOE RENEW Scholarship, TUNL/Duke (Summer 2024)

Experience

Microcontroller-Based Instrumentation — Python, C++, Embedded Microcontrollers

Aug 2024 – May 2026

Embedded Systems Developer

UNC Physics – Chapel Hill, NC

- Designed PCBs (schematic capture and layout) and hand-soldered prototypes on Arduino, ESP8266, and Teensy platforms
- Built interactive physics demonstrations and mini robots integrating IMUs, encoders, and closed-loop motor control
- Developed analog and digital circuits from discrete components, including radio receivers, MIDI-controlled audio interfaces, and piezoelectric sensor readouts
- Implemented real-time signal conditioning and data acquisition pipelines in embedded C/C++ with Python-based analysis

Piezoelectric Pressure Sensor Fabrication

Jan 2026 – May 2026

Undergraduate Researcher

UNC Physics – Chapel Hill, NC

- Fabricated thin-film FTO/ZnO/Ag piezoelectric pressure sensor and characterized electrical response under cyclical mechanical loading. Confirmed piezoelectric signal against three independent controls
- Designed custom AD620 instrumentation-amplifier circuit with signal conditioning for millivolt-level piezo transients; root-caused signal attenuation to a parasitic shunt path through systematic electrical analysis

Polymer Rheology – Shear-Activated Gelation

Aug 2025 – Dec 2025

Undergraduate Researcher

UNC Applied Physics – Chapel Hill, NC

- Synthesized and characterized mechanical response of charged-polymer networks using rheology techniques and data analysis to study structure–property relationships

Optics in the City of Light iREU

May 2025 – Aug 2025

Research Assistant

Université Paris-Saclay – Paris, France

- Built, aligned, and debugged optical and electronic experimental setups with lasers and detectors
- Modeled hybrid photonic–plasmonic cavities using Lumerical FDTD software

Nuclear Physics at TUNL

May 2024 – Aug 2024

Research Assistant

Duke University – Durham, NC

- Implemented ML-based peak-finding algorithms in Python and C++ on Linux for detector calibration of nuclear-spectroscopy data

Projects

Quantum Cryptography 🔒

Aug 2025 – Dec 2025

- Analyzed BB84/E91 quantum key distribution protocols; delivered public talk with live demo

3D Potts Model Simulation 🎲 — Python

Aug 2024 – Dec 2024

- Built interactive 3D Monte Carlo simulation to model phase transitions in spin lattices

Technical Skills

Electronics: Analog & digital circuit design, PCB design (schematic + layout), soldering, oscilloscope, logic analyzer, signal conditioning, testing & debugging

Embedded Systems: Arduino, NodeMCU ESP8266, Teensy 4.1, Raspberry Pi; embedded C/C++; I2C, SPI, UART; IMU, ADC/DAC, PWM, closed-loop motor control

EE Fundamentals: Electromagnetism, Maxwell's equations, transmission lines, power delivery (transformers, rectifiers, linear & switching regulators), signal integrity

Simulation & CAD: LabVIEW, LTspice, KiCad, Lumerical FDTD, Monte Carlo

Programming: Python, C++, embedded C/C++, Linux, LaTeX

Lab Skills: Optical alignment, laser systems, data acquisition, instrumentation

Languages: English (native), Spanish (native), French (conversational)