Ebram Youssef

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EDUCATION

University of Rochester Aug. 2019 – May 2023 (Anticipated)

Bachelor of Science in Physics Rochester, NY

Major: Physics **Cumulative GPA:** 3.78/4.00 **Awards:** Dean's List

- **Minors**: Math and Computer Science
- **Relevant Coursework**: Advanced Classical Mechanics, Quantum Mechanics and Modern Physics, Advanced E&M, Statistical Mechanics and Thermodynamics, Advanced Experimental Techniques, Multivariable Calculus, Advanced Linear Algebra, Partial Differential Equations, Data Structures and Algorithms.

RESEARCH EXPERIENCE

University of Rochester – Institute of Optics May. 2022 – Present

Research Assistant, Prof. Robert Boyd's Group (Quantum Photonics and Nonlinear Optics lab) Rochester, NY

- Worked on a project aimed at exciting and observing nonlinear spatial surface solitons at an interface or in a planar anti-waveguide geometry; derived the Nonlinear Schrödinger Equation and the corresponding operators for the investigated geometry and parameters; created a 2D quasi-CW SSFM numerical simulation for a TE-polarized Gaussian beam propagating through the waveguide to find optimal soliton excitation parameters; observed and studied various nonlinear effects resulting from the simulation. [Ongoing]
- Worked on a project aimed at performing spatially resolved measurements of the complex envelope of a picosecond pulse reflected from Indium-Tin-Oxide (ITO) exploiting Sagnac electro-optic spectral shearing interferometry for the goal of observing optical bistability; measured the spectrum and duration of pulses generated by an optical parametric generator; helped build and calibrate the spectral shearing interferometer. [Ongoing]
- Wrote a numerical simulation to reproduce results from a study by Akhmediev et al. 1984 (Excitation of nonlinear surface waves by Gaussian light beams) utilizing split-step Fourier transform (SSFM) algorithm. [Completed]
- Wrote a numerical simulation to reproduce results from a study by Gubbels et al. and Moloney, 1987 (Numerical study of soliton emission from a nonlinear waveguide) using SSFM algorithm. [Completed]
- Performed computational Effective Medium Approximations calculations for both layered Ag-SiO2 and nanoparticle-doped Au-SiO2 composites to find optimal fill fractions and laser wavelengths for desired nonlinear properties in each composite. [Completed]

SELECTED LABS AND PROJECTS

Doppler-free Saturated Absorption Spectroscopy of Rubidium D2 Transitions Sep 2022 - Oct 2022

Advanced Experimental Techniques Lab, Prof. Nicholas Bigelow Rochester, NY

- Implemented an experiment studying the saturated absorption of rubidium vapor in a pump-probe optical setup utilizing a single grating-feedback diode laser to produce a Doppler-free absorption spectrum with narrow spectral features and identifiable hyperfine transitions.
- Used computational methods to analyze and calibrate spectra via Fabry-Perot resonances.
- Got acquainted with a variety of optics techniques and components.

Period Doubling, Feigenbaum Constants, and Chaos in a Chaotic RLD Circuits Oct 2022 - Nov 2022

Advanced Experimental Techniques Lab, Prof. Nicholas Bigelow Rochester, NY

- Performed an experiment studying the period doubling and chaotic behavior of an RLD electrical circuit
- Calculated the experimental values of Feigenbaum constants and compared them to theoretical ones.
- Used computational techniques to analyze chaotic behavior of circuit, plotted a bifurcation diagram using the analyzed data.

SKILLS

Programming Languages: MATLAB, Python, Java, Mathematica
Technical skills: Operating, calibrating, and aligning different lasers, designing optical setups, mathematical and numerical modeling, computational simulations
Languages: Arabic (Native), English (Fluent), German (Intermediate).