Raed Diab – Curriculum Vitae

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PROFESSIONAL SUMMARY

Highly motivated PhD candidate in Physics with extensive hands-on expertise in designing, building, and automating complex optical experimental setups. Skilled in precision optical alignment, laser systems, and control systems using Python and LabVIEW. Eager to apply strong experimental physics and precision instrumentation experience to cutting-edge research in quantum atom optics and quantum technologies.

WORK AND PROFESSIONAL RESEARCH EXPERIENCE

Doctoral Research Assistant, *University of Florida,* Gainesville, Florida — Aug 2020 – Present

- Developed precision optical alignment and noise mitigation methods for interferometric systems, applicable to optical trapping stability.
- Designed, built, and characterized an RF-driven electro-optic system for angular modulation, integrating components and validating performance against COMSOL simulations, relevant for atom manipulation
- Automated experimental data collection using LabVIEW and Python, increasing efficiency by 70%
- invented and prepared a novel optical mode matching and sensing scheme for optimizing light delivery in high-precision optical systems.

Simulation Fellow, *LIGO Collaboration,* Pasco, Washington — Apr 2025 – Jun 2025

- Modeled opto-mechanical effects on interferometer stability and control loops using Python-based DSP tools
- Simulated quantum squeezing and opto-mechanical coupling, demonstrating foundational understanding of quantum optics and light-matter interaction.
- Collaborated with senior researchers on experimental test planning and troubleshooting, enhancing system performance through strong teamwork and problem-solving
- Authored technical documentation and presented results to commissioning teams

Exchange Researcher, *University of Padova,* Padova, Italy — May 2024 – Aug 2024

- Modeled optical mode matching for Virgo using Python simulations and alignment diagnostics.
- Designed a proof-of-concept for integrating an electro-optic lens into tabletop optical systems, showcasing innovative experimental design.

Research Assistant, *Miami University,* Oxford, Ohio — Aug 2018 – Jul 2020

- Conducted simulations of galactic rotation curves using MOND, achieving results consistent with observed dynamics without dark matter.
- Developed and optimized numerical models in Fortran, focusing on high-performance computing and physical accuracy.

EDUCATION

Doctor of Philosophy in Physics, *University of Florida*, Gainesville, Florida — Dec 2025 (expected)

- **Dissertation topic:** Investigating a New Alignment and Mode Matching Sensing Schemes for Advanced Gravitational Waves Detectors such as LIGO.
- **Selected awards:** Research Assistant Fellowship (stipend & tuition); College of Liberal Arts & Sciences (CLAS) Travel Support; LIGO Scientific Collaboration Fellowship.

Master of Science in Physics, *Miami University*, Oxford, Ohio — Jul 2020

- **Thesis topic:** The Dynamics of Starts in Dwarf Spheroidal Galaxies Around the Milky Way in the MOND Regime.

SKILLS

- **Optical Systems**
- Extensive hands-on experience with laser systems, optical trapping concepts (implied from alignment/interferometry), interferometry, precision optical alignment, and benchtop optical setups.

- Proficient in beam diagnostics, fiber optics, calibration, precision optical component testing, and optimizing complex optical systems.
- Familiar with optical design and simulation tools including ZEMAX for layout planning and performance prediction.

- **Programming Languages**
- Proficient in Python and MATLAB for data acquisition, experimental automation, modeling, and signal/data analysis.
- Developed robust, lab-wide Python tools for universal measurement control and data processing, streamlining experimental workflows.
- Strong experience with LabVIEW and C++ for instrument control and hardware integration.
- Skilled in closed-loop control of precision alignment systems.

- **Simulation Tools**
- 3+ years of COMSOL Multiphysics for finite element analysis.
- Intermediate experience in ZEMAX for optical system simulation and analysis.
- 5+ years FINESSE, Python-based frequency-domain interferometer simulator.

- **Soft Skills**
- Collaborative team player with a strong track record of clear technical documentation, effective reporting, and presenting research results.
- Self-motivated, independent, and always willing to learn something new.
- Fast learner with a strong interest in microwave engineering and low-noise detection systems.

LANGUAGE SKILLS

Languages: Arabic (native); English (fluent); German (A2)

SCIENTIFIC PUBLICATIONS

- Experimental Study and Quantitative Comparison Between Wavefront Sensing and RF Jitter Alignment Schemes (In review)
- Mode Mismatch Sensing with Two Quadrant Photodiodes (In progress)