Omar A. Ashour

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Education

UC Berkeley **Berkeley, CA**
PhD, Applied Physics May 2022
- **Advisor:** Professor Xiang Zhang

Texas A&M University **College Station, TX**
B.S., Electrical Engineering, ***GPA: 4.0/4.0*** May 2017
- **Thesis:** Maximal Intensity Higher-Order Breathers of the Nonlinear Schrödinger Equation on Different Backgrounds.
- **Capstone:** Wireless Power Transfer for Electric Vehicle Charging (in progress).
- **Track:** Device Science and Nanotechnology.
- **Minors:** Mathematics, Physics.
- **Honor Societies:** HKN, TBΠ, ΦΚΦ.
- **Dean's Honor Roll:** 6 times.

Experience

Research

Texas A&M Engineering Experiment Station **College Station, TX**
Research Assistant, Supervisor: Dr. Peter Rentzepis January 2016 – Present
- Investigated the ablation of thin metal films by femtosecond laser pulses using the two-temperature model (TTM).
- Contributed to time-resolved X-ray diffraction experiments.
- Gathered and analyzed spectral data of biological samples including bacteria.
- Analyzed synchronous and EEM spectra using principal component analysis to discern live and dead bacteria.
- Performs nanosecond and picosecond time-resolved spectroscopic experiments.
- Awarded highly competitive 11-week funding from the College of Engineering and Qatar Campus (Summer 2016).

Physics Department, Texas A&M University **College Station, TX**
Science Program, Texas A&M University (Qatar Campus) **Doha, Qatar**
Research Assistant, Supervisors: Dr. Milivoj Belić, Dr. Siu Chin. January 2014 – Present
- Presented the first correct formation time formula for Akhmediev Breathers with one unstable mode (PRE 2015).
- Proved that peak heights of all NLSE solutions add linearly (PLA 2016, PRE 2016).
- Presented the first systematic method for finding initial conditions for generating high-order breathers (PLA 2016).
- Developed 2 open-source solvers for the nonlinear Schrodinger equation (NLSE).
- Implemented high performance algorithms for solving PDEs numerically on GPUs and clusters.

Institute of Electronic Structure and Laser (IESL-FORTH) **Heraklion, Greece**
Research Assistant, Supervisor: Dr. Stelios Tzortzakis May – July 2015
- Fabricated photonic structures in the bulk of glass using femtosecond lasers.
- Designed and implemented software for writing bent waveguides.
- Performed experiments and analysis to determine waveguide coupling coefficients and losses.

Teaching

Science Program, Texas A&M University (Qatar Campus) **Doha, Qatar**
Teaching Assistant, Supervisor: Dr. Milivoj Belić May 2014 – December 2015
- Aided in teaching introductory freshman courses such as PHYS-218 (mechanics) and PHYS-208 (E&M).
- Assisted students through weekly problem solving sessions, math reviews and exam reviews.
- Maximized students' understanding through detailed handouts and online material.

Qatar Robotics Institute for Development (QRID) **Doha, Qatar**
Junior Robotics Trainer May – November 2014

- Created workshop curricula by simplifying QRID's designs to an accessible level.
- Taught several introductory robotics and programming workshops to students of different backgrounds and ages.
- Developed and designed Arduino-operated robots, including Micromouse and remote-controlled robots.

Journal Articles

Published

- R. Li , **O. Ashour** , J. Chen , H.E. Elsayed-Ali , P. Rentzepis, "Femtosecond laser induced structural dynamics and melting of Cu (111) single crystal: an ultrafast time-resolved x-ray diffraction study," Journal of Applied Physics, **121**, 6. (In Press)
- S. Chin, **O. Ashour**, S. Nikolić, and M. Belić, "Peak-height formula for higher-order breathers of the nonlinear Schrödinger equation on non-uniform backgrounds,", Phys. Rev. E., **95**, 012211 [Link]
- S. Chin, **O. Ashour**, S. Nikolić, and M. Belić, "Maximal intensity higher-order Akhmediev breathers of the nonlinear Schrödinger equation and their systematic generation", Phys. Let. A **380**, 43 (2016). [Link]
- S. Chin, **O. Ashour**, and M. Belić, "Anatomy of the Akhmediev breather: cascading instability, first formation time and Fermi-Pasta-Ulam recurrence," Phys. Rev. E **92**, 063202 (2015). [Link]

In Progress

- S. Nikolić, N. Aleksić , **O. Ashour** , M. Belić, S. Chin, "Systematic generation of higher-order solitons and Akhmediev breathers of the nonlinear Hirota equation on different backgrounds," (Preparing for submission to Nonlinear Dynamics).
- **O. Ashour**, "Schrödinger's Lab: a numerical suite for the nonlinear Schrödinger equation," (preparing for submission to Computer Physics Communications).

Conference Presentations

Presentations

- **O. Ashour**, R. Li, P. Rentzepis, "Monitoring femtosecond laser induced melting and recrystallization of Cu (111) single crystal by sub-picosecond X-ray pulses," to be presented at the APS March Meeting, March 13-17 2017, New Orleans, LA.

Papers

- **O. Ashour**, B. Aleksić, N. Aleksić, and M. Belić, "Comparison of Highly Efficient Multidimensional Algorithms for Solving Nonlinear Schrodinger Equation," presented at the first International Computational Science and Engineering Conference, May 11-12 2015, Doha, Qatar.

Posters

- **O. Ashour**, S. Chin, and M. Belić, "Anatomy of the Akhmediev breather: cascading instability, first formation time and Fermi-Pasta-Ulam recurrence," presented at the Photonics Middle East Conference, December 13-15 2015, Doha, Qatar.
- S. Nikolić, **O. Ashour**, S. Chin, and M. Belić, "Dynamics of Rogue Waves," presented at the Photonics Middle East Conference, December 13-15 2015, Doha, Qatar.
- **O. Ashour**, B. Aleksić, N. Aleksić, and M. Belić, "Comparison of Algorithms for Nonlinear PDEs on GPUs," presented at the 4th TAMUQ Annual Research and Industry Showcase, April 23 2015, Doha, Qatar.

Honors and Awards

Richard E. Ewing Award for Excellence in Student Research
Texas A&M University (Qatar Campus)

- University-wide award open to juniors, seniors and recent graduates with outstanding research achievements.
- Awarded once in April 2016 for work on nonlinear breathers, based on faculty nominations.

Takreem Award for Best Student Research
Qatar Foundation for Education, Science and Community Development

- Highly competitive faculty-nomination-based award open to students from all 7 Education City branch campuses.
- Awarded once in April 2016 for work on breathers of the nonlinear Schrödinger equation.

Gathright Scholar Award
The Association of Former Students – Texas A&M University

- Highly competitive award given to the most academically distinguished student in each class year.
- Awarded once during academic year 2014-2015.

Student Employee of the Year
Texas A&M University (Qatar Campus)

- Acknowledges the contribution of three distinguished student employees based on supervisor nomination.
- Recognized for excellence in teaching based on supervisor nomination.
- Awarded once during academic year 2014-2015.

Qatar Foundation Scholarship
Qatar Foundation for Education, Science and Community Development

- Competitive, merit-based full scholarship for academically distinguished students.
- Awarded thrice during academic years 2014-2015, 2015-2016, and 2016-2017.

Extracurricular Activities

IEEE TAMUQ Student Branch
Technical Chair — May 2014 – December 2015

- Planned all the branch's technical projects.
- Promoted interest in electrical engineering through multiple workshops, including programming.
- Represented the branch in multiple technical projects and international competitions (IEEEXtreme).

A&M Astronomy Club
President and Co-founder — May 2014 – August 2015

- Managed the club in conjunction with the executive board.
- Communicated with the adviser to invite guest lecturers and buy equipment.
- Presented multiple talks to promote astronomy to both STEM and non-STEM majors.

Student Engineers' Council
System Administration Chair — July 2014 – July 2015

- Attended to the council's technical needs and maintained the website.
- Performed science experiments for children during on E-Day.

HKN, Lambda Mu Chapter
Treasurer — September 2015 – December 2015

Computer Skills

Programming: C, Cuda C/C++, Java
Scripting: Python, Bash
Operating Systems: Linux, OS X, Windows
Math: MATLAB, Mathematica
Circuits/Design: PSPice, Verilog, ANSYS Maxwell
Markup: LaTeX, CSS, HTML
Other: Solidworks, MPI, Arduino, Raspberry Pi, Microsoft Office