Zakaria El-Helw

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Summary

Physics and mathematics double major, quantum materials researcher experienced in angle-resolved photoemission spectroscopy (ARPES), and polyglot. Passionate about community engagement, project management and science communication.

Work Experience

Partnerships for Research and Education in Materials, Fellow Oct 2025 – Present

Presenting and participating in discourse at Interdisciplinary Research Group meeting biweekly, presenting at conferences every semester. Collaborating with other research groups on papers.

Neupane Group, Undergraduate Research Assistant Nov 2024 – Present

Characterization of novel Quantum Topological Materials. Developed skills in ARPES: sample preparation and handling, Ultra High Vacuum maintenance, Helium lamp, Scienta Omicron SES software, data analysis for ARPES, pyARPES integration.

Projects

Transition Metal Trichalcogenide Density Functional Theory Study (In Progress)

Wrote proposal for and received **$2,000** grant from American Institute of Physicists through the Society of Physics Students to build a computer to run DFT and Tight Binding simulations of a novel van der Waals Material candidate.

Transition Metal Trichalcogenide ARPES Study (In Progress)

Collaborated with researchers using Raman Spectroscopy to provide complementary ARPES data. Developed code in python to streamline data analysis.

Education

Fall 2024 – Present **University of Central Florida - Burnett Honors College**
Bachelors in Physics and Mathematics (GPA: 3.45/4.00)
President's Honor Roll (2024), Dean's List (2025)

Engagement, Outreach, & Awards

UCF Society of Physics Students Fall 2024 – Present

Secretary Spring 2025 – Spring 2026

- **Grant Writing & Awards:** Secured **$6,500** in total funding for the chapter. Authored the winning proposal for the Chapter Research Award (**$2,000**) and the AIP Marsh White Award (**$300**). Coauthored APS 2026 travel grant for the chapter, appealed to Student Government funding committee, securing **$4,200** to subsidy presenting undergraduate researchers and highly engaged SPS members. Awarded 2025 Notable Chapter.
- **Project Leadership & Conference Planning:** Spearheaded the chapter research project by organizing think tanks among members and authoring the technical proposal. Established a line of communication with a local school PTA board to execute the Marsh White outreach project (Spring 2026). Mentored outreach coordinators in drafting proposals for the Future Faces of Physics Award.

Accepted to host and coordinate the SPS Zone 6 Meeting, attracting up to **50** external participants.

- **Operations:** Restructured club operations to improve member engagement (adding more nominated roles, making club meetings more frequent, more socials) and acted as the primary liaison between the executive board and university administration. Planned socials, general body meetings,
- **Cross-Club Collaboration:** Planned, advertised, and hosted a volleyball game between the American Chemical Society chapter and SPS (engaging about **30** students). Planned and advertised an observatory night with the Astronomy society (engaging about **40** students). Maintained line of communications with ACS, the Astronomy society, and the Pegasus Math Club.

Social Media Manager Fall 2024 – Fall 2025

- Curated weekly social media content to maintain digital visibility and member communication.
- Assisted in planning and executing general body meetings.

Departmental & Community Service at UCF Fall 2024 – Present

- **STEM Day Volunteer:** Demonstrated and explained classical physics concepts to K-5 students (2024, 2025).
- **Orlando Science Center Outreach:** Volunteered with the American Chemical Society (ACS) to demonstrate optics principles (engaged **180** visitors). Volunteered with the Physics Department to do electrolysis demonstrations (engaged **208** visitors).

Congressional Award Gold Medalist Awarded 2023

- **Community Service:** 485 total hours across the Orlando Science Center, Grow it Forward, and Second Harvest food bank.
- **Personal Development:** 472 total hours across club engagement, project management, and practical skill development (plumbing, welding, SCUBA diving).
- **Personal Fitness:** 668 total hours across long distance running, biking, and swimming.

Publications & Presentations

Valadez, Nathan, M. Sprague, I. B. Elius, A. Kumay, **Z. El-Helw**, D. James, F. Mesple, E. Thompson, K. Tou Chu, S. Regmi, V. Buturlim, M. Matzelle, N. Atlam, M. Yankowitz, R. Sankar, A. Bansil,K. Gofryk, and M. Neupane. "Impact of Orthorhombic Distortion in Rare-Earth Based Nodal Line Semi-metal Candidate TbAsSe across the AFM transition". (In preparation).

Sprague, Milo, S. Regmi, V. Buturlim, I. Paneer Muthuselvam, N. Valadez, A. Kumay, **Z. El-Helw**, R. Sankar, K. Gofryk, and M. Neupane. "Interplay of Magnetic Exchange, Crystal Field Splitting, and Lattice Structure in TbAsSe" (In preparation)

El-Helw Zakaria, M. Sprague, S. Regmi, V. Buturlim, N. Valadez, M. Islam Mondal, A. Pradhan Sakhya, R. Shankar, K. Gofryk, and M. Neupane (2025). "Initial Transport Measurements for Rare Earth-Based Topological Material Candidate". Poster presented at: APS Global Physics Summit, Denver, CO (Accepted, Mar. 2026); and PREM STEMS Conference, Orlando, FL (Nov. 2025).

Skills

Polyglot	Fluent in: Spanish, French, English, Egyptian Arabic. Conversational in: Mandarin, Turkish, Saudi Arabic.
Mathematics	Linear Algebra (Summer 2025, Spring 2026), Partial Differential Equations (Fall 2025), Complex Analysis (Spring 2026), Calculus of Variations (Spring 2026)
Programming	Java, Python, JavaScript, HTML/CSS, LaTeX