Nicholas Jaber

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Career Goal: **R&D PICs to network heterogeneous Trapped Ions and Photonic Quantum Computers**
Areas of Interest: **Nonlinear optics, Photonic Integrated Circuits, Quantum Optic, Low Temperature**

EDUCATION

M.S. Duke University GPA: 3.5 Department: **Electrical & Computer Engineering**
Focus: **Quantum Computing Hardware** Graduation: **May 2023**
Selected Coursework: **Nanoelectronics & Nanophotonics, Advanced Optics, Microwave Electronic Circuitry, Quantum Engineering, Quantum Device Manufacturing**

B.S. University of California, Irvine GPA: 3.2 Department: **Physics & Astronomy**
Major: **Physics** GPA: 3.4 Concentration: **Computational Physics**
Minor: **Information and Computer Science** Graduation: **June 2021**

PROFESSIONAL EXPERIENCE

Jaber Optics & Bandwidth LLC Albuquerque, NM
Owner, Founder, and Chief Executive Officer Aug. 2023 – Present

· Developed a contracting service for Sandia National Laboratories to design and test high-fidelity UV to NIR intermodal four-wave mixing nanophotonic devices for optical frequency conversion

Sandia National Laboratories- Photonic and Phononic Microsystems Albuquerque, NM
Research Year-Round Intern May 2022 – Aug. 2023

· Designed and implemented experiment to induce quantum state preserving Bragg Scattering Four Wave Mixing frequency conversion in an ultra-low loss PIC for quantum networking heterogeneous quantum systems
· Designed intermodal single-photon pair high-fidelity frequency conversion CMOS-compatible fabricated PICs
· Currently holds L-level Department of Energy security clearance
· World record nonlinear figure of merit as characterized by the ratio of the systems propagation loss and Kerr coefficient this figure represents the capability of a system to induce near unity system efficiency conversions
· Developed custom GDS generation script and associated Lumerical simulation scripts

Duke Department of Electrical & Computer Engineering- Kim MIST Durham, NC
Photonics Research Assistant Mar. 2022 – May 2023

· Photonic linking integrated surface trapped ion Fabry Perot cavities for high efficiency linked photon collection
· Designed and built Pound-Drever-Hall laser locking circuit, custom water-cooled breadboard for target ablation optics, silicon oxide ablation infrared circuit to generate mode matching fabrey perot optical cavity, dichroic optical filter with filtering ratio greater than 10^{14} for wavelengths 7 nm apart, machined aluminum fiber mount for focused beam to address single trapped barium ion while avoiding charging trap surface
· Installed EPICs surface trap in class 100 cleanroom, baked and built 10^{-12} Torr chamber

UCI Department of Physics and Astronomy- Low-Temperature Materials Lab Irvine, CA
Condensed Matter Research Assistant Sep. 2019 – Jun. 2021

· Restored a sub 1.2K Dilution refrigerator Chamber, which was initially used to measure superfluid helium-3 to, for the first time, image superfluid droplet pinch-off and surface evaporation dynamics in the early 1990's
· Used interferometry to measure the locality of alcohol evaporation in a variety of humidity/surface conditions

UCI Department of Physics and Astronomy- Peer Tutor and Learning Assistant Irvine, CA
Certified Learning Assistant Dec. 2018 – Mar. 2021

· Taught and designed problems for kinematic, optics, python, and boolean algebra, focused on group learning

UCSF School of Dentistry- Ho Laboratory San Francisco, CA

Biomedical Researcher Assistant Nov. 2015 – Dec. 2019

· Led a research project for 2.5 years, presented weekly to PIs/surgeons, worked closely with PI and postdocs

· Designed and wrote a draft paper of my novel theory to connect kidney, salivary, and prostate stone calcification by correlating optical, fluorescence, x-ray, electron, and inductively coupled plasma imaging systems

· Compared stones by the relative zinc concentrations in their surrounding fluids to understand how organic material calcifies using zinc in growth regions as a catalyst in a similar manner as bone development

Sigray- Imaging System Design and Manufacturing Concord, CA

Research Fellow Mar. 2018 – Sep. 2018

· Worked at Advanced Light Sources at Lawrence Berkeley National Laboratory and wrote XRF denoising code

PUBLICATIONS

1. Hayden J. McGuinness, Michael Gehl, Craig G. Hogle, William J. Setzer, Nick Karl, Nick Jaber, Justin Schultz, Joonhyuk Kwon, Megan Ivory, Rex R. Kay, Daniel Dominguez, Douglas Trotter, Matt Eichenfield, Dan L. Stick "Integrated photonics for trapped ion quantum information experiments at Sandia National Laboratories," Proc. SPIE 12206, Quantum Nanophotonic Materials, Devices, and Systems 2022, 1220604 (3 October 2022); https://doi.org/10.1117/12.2636695
2. Scott Wiener, Nicholas Jaber, Sofia Iribarren, Misun Kang, Jolie Chang, Marshall Stoller, and Sunita Ho "Salivary and Kidney Stones: Insights into Pathologic Biomineralization," AUA MP24-17, (1 April 2018); https://doi.org/10.1016/j.juro.2018.02.770

TECHNICAL SKILLS & EXPERIENCES

Programming Experience: Python (3 years), Matlab (2.5 years), Java (1 year), C++ (6 months)

Laboratory Skills: designing integrated and fiber optic circuits, free space mode measurement, CAD component design, dilution refrigerator troubleshooting, building and maintaining 10^{-12} torr vacuum systems, cleanroom operations, electron/x-ray imaging and lithography, Lumerical simulations, chemical etching, photolithography, plasma enhanced chemical vapor deposition, reactive ion etching

Nanotechnology Materials Lab

1. Designed and built a series of wafers to generate an integrated silicon nitride fiber grating coupler with a chemically etched cavity above to match the mode of a Gaussian beam to create an optical cavity around a surface-trapped ion. This design allows optics to be routed independently of surface trap interference and to increase the collection efficiency by increasing optical access and numerical aperture.

Search Engine Optimization

2. Webcrawler 50,000 UCI sites avoided traps and developed an efficient search algorithm using custom page rank