Vanessa Carling Kwong

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Research Interests

- Optics and transport in two-dimensional van der Waals heterostructure devices

Education

University of California, Riverside *Oct 2020 – Mar 2025*
B.S. in Physics (Standard)

Relevant Coursework: Condensed Matter Physics, Computational Physics, Classical Mechanics, Electromagnetism, Electromagnetic Waves, Quantum Mechanics, Thermodynamics / Statistical Mechanics, Introductory Computer Science, Introductory Biochemistry, Organic Chemistry

Experience

The Joe Lab at UC Riverside Riverside, CA
External Researcher *Apr 2025 - Present*

- Independent research project on contact engineering to develop low temperature, Ohmic contacts to p-type monolayer WSe_2 testing quantum transport; expand my project to other types of TMDs, namely $MoSe_2$ and WS_2
- Assist in various graduate projects through designing, patterning, and training others with nanofabrication equipment, building expertise in these tools
- Prepare monthly presentations on project progression and relevant papers

Undergraduate Researcher *Oct 2023 - Mar 2025*

- Demonstrated expertise in fabricating reliable van der Waals devices through precise patterning and dry transfer of mechanically exfoliated 2D materials; Trained incoming undergraduates on these techniques, improving lab efficiency and technical skills
- Conducted optical and electrical measurements and data analyses for novel devices
- Built, used, and set up equipment in new laboratory space, training users on laboratory / cleanroom facility for nanoscale engineering

UC Riverside Research in Science and Engineering (RISE) Riverside, CA
Undergraduate Researcher *Jun 2024 – Aug 2024*

- Conducted independent research on fabrication and developing platinum contacts and testing contact resistance for transition metal dichalcogenide (TMD) devices
- Presented topic to over 250 multidisciplinary researchers, faculty, and guests
- Assisted in fabrication of graphene heterostructures for magnetotransport in search of the quantum anomalous Hall effect
- Advisor: Prof. Andrew Joe

Presentations and Events

CSU San Bernardino calSWIFT'25 Symposium San Bernardino, CA
Panelist *Apr 2025*

- California Semiconductor Workforce Development & Innovation for Future Technologies
- Panelist speaker for Student Experiences in Semiconductor Research

Students Transforming Through Research (CUR-STR) Program Washington, DC
Undergraduate Advocate *Mar 2025*

- Represent University of California, Riverside and the UC system in communicating and advocating for undergraduate research to stakeholder groups at Capitol Hill, including California senators Adam Schiff and Alex Padilla, and Representative Mark Takano

142W Capstone Final Project Presentation Riverside, CA
Oral Presenter *Dec 2024*

- Capstone presentation, "Advances in Monolayer TMD Heterostructure Devices"

UC Riverside RISE Program Symposium Riverside, CA
Oral Presenter *Aug 2024*

- Oral presentation on low-temperature device measurements and background on platinum contact development for WSe_2-based devices for Hall and transport data

UC Riverside Undergraduate Research Symposium Riverside, CA
Oral Presenter *May 2024*

- Talk on emerging research within TMD heterostructure devices and their optical measurements, analyses, and relevance in materials science and engineering for future optoelectronics

Mutating AT3G08680 to Determine Functional Redundancy Riverside, CA
Oral Presenter *Mar 2021*

Los Angeles County Science and Engineering Fair Pasadena, CA
Oral Presenter *Mar 2018*

Projects

Transport in Monolayer WSe_2 Heterostructure Devices *Jun 2024 - Present*

- Fabricated and electrically tested monolayer WSe_2 semiconducting devices for transport properties through observations of Shubnikov-de Haas oscillations

Pulsed Nuclear Magnetic Resonance *Nov 2024 - Dec 2024*

- Measured and analyzed spin-spin relaxation and spin-lattice relaxation times for water, glycerin, and various concentrations of Fe^{3+} samples to relate magnetic moments in liquids respective to viscosity and paramagnetic impurities ; PHYS 142W

Gamma Ray Emission of Radioactive Isobars *Nov 2024*

- Measured and analyzed spectra of various radioactive materials to determine their decay paths and nuclear energy levels; PHYS 142W

Noise Fundamentals *Oct 2024*

- Determine resistance dependence of Johnson noise and photodiode current dependence of Shot noise; PHYS 142W

Laser Dispersion Calculation Program *Mar 2024 - Apr 2024*

- Developed and implemented program to relate diffraction grating and placement to dispersion of light from supercontinuum laser by selected wavelength

Mutagenesis of KOIN and WFL in *A. thaliana* *Feb 2021 - Mar 2021*

- Conducted gene knockout experiments to assess functionality and redundancy of WFL and KOIN genes in Arabidopsis thaliana, analyzing resulting phenotypic variations

PLTW Biomedical Sciences Capstone Research *Oct 2019 - Jun 2020*

- Independent research on effectiveness of natural preservatives in limiting bacteria growth

Microbiological Analysis Glove Materials in Bacterial Penetration *Oct 2017 - Mar 2018*

- Study effectiveness between latex, nitrile, and vinyl gloves in preventing bacterial penetration

through serial dilutions and incubation

Skills

Laboratory: Mechanical Exfoliation, Dry Transfer, Sputtering, Atomic Force Microscopy (AFM), Atomic Layer Etching (ALE), Soldering, Optical Path Setup, Electron-beam Evaporation (EBE) & Lithography (EBL), Spectroscopy, Spectrophotometry

Programming: C++, Python, MATLAB, HTML, CSS, JavaScript

Other: LATEX, CAD (KLayout, AutoCAD), Excel

Languages (Spoken): English (Native), Cantonese (Native), Mandarin (Fluent)

Awards

UC Riverside College of Natural & Agricultural Sciences Dean's List

3rd Place Microbiology Senior in LA County Science and Engineering Fair (2018)

References

Available upon request.