CHANGYUAN WANG

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EDUCATION

University of California, Santa Barbara Sept. 2019 - Present
Honors Bachelor of Science, Major in Physics, Minor in Mathematics
GPA: 3.97/4.00

RESEARCH EXPERIENCES

Experimental Soft Matter Group Aug. 2021 - Present
PI: Prof. Zvonimir Dogic, Co-Mentor: Raymond Adkins *UCSB*

· Worked on self-assembled colloidal phage membranes and their development and variations.
- *End labeling*: Worked out a highly efficient phage & end label combination among various phage systems; implemented labeled phages to induce shape changes on colloidal membranes, and analyzed why it is analogous to specific dynamics among lipid bilayers.
- *Crosslinking*: ① Crosslinked colloidal membranes with 2-arm PEG; explored the extreme salt concentration gradient that crosslinked vesicles could endure while retaining their shapes; ② Discovered unexpected pore formation dynamics of uncrosslinked vesicles under osmotic pressure
- *Genetic engineering*: ① Genetically modified phage lengths to attain dissimilar colloidal rods, incorporate them into phage monolayers, and studied membrane distortions; ② Transformed versatile end proteins and antibiotic resistance sequences between phages to obtain more functional species.

Directed Reading on Differential Geometry Mar. 2022 - Jun. 2022
Supervisor: Prof. Xianzhe Dai, Co-Mentor: Danning Lu *UCSB*

· Went through the Ph.D. thesis of Leroy Jia, a mathematician collaborator of Dogic Lab; derived several toy models of pore formations on vesicles based on Jia's equations of colloidal membranes.
· Used MeshLab to help analyze and present pore formation models to Prof. Xianzhe Dai during biweekly meetings.

Experimental Nanophotonic Materials Group Jun. 2021 - Oct. 2021
PI: Prof. Siying Peng *Westlake University*

· Solely worked on simulating the monolayer perovskite excitons coupled to a nontrivial photonic crystal by Lumerical FDTD; collaborated with experimentalists to search for practical choices of perovskite and parameters of photonic crystals.
· Used tight-binding approximation to predict perovskite-photonic crystal system.

AWARDS AND FELLOWSHIPS

Worster Summer Research Fellowship UCSB, 2022
Project: Developing Phages with a Versatile End-Label toward a Model System for Endocytosis

TECHNICAL SKILLS

Languages	MATLAB, Python, Mathematica, R
Hardware	Raspberry Pi, LabJack U3-HV
Scientific Software	MeshLab, COMSOL, Ansys Lumerical FDTD, Inkscape

SELECTED COURSEWORK

Graduate Classes:
Quantum Mechanics, Complex Fluids, Biomaterials and Biosurfaces, Symmetry and Tensor Properties of Materials, Mechanical Behavior of Materials
Undergraduate Elective Classes:
Condensed Matter, Complex Analysis, Topology, Differential Geometry, Linear Algebra, Group Theory, Teaching Physics

TEACHING EXPERIENCES

Learning Assistant
Hold three weekly discussion sections and two office hours. Involves answering questions about homework and section worksheets, promoting classroom discussions, and presenting examples to explain concepts.

- PHYS 119A, Thermodynamics and Statistical Mechanics, with Prof. Philip Pincus   Fall 2021

Grader
Wrote half of solutions of weekly problem sets and graded them.

- PHYS 103, Intermediate Mechanics, with Prof. Kai Kristiansen   Summer 2021
- PHYS 20, General Physics, with Prof. Cenke Xu   Fall 2020

PROJECT GALLERY

Term Paper: Colloidal Phage Membranes as a Model System for Lipid Bilayer Dynamics
Prof. Angela A. Pitenis   *Spring 2022*

· Mock review paper
· Introduced colloidal membranes self-assembled from filamentous bacteriophages; analyzed why they can serve as a model system of biological membrane dynamics; presented evidence in shape transitions, splitting and merging events, pore formation, and membrane-membrane interactions.

Term Paper: Model Membrane Systems for 2D Monolayer Membrane Coalescence and 3D Bilayer Membrane Fusion
Prof. Daniel S. Gianola   *Winter 2022*

· Mock review paper
· Introduced GUVs, SUVs (giant/small unilamellar vesicles,) and colloidal phage monolayers as model systems for the dynamics of membrane fusion; identified their limitations and possible improvements

Term Project: Fiber Optical Gyroscope
Supervisor: Prof. Andrew Jayich, Collaborators: Yuan Li, Haopu Yang   *Spring 2021*

· Built a fiber optical gyroscope, collected light intensity changes by LabJack, implemented USB virtualization to remotely send data to laptops, and used the Sagnac effect to convert shifted fringes into angular velocities.
· In charge of most material selection, purchase, and testing; light path setup, stabilization, and calibration; USB virtualization; data analysis
· Solely organized all data and created a GitHub repository [GitHub]

Term Paper: The Application of Fourier Transform in Speech Recognition Systems
Prof. Jean M. Carlson   *Winter 2021*

· Analyzed how Fourier Transforms are applied in Speech Recognition Systems, especially how to decompose vocal information to distinguish different persons' voices, extract emotional states, and recognize numerous languages.