Ivar Cruz Rydstrom

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EDUCATION

University of California, Berkeley **June 2024 - Present**

Ph.D. Physics. Advisor: Dr. Matt Pyle

Santa Clara University **2020 - 2024**

B.S. Engineering Physics (GPA: 3.90)

Minors: Mathematics, Computer Engineering

University Honors Program (Thesis: *Contributions to Prototype Dark Matter Experiments*)

Aliso Niguel High School **2016 - 2020**

GPA: 4.6. Valedictorian Class of 2020. California Scholarship Federation special honors. Student of the Semester May 2018. Seal of Bi-Literacy in French. Astronomy Club Co-President.

RESEARCH EXPERIENCE

Graduate Student Researcher **June 2024 - Present**

University of California, Berkeley

Pyle group, TESSERACT collaboration. TES development for light dark matter search experiments.

Undergraduate Student Research Assistant **June 2022 - June2024**

SCU & SLAC National Accelerator Laboratory

Member of Dr. Betty Young's group at SCU in collaboration with Dr. Noah Kurinsky's group at SLAC. Helped develop novel low temperature detectors to search for dark matter. Implemented web-based GUI for control and temperature readout of a 3He Cryostat. Built custom pick-n-place device from 3D printer for precision mounting of detectors into housings. Designed custom breakout and filtering PCBs for experiment readout. Developed various benchtop breakout electronics for component testing. Aided during installation of new Oxford dilution refrigerator.

TECHNICAL SKILLS

Device Fabrication & Photolithography

Qualified at Stanford Nanofabrication Facility (SNF) to perform basic full-wafer fabrication processes. Spin coating (Headway), exposure (Heidelberg), dry etching (PlasmaTherm), wet bench skills (wet etching, developing), SEM and AFM Imaging.

Engineering & Design

Basic benchtop electronics, Soldering, Machining (metal and wood, welding, plasma cutting, shop tools), CAD (Solidworks, Fusion 360), 3D Printing, FPGA Programming (Quartus), PCB Design (KiCad).

Basic Cryogenics Experience

Operation, wiring, device mounting, detector readout in dry 3He cryostat. Basic use of dry dilution refrigerators.

Proficiency in Programming Languages

Matlab, Git, Python (including Jupyter, Streamlit, Flask), Javascript (including p5.js, NODE.js), HTML, CSS, PHP, Java (including Processing), C, C++, ARM Assembly, BASIC, Verilog, Prolog, Smalltalk, Shell Script.

RELEVANT UNDERGRADUATE COURSEWORK

COURSES: Statistical Mechanics, Thermodynamics, E&M, Quantum Mechanics, Solid State Physics, Intro to Relativistic QED, Optics, Analytical Mechanics, Numerical Methods, Intro to Quantum Computing, Adv. Linear Algebra, Adv. Optimization, Putnam Competition Problem Solving Seminar.

ADVANCED LABS: *Quantum Control* (Setup, calibrated, and performed measurements of relaxation and coherence times (T1 and T2) of the nuclear magnetic resonance of protons in water, emulating a qubit); *Quantum Optics* (Measured single down-converted photons from a laser through a nonlinear optic. Verified conservation laws through observation of coincident photons in opposing APD detectors). *Mr. SQUID*. *Nuclear Alpha Decay Spectroscopy*.

CONFERENCES AND PRESENTATIONS

Posters

20th Conference on Low Temperature Detectors 2023 (LTD 20). *Two-Stage Cryogenic HEMT Amplifiers for Low Temperature Detectors*. Institute for Basic Science. Daejeon, South Korea. July, 2023.

Sigma Xi Honors Society 2023 Research Poster Session. *Development of a Cryogenic Two-Stage HEMT Amplifier to Search for Dark Matter.* Santa Clara University. Santa Clara, CA. April, 2023.

Talks

APS Far West Section Fall Meeting 2023. *Development of a Cryogenic Two-Stage HEMT Amplifier to Search for Dark Matter*. UC San Diego. San Diego, CA. October, 2023.

2023 SCU Undergraduate Summer Research Symposium. *Development of a Cryogenic Two-Stage HEMT Amplifier to Search for Dark Matter*. Santa Clara University. Santa Clara, CA. September, 2023.

2022 SCU Undergraduate Summer Research Symposium. *Hot Physics at Cold Temperatures*. Santa Clara University. Santa Clara, CA. October, 2022.

SPS Journal Clubs and Similar Presentations

Cryogenic Thermometry (2023) • *Diamond Nitrogen-Vacancy Physical Qubits* (2023) • *Piezoelectric Fluids* (2023) • *Neutrino Physics* (2022).

AWARDS

George W. Evans II Award runner-up recipient (SCU internal putnam exam award)	May 2024
Sigma Xi Research Fellow	May 2023
Geoff and Josie Fox Research Fellowship	Summer 2022, Summer 2023
SCU Dean's Scholarship	2020-2024
Aliso Niguel High School Valedictorian Class 2020	August 2020
Seal of Bi-Literacy in French Language	August 2020
California Scholarship Federation Special Honors Recipient	August 2020
Aliso Niguel High School Student of the Semester Award	May 2018

TEACHING EXPERIENCE

Private Physics Tutor — **March 2022 - Present**

Freelance (Over 400 sessions experience)

I teach problem-solving methods students can use to maximize their success on tests, while simultaneously maximizing their understanding of the content. I provide a toolset of methods developed over many years to solve most introductory physics problems. Through this experience, I have discovered a love for teaching others and seeing them improve over time.

Physics Tutor — **September 2021 - April 2023**

SCU Drahmann Center (Over 100 sessions experience)

Provided free tutoring for students taking introductory physics courses at SCU. I gained experience directly working with students in 1-on-1 environments. Learned how to target teaching to areas of misunderstanding and how to encourage students to succeed.

ACTIVITIES

Society of Physics Students SCU Chapter President	2023-2024
Society of Physics Students SCU Chapter Vice President – Outstanding Chapter Award Received	2022-2023
Recipes for Relief On-Campus Events Coordinator	2022-2023
Triathlon Club Member	2022-present
Team Mike's Bikes Racing Team Athlete (cycling)	2021-present

VOLUNTEERING

St. Patrick Middle School STEM Tutor	September 2023 - December 2023
SCU Welcome Weekend Volunteer	September 2023
Recipes for Relief On-Campus Event Coordinator and Cook	2022 - 2023

PUBLICATIONS

1) Anczarski, J., Rydstrom, I., Young, B. et al. Two-Stage Cryogenic HEMT-Based Amplifier for Low-Temperature Detectors. J Low Temp Phys (2024). https://doi.org/10.1007/s10909-023-03046-1