

# NADIE YILUO LITENN

yiluo\_li@ucsb.edu, litenn.com

## EDUCATION

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**University of California, Santa Barbara**

Aug. 2017 - Present

Honors Bachelor of Science, Physics, College of Creative Studies

## GENERAL RESEARCH INTERESTS

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Black Hole Information, Gravity Theory, Quantum Field Theory, Beyond Standard Model Physics

## SELECTED COURSEWORK

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### Graduate Classes:

Quantum Gravity Path Integral and Baby Universes, QFT in the Curved Space, Black Hole Info Paradox, Quantum Field Theory, General Relativity, Intro to Condensed Matter, High Energy Astro, Quantum Computation and Quantum Information, Quantum Mechanics, Electrodynamics

### Undergrad Upper Division Classes

Particle Physics, Group Theory, Tensor Analysis, Cosmology, Fly by Night Physics, Complex Analysis, Fluid Dynamics, Graph Theory, Teaching Physics

## RESEARCH EXPERIENCES

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### Gravity Theory Group

May. 2021 - Present

*PI: Prof. Xi Dong, Co-mentor: Sean McBride*

*UCSB*

- Studying holographic duality with random tensor network, and numerically calculating the replica negativity near phase transition using random tensor network as a toy model

### AMO Exmpermental Group

Mar. 2019 - Mar. 2020

*PI: Prof. Andrew Jayich*

*UCSB*

- Worked on quantum error correction code for qudits, specifically for Sr87+ ions
- Simulated magnetic field insensitive ions by dressing them with radio-frequency magnetic fields, and encoding them into the decoherence free subspaces for quantum information processing

### Geological and Planetary Science Group

Jun. 2018 - Sep. 2018

*PI: Prof. Michael Brown, Co-Mentor: Samantha Trumbo*

*Caltech*

- Analyzed the thermal properties of the Galilean satellites from over 300 unpublished Galileo Mission PPR data with the simple global thermal diffusion model
- Characterized the potential thermal anomalies on Europa, the thermal inertia map for Ganymede, as well as the relations between measurement and the albedo variations

### Near Earth Asteroid Group

Jun. 2016 - Aug. 2016

*Advisor: Prof. Michael Dubson*

*Sommers Bausch Observatory, University of Colorado, Boulder*

- Took original observation data and determined the apparent magnitude and the orbit of the Near-Earth Asteroid 40329 (1999ML)
- Results accepted by the Minor Planet Center

### Experimental Cosmology Group

Jun. 2015 - Aug. 2015

*PI: Prof. Philips Lubin, Co-Mentor: Qicheng Zhang*

*UCSB*

- Improved the laser-spacecraft simulation by determining and eliminating laser energy that will backfire

- Maximized energy output and minimized time cost by putting laser and spacecraft in orbital resonance
- Reduced uncertainty in time cost when varying the spacecraft launching time

## INDEPENDENT STUDIES

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**2D CFTs** Jun. - Sep. 2021  
*SB Theory Group Summer Reading* UCSB

- Focus on the introduction to CFT from Polchinski and Di Francesco
- Other talks in the group from other grad students involve minimal models, WZW models, Liouville theory, DOZZ and branes, and  $c = 1$  string.

**Canonical Formulation of General Relativity** Mar. - Jun. 2021  
*Prof. Don Marolf* UCSB

- Term paper for Quantum Gravity Path Integral, Baby Universes, and Black Hole Information Problem
- First part starts with initial value formulation for Klein-Gordon theory and generalizes up to gravity
- Second part involves actual calculation of the (1+3) split of GR, and explores the role of constraints

**Directed Reading on Quantum Field Theory** Dec. 2019 - Jun. 2021  
*Prof. Anthony Zee* UCSB

**Directed Reading on Quantum Field Theory in the Curved Space** Jan. - Mar. 2021  
*Prof. Don Marolf* UCSB

**Hydrodynamics in Astrophysical Accretion Disks** Sep. - Dec. 2020  
*Prof. Anthony Zee* UCSB

- Term paper for Fluid Dynamics
- Explain Bondi accretion and its application for stellar wind and collision particles

**Entropy, Information, and the Universe** Jan. - Mar. 2020  
*Prof. Anthony Zee* UCSB

- Term paper for Fly by Night Physics
- Explain the origin of entropy and relate to advantages of quantum computers
- Sketch the derivation of Bekenstein bound, show why black holes saturate the upper limit of computational power, and calculate the ultimate computational power of the universe since the Big Bang

**Young Tableaux and Its Applications** Mar. - Jun. 2019  
*Prof. Anthony Zee* UCSB

- Term paper for Group Theory
- Explored theoretical properties of including involution and Cauchy identities
- Relate to applications in binary trees, quantum angular momentum additions, and the dimension of decoherence free subspace in quantum error correction

**Remotely Operated Vehicle (ROV) with Touch Sensing Control** Dec. 2019 - Present  
*Prof. Andrew Jayich* UCSB

- Quarter long project for PHYS CS 15C, Intro to Experimental Physics
- In charge of simple machine learning training, visualizing feedback data from the vehicle, and programming the hardware

## TALKS AND PRESENTATIONS

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**N.Y. LiTenn** (2021), “Black Hole, Entropy, Holography: Then and Now with Random Tensor Network”, Undergraduate Physics Research Symposium, UC Santa Barbara, California

**N.Y. LiTenn** (2021), “What the heck is CFT, I”, SB Theory Group Summer Reading, UC Santa Barbara, California

**N.Y. LiTenn** (2021), “Canonical Formulation of General Relativity”, PHYS 231C Quantum Gravity Path Integral, Baby Universes, and Black Information Problem, UC Santa Barbara, California

**N.Y. LiTenn** (2020), “Black Hole Information Paradox - A Pedestrian’s Roadmap”, SPS Journal Club, UC Santa Barbara, California

**N.Y. LiTenn** (2020), “Entropy and Computational Power of the Universe”, SPS Journal Club, UC Santa Barbara, California

**N.Y. LiTenn** (2020), “Introduction to Theoretical Quantum Error Correction”, Guest lecture at INT CS 10, Full Stack Quantum Computing class, UC Santa Barbara, California

W. Fu, **N.Y. LiTenn**, M. Wang (2019), “Remotely Operated Vehicle Controlled by Touch Sensing on Simulated Terrain”, Independent Project Showcase of PHYS CS 15C Intro to Experiment, UC Santa Barbara, California

**N.Y. LiTenn**, M. Fan, A.M. Jayich (2019), “Magnetic Field Insensitive Radio-Frequency Dressed Qubit”, Research and Creative Activities Conference, UC Santa Barbara, California

**N.Y. LiTenn**, S. Trumbo, M.E. Brown (2019), “Temperatures of the Galilean Satellites”, APS Conference of Undergraduate Women in Physics, UC Santa Barbara, California

**N.Y. LiTenn**, S. Trumbo, M.E. Brown (2018), “Temperatures of the Galilean Satellites”, Research and Creative Activities Conference, UC Santa Barbara, California

**N.Y. LiTenn**, S. Trumbo, M.E. Brown (2018), “Temperatures of the Galilean Satellites”, KITP Undergraduate Physics Research Symposium, UC Santa Barbara, California

**N.Y. LiTenn**, S. Trumbo, M.E. Brown (2018), “Temperatures of the Galilean Satellites”, Caltech Summer Seminar, California Institute of Technology, California

**N.Y. LiTenn**, Q. Zhang, P. Lubin (2015), “Push that Craft Faster Every Single Time - Optimization for Laser-Propelled Spacecraft at All Launching Times”, Research Mentorship Program Symposium, UC Santa Barbara, California

## AWARDS AND FELLOWSHIPS

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<b>Summer Undergraduate Research Fellowship (SURF)</b>	Dean’s Fellow, UCSB, 2019
<b>Traveling Undergraduate Research Fellowship (TURF)</b>	UCSB, 2019
<b>Visiting Undergraduate Research Program (VURP)</b>	Caltech, 2018
<b>Goldman Sachs Best Data Visualization</b>	MHacks X, University of Michigan, 2017

## TEACHING EXPERIENCES

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<b>Learning Assistant</b>	<i>UCSB</i>
PHYS 131, General Relativity, with Prof. Steve Giddings	Apr. - Jun. 2021
PHYS 150, Group Theory, with Prof. Anthony Zee	Apr. - Jun. 2021

PHYS 21, Mechanics and Waves, with Dr. Tengiz Bibilashvili	Jan. - Mar. 2021
PHYS 150, Fly by Night Physics, with Prof. Anthony Zee	Jan. - Mar. 2021
PHYS 20, Newtonian Mechanics, with Prof. Don Marolf	Sep. - Dec. 2020
PHYS 101, Complex Analysis, with Prof. Jean Carlson	Jan. - Mar. 2020
INT 84AH, Honors Special Relativity, with Dr. Tengiz Bibilashvili	Jan. - Mar. 2019
PHYS 24, Electricity and Magnetism, with Prof. Paula Popescu	Jan. - Mar. 2019

<b>Grader</b>	Aug. - Sep. 2019
PHYS 104, Advanced Mechanics, with Eric Jones	<i>UCSB</i>

## PROFESSIONAL SERVICES

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<b>Student Director</b>	Oct. 2018 - Present
<i>KITP Undergraduate Physics Research Symposium</i>	<i>UCSB</i>

<b>Chair of Journal Club</b>	Oct. 2020 - Present
<i>Society of Physics Student</i>	<i>UCSB</i>

<b>Invited Juror</b>	Jan. 2021
<i>US Invitational Young Physicists' Tournament</i>	<i>UCSB, Zoom</i>

<b>Research Mentor, Jayich Lab</b>	Jun. - Aug. 2019
<i>Research Mentorship Program (mentors are usually at least graduate students)</i>	<i>UCSB</i>

- Student: Brian Ji from Burnaby North Secondary School
- Project: Characterization of Collimated Atomic Beaming for Ra-225 Qubit Isolation

<b>Invited Juror</b>	Jan. 2019
<i>US Invitational Young Physicists' Tournament</i>	<i>Rye Country Day School</i>

## REFERENCES

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**Prof. Anthony Zee**  
zee[at]kitp.ucsb.edu

**Prof. Don Marolf**  
marolf[at]ucsb.edu

**Prof. Xi Dong**  
xidong[at]ucsb.edu

**Prof. Mark Srednicki**  
mark[at]physics.ucsb.edu

**Dr. Tengiz Bibilashvili**  
tbib[at]ucsb.edu