

# Kareem Shamma

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 Kareem Shamma

 Personal Website



## Education

- 2025 – Present      **UC Santa Barbara** Physics B.S. student  
*Letters and Science Honors Program* student hoping to pursue a PhD in Physics
- 2022 – 2025      **Technology High School**  
 **Santa Rosa Junior College** (High School Dual-Enrollment)

## Experience

### Certifications

- 2022      **Richey-Critien 20" Operator Certification.** CCD and CMOS research telescope certification at [Robert Ferguson Observatory](#), equipped with a spectrometer and spectrograph
-  **Optical Refracting 8" Operator Certification.** Education/Public outreach telescope certification at Robert Ferguson Observatory

### Observatory Research Committee Member

- 2023 – Present      Attend meetings on various Astrophysics research topics/issues within the research committee
- 2024      Helped with data collection and programming in a group focusing on recording exo-planet transits and using methods to determine system parameters.
- 2023      Joined Robert Ferguson Observatory's research committee and helped with basic data collection aimed at plotting light curves of variable stars using their 20" Richey-Critien telescope  
Used simple limb-darkening models with an occluding body to create a closed-form solution for the light curve in terms of the system parameters and created a simple curve fitting algorithm using Scipy and PyTorch to interpolate data from TrES-2b and determine the orbital period.

### Tutoring

- Ongoing      Tutored all ages from 3rd graders to college students in math and basic physics via the Tech High Math Club and as a private tutor.

## Extracurriculars & Leadership

### Robert Ferguson Observatory Docent

- 2022-2025      **Telescope Operator for Public Viewing**  
Operated both a Richey-Critien 20" telescope with a color CMOS and CCD sensor and an optical 8" Refracting telescope for public outreach events for all ages/knowledge levels.

### Clubs

- 2025 - Present      **UCSB Society of Physics Students**  
 **UCSB Undergraduate Diversity in Physics**

## Extracurriculars & Leadership (continued)

- 2025
- **Tech High Math Club President** (Member from 2022-2025, VP in 2023-2024, President from 2024-2025) Caused a major recruitment push for the math club in 2023 as vice-president, allowing a school record of students to participate in competition math, free tutoring, and volunteer tutoring at nearby Technology Middle School.  
Co-founded and hosted the first annual [Tech High mini Math Tournament](#) intended for middle-schoolers in Sonoma County as President in spring 2025.
  - **Tech High Astronomy Club Co-Founder** Served as Vice-President after founding in the 2024-25 school year, assisting in meeting prep aimed at Astronomy/Astrophysics enrichment for Tech High students. Organized for an astronomy professor to give a talk on stellar astronomy for the club.
- 2024-2025
- **Santa Rosa Junior College Physics Club Member** Attended meetings and special lectures given by Santa Rosa Junior College Physics department professors while dual-enrolled. Lecture/meeting topics included Quantum Information and Encryption, Physics Education Research, Radio Telescope Construction, and a Scanning Electron Microscopy Lab.

## Competition Math

- 2022-2025
- Competed in and helped organize participation in the following competitions through the Tech High Math Club: AMC 10/12, Berkeley Math Tournament, Bay Area Math Olympiad, CEMC Pascal, Cayley, Fermat, Fryer, Galois, Hypatia, Euclid, and the Stanford Math Tournament.

## Awards

- 2025
- **AP Scholar With Distinction**
- 2024
- **President's Volunteer Service Award (Gold)**  
Gained 250+ hours as a volunteer docent at the Robert Ferguson Observatory
  - **Titan Research Institute (1st place)**  
Won a science-fair style project expo among the entire grade at Technology High School.  
Project titled *The Effectiveness of Math in Physics*, analyzing how different methods of solution to the nonlinear simple pendulum differential equation predict experimental data, aiming to demonstrate the necessity of abstract mathematical methods in solving physics problems.

## Relevant Coursework

### UC Santa Barbara

- 2026 - In Progress
- **Phys CS 32** (Mechanics and Waves, College of Creative Studies)
  - **Phys CS 140VA** (Vector Analysis, College of Creative Studies)
  - **Phys 115A** (Quantum Mechanics I)
  - **Phys CS 15B** (Experimental Physics, College of Creative Studies)
  - **Writ 105SW** (Science Writing for the Public)
  - **Math 122A** (Theory of Complex Variables I)
- 2025
- **Phys 21** (General Physics I: Newtonian Mechanics)
  - **Phys 23** (General Physics III: Waves and Electrostatics)
- 2025
- **Phys CS 15A** (Introduction to Experimental Physics, College of Creative Studies)
  - **Int 84AH** (Special Relativity for Pedestrians)
  - **Math 8** (Introduction to Higher Mathematics)

## Relevant Coursework (continued)

### 📘 **Phys 98** (Directed Reading\*)

\*Directed reading with a theoretical physics faculty member. Covered topics include modern physics, abstract linear algebra, and Fourier analysis, aiming to prepare for upper-division quantum mechanics early.

### Santa Rosa Junior College (High School Dual-Enrollment)

#### 📘 **Math 2** (Differential Equations)

2024

#### 📘 **Math 1C** (Calculus III)

#### 📘 **Math 5** (Linear Algebra)

#### 📘 **Astron 42** (Astrobiology)

#### 📘 **Astron 4** (Astronomy of the Solar System)

2023

#### 📘 **Astron 3** (Stellar Astronomy)

## Skills

- |             |   |
|-------------|---|
| Coding      | 📘 Java, Python (Matplotlib/Scipy/PyTorch/Sympy/Blender PY/Jupyter Notebooks), and L <sup>A</sup> T <sub>E</sub> X |
| Soft Skills | 📘 Avid public speaker, teacher, and team player   |
| Misc.       | 📘 Skills in 3D modeling with Blender and 3Ds Max, 3D Scanning, Motion Tracking, and 3D Printing.                  |