Kareem Shamma

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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 exoplanet 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 LaTeX
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.