

**Monika Getsova**  
**1200 E California Blvd, MSC 440**  
**Pasadena, CA, 91125**  
**757-355-7637**  
**mgetsova@caltech.edu**

### Education

**California Institute of Technology**

**Sept. 2016 – Dec. 2021**

- B.S. in Physics – overall GPA 3.2/4.0
- Minor in Computer Science

**Ocean Lakes Math and Science Academy**

**Sept. 2012 – June 2016**

- Salutatorian – GPA 4.8104/4.0

### Academic Interests

After taking a course on quantum field theory, I became interested in the subject and particularly in the mathematical frameworks which led me to study the use of the quantum invariants of knots in topological field theories. I then continued to self-study various related topics which are documented on my blog (url above) and which I plan to continue in the coming months. I was also led to audit one term of a course on differential topology, as well as my research with Prof. Smillie, and taking a course on topological QFT. I also enjoyed studying graph theory in a class on algorithm design. Thus, I hope to pursue graduate studies in algebraic topology as I feel it most broadly covers my interests, but I am also interested in other areas of mathematics and applications to physics, computation, and any other fields.

### Research Experience

**August 2021 – present** – an unofficial study of the cohomology of Kontsevich graph complexes and relations to Feynman rules guided by Prof. Peter Smillie (Caltech Mathematics) starting with Francis Browns paper *Invariant differential forms on complexes of graphs and Feynman integrals* (Pasadena, CA)

**August 2020 – January 2021** – employed at Topdeck.ai Under Prachi Parihar: created an algorithm to detect blur and eliminate such frames from a video utilizing a TensorFlow ML algorithm to identify similar images and attempting to quantify blur via local phase coherence of the Fourier transform

**Jan 2019-June 2019** – including a SURF funded by the John Stauffer Charitable Trust during the summer under Prof. William A. Goddard III titled “Constructing a Fully Optimized A2A-fullGs Protein Complex Using the A2A-miniGs Cryo-EM Structure” (Pasadena, CA)

**Summer 2018-** SURF under Prof. Maria Spiropulu at Caltech titled “Projection for WZZ Production Cross Section Measurements at the HL-LHC” (Pasadena, CA)

**Spring 2018** – Worked with Dr. Yasuhiro Hasegawa at JPL studying/trying to identify hot Jupiter exoplanets.

**Summer of 2017** – SURF under Prof. Ryan Patterson at Caltech titled “Determining the Wrong-Sign Component of a NOvA Beam in Anti-Neutrino Mode” (Pasadena, CA)

**Summer of 2015** – Mentorship in Nuclear Physics under Prof. Lawrence Weinstein and Dr. Gail Dodge at Old Dominion University (Norfolk, VA).

### Recent Notable Accolades

**2019** – Placed 2<sup>nd</sup> in an IST4 class competition for developing the fastest algorithm to determine word edit distance using a nonstandard dynamic programming approach exploiting several cases of symmetries which I identified in binary strings

**2017** – SURF proposal (see above) used by Caltech Hixon writing center as example of good scientific writing

### Skills

Proficient in Python, C++ (including ROOT), and Java  
Very comfortable with most common Linux distros

Experience with the following publicly available material and biological simulation software: LAMMPS, Maestro, Gromacs, MPSim  
Experience working in a laboratory setting with radioactive material, Geiger counters, scintillators, and cloud chambers.

**Work Experience**

Caltech Y archivist (2021 – ongoing) – archiving images from Caltech’s history including writing some short programs solve the matter of sorting through thousands of scanned and annotated images  
Topdeck.ai software engineer (2020)  
Sherman Fairchild Library Circulation Desk – (2016-2018)  
Part time private high school math and science tutoring – (spring 2018)  
Online/Face-to-face volunteer math tutor for students in high school and college as part of Mu Alpha Theta outreach – (2013 – 2016)

**Leadership and Outreach**

Mu Alpha Theta (HS math honor society) president (2015-1016) – most enjoyed planning a math fun day for elementary school students  
Physics Club founder (HS) (2015-2016)