# Martin Lopez Jr.

majlopez@ucsc.edu | www.mjlopezjr.com

## Education

**University of California, Santa Cruz** *Santa Cruz, CA*

**Physics (Astrophysics) B.S., Summa Cum Laude** *2018*

- Advisor: Prof. Enrico Ramirez-Ruiz
- Overall GPA: 4.0, Highest Honors in the Major

**Mission College** *Santa Clara, CA*

- Overall GPA: 3.92 *2011 - 2015*

## Research Interests

Theoretical and computational astrophysics, transients, high energy astrophysics, compact objects, formation channels of LIGO sources.

## Research Experience

**Junior Specialist** *UC Santa Cruz*

Advisors: Prof. Enrico Ramirez-Ruiz *2018-Present*

- Study the structure of binary black hole tidal disruption events using numerical tools such as SPH and FLASH.

**Undergraduate Research Fellow, Supercomputer Lab for Undergraduates** *UC Santa Cruz*

Advisors: Prof. Enrico Ramirez-Ruiz and Dr. Aldo Batta *2016 - 2018*

- Use 3D Lagrangian hydrodynamic simulations and analytic methods to study dense stellar systems (globular clusters and galactic nuclei). Specifically, the physical and tidal interactions within them.

**NBIA & DARK Summer School: Multi-Messengers from Compact Sources** *Niels Bohr Institute*

Advisors: Prof. Enrico Ramirez-Ruiz and Dr. Aldo Batta *2018*

- Study how tools from an array of disciplines can be utilized to better understand gravitational wave and electromagnetic sources.

**Kavli Summer Program in Astrophysics** *Niels Bohr Institute*

Advisors: Prof. Enrico Ramirez-Ruiz and Dr. Aldo Batta *2017*

- Study tidal disruptions of stars by LIGO binary black holes to understand the evolution of their individual spins.

**NSF Research Experience for Undergraduates, *Lamat*** *UC Santa Cruz*

Advisors: Prof. Enrico Ramirez-Ruiz and Dr. Aldo Batta *2016*

- Study physical encounters between compact objects and red giants using analytical methods.
- Use order of magnitude estimates to calculate rates of collisions and significance of feedback energy on the system.

## Computational Skills

Hydrodynamics

- Proficiency in the Lagrangian Smoothed Particle Hydrodynamic (SPH) formulated code GADGET-3 (Springel, V.). GADGET-3 utilizes MPI.

Programming Languages

- Python
- C/C++
- MATLAB
- HTML
- CSS

Supercomputers

- University of Copenhagen HPC@UCPH Cluster
- UC Santa Cruz Hyades Cluster

## Publications

"Probing the Black Hole Merger History in Clusters using Stellar Tidal Disruptions", Johan Samsing, Tejaswi Venumadhav, Liang Dai, Irvin Martinez, Aldo Batta, **Martin Lopez Jr.**, Enrico Ramirez-Ruiz, Kyle Kremer. 2019, Submitted.

"Tidal Disruptions of Stars by Binary Black Holes: Modifying The Spin Magnitudes and Directions of LIGO Sources in Dense Stellar Environments", **Martin Lopez Jr.**, Aldo Batta, Enrico Ramirez-Ruiz, Irvin Martinez, Johan Samsing. 2018, The Astrophysical Journal, Submitted.

## Honors & Awards

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| 2017 | UCSC Women's Club Scholarship (Re-Entry Scholarship) |
| 2016-2017 | Ron Ruby Memorial Scholarship |
| 2015-2017 | Karl S. Pister Leadership Opportunity Award |
| 2012-Present | Dean's Honor List |

## Presentations

**Presentation, UC Board of Regents Meeting** — *San Francisco, CA*
*The Benefit of Undergraduate Research* — *2018*

**Poster, American Astronomical Society 231st Meeting** — *Washington, DC*
*Understanding The Spin Evolution of LIGO Sources* — *2018*

**Talk, Dynamically Assembled Binaries at the Beach Program** — *UC Santa Cruz*
*Understanding The Spin Evolution of LIGO Sources* — *2017*

**Talk, Department Funding Presentation** — *UC Santa Cruz*
*Red Giant Depletion Through Collisions in Dense Stellar Systems* — *2017*

**Talk, Prof. Ruth Murray-Clay Group Collaboration Presentation** — *UC Santa Cruz*
*Red Giant Depletion Through Collisions in Dense Stellar Systems* — *2017*

**Poster, Undergraduate Research Symposium** — *UC Santa Cruz*
*The Extermination of Stars Through Collisions* — *2016*

## Outreach, Services, and Experiences

**Lab Tours Host of SLUG Offices** — *UC Santa Cruz*
STEM Diversity and STARS — *2016-2018*

**COMET Mentor** — *UC Santa Cruz*
STARS — *2016*

**Tutor, *Introduction to Scientific Computing*** — *UC Santa Cruz*
Learning Support Services — *2016*

**Free Tutoring Services, Math** — *Santa Clara, CA*
Muslim Community Association — *2015*

**Peer Mentor, *Arithmetic* and *Elementary Algebra*** — *Mission College*
AANAPISI — *2014-2015*

**Tutor, Physics, Math, Statistics, Chemistry, and English** — *Mission College*
Academic Support Center — *2014-2015*

## Languages

English and Spanish (Native)
Arabic (Intermediate)