

# Martin Lopez Jr.

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## Education

### University of California, Santa Cruz

Santa Cruz, CA

#### PHYSICS (ASTROPHYSICS) B.S., SUMMA CUM LAUDE

2018

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

ADVISOR: 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 BATTÀ

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.

### Open Questions in Astrophysics Program

Niels Bohr Institute

ADVISOR: PROF. ENRICO RAMIREZ-RUIZ

2018

- Gain exposure to cutting-edge research in various fields of astrophysics such as high energy astrophysics, star formation, galaxy dynamics, and cosmology. Discuss issues of diversity and inclusion in the astronomy community.

### NBIA & DARK Summer School: Multi-Messengers from Compact Sources

Niels Bohr Institute

ADVISORS: PROF. ENRICO RAMIREZ-RUIZ AND DR. ALDO BATTÀ

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 BATTÀ

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 BATTÀ

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

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### 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

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“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, ACCEPTED TO APJ.

## Honors & Awards

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2019	Harvard Graduate School of Arts and Sciences Prize Fellowship
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

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<b>Poster, High Energy Astrophysics Division 17th Meeting</b>	Monterey, CA
<i>Tidal Disruptions by Binary Black Holes in Dense Stellar Systems</i>	2019

<b>Talk, Transient Lunch</b>	UC Santa Cruz
TIDAL DISRUPTIONS OF STARS BY BINARY BLACK HOLES	2018

<b>Talk, TDE Meeting</b>	UC Santa Cruz
<i>Tidal Disruptions by Binary Black Holes: Altering Birth Spin Magnitude and Direction</i>	2018

<b>Presentation, UC Board of Regents Meeting</b>	San Francisco, CA
<i>The Benefit of Undergraduate Research</i>	2018

<b>Poster, American Astronomical Society 231st Meeting</b>	Washington, DC
<i>Understanding The Spin Evolution of LIGO Sources</i>	2018

<b>Talk, Dynamically Assembled Binaries at the Beach Program</b> <i>Understanding The Spin Evolution of LIGO Sources</i>	<i>UC Santa Cruz</i> 2017
<b>Talk, Department Funding Presentation</b> <i>Red Giant Depletion Through Collisions in Dense Stellar Systems</i>	<i>UC Santa Cruz</i> 2017
<b>Talk, Prof. Ruth Murray-Clay Group Collaboration Presentation</b> <i>Red Giant Depletion Through Collisions in Dense Stellar Systems</i>	<i>UC Santa Cruz</i> 2017
<b>Poster, Undergraduate Research Symposium</b> <i>The Extermination of Stars Through Collisions</i>	<i>UC Santa Cruz</i> 2016

## Outreach, Services, and Experiences

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<b>Math and Physics Academic and Test Prep Tutor</b> AJ TUTORING	<i>AJ Tutoring</i> 2019-Present
<b>High School Spring Into STEM Day SLUG Lab Tour Host</b> STEM DIVERSITY	<i>UC Santa Cruz</i> 2019
<b>STEM Transfer Day SLUG Lab Tour Host</b> STEM DIVERSITY AND STARS	<i>UC Santa Cruz</i> 2016-2018
<b>COMET Mentor</b> STARS	<i>UC Santa Cruz</i> 2016
<b>Tutor, Introduction to Scientific Computing</b> LEARNING SUPPORT SERVICES	<i>UC Santa Cruz</i> 2016
<b>Free Tutoring Services, Math</b> MUSLIM COMMUNITY ASSOCIATION	<i>Santa Clara, CA</i> 2015
<b>Peer Mentor, Arithmetic and Elementary Algebra</b> AANAPISI	<i>Mission College</i> 2014-2015
<b>Tutor, Physics, Math, Statistics, Chemistry, and English</b> ACADEMIC SUPPORT CENTER	<i>Mission College</i> 2014-2015

## Languages

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ENGLISH AND SPANISH (NATIVE)  
ARABIC (INTERMEDIATE)