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 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.

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 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, Accepted to ApJ.

Honors & Awards

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

Poster, High Energy Astrophysics Division 17th Meeting *Monterey, CA*
Tidal Disruptions by Binary Black Holes in Dense Stellar Systems *2019*

Talk, Transient Lunch *UC Santa Cruz*
Tidal Disruptions of Stars by Binary Black Holes *2018*

Talk, TDE Meeting *UC Santa Cruz*
Tidal Disruptions by Binary Black Holes: Altering Birth Spin Magnitude and Direction *2018*

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

High School Spring Into STEM Day SLUG Lab Tour Host — *UC Santa Cruz*
STEM Diversity — *2019*

STEM Transfer Day SLUG Lab Tour Host — *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)