

# BRUNO VILLASENOR

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## EDUCATION

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### University of California, Santa Cruz

June 2018 - August 2022

Ph.D. in Astronomy and Astrophysics

Department of Astronomy and Astrophysics.

Thesis: “*Understanding the Intergalactic Medium Through High-Performance Cosmological Simulations.*” Advisors: Brant Robertson & Piero Madau

### University of California, Santa Cruz

August 2016 - June 2018

Master of Science in Astronomy and Astrophysics

Department of Astronomy and Astrophysics. Advisor: Brant Robertson

### Universidad Nacional Autonoma de Mexico, UNAM, Mexico

August 2007 - June 2016

Bachelor of Science in Physics.

Thesis: “*On the kinematics of the stellar component of satellite galaxies as tracer of their dark matter distribution.*” Advisor: Vladimir Avila-Resse

## WORK EXPERIENCE

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### MTS Software Applications Eng.

AMD, August 2022 - Current

Port and optimize scientific applications to run on GPU-based large-scale systems.

### Summer Intern at Fermilab

Fermi National Lab, Illinois, Summer 2010

- Fellow for the Internship for Physics Majors at Fermi National Accelerator Laboratory. Developed software to analyze events from the Tevatron collider and applied a new method to select Higgs Boson events from the WW decay, this algorithm was latter applied in the Higgs detection pipeline.

Advisor: Eric James.

### Summer Intern at Fermilab

Fermi National Lab, Illinois, Summer 2011

- Received a “come back” offer for further development of the data analysis work done during the previous summer for the Higgs boson detection. Analyzed the Higgs Thrust from monte-carlo simulations and optimized the selection criteria for Higgs events from the Tevatron collider. Advisor: Eric James & Sergio Jindariani

## PUBLICATIONS

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**B. Villasenor**, B. Robertson, P. Madau, and E. Schneider, “New Constraints on Warm Dark Matter from the Lyman-alpha Forest Power Spectrum”, 2022, [arXiv:2209.14220](https://arxiv.org/abs/2209.14220).

Ryan Hausen, Brant E. Robertson, Hanjue Zhu, Nickolay Y. Gnedin, Piero Madau, Evan E. Schneider, **Bruno Villasenor**, Nicole E. Drakos, “Revealing the Galaxy-Halo Connection Through Machine Learning”, 2022, [arXiv:2204.10332](https://arxiv.org/abs/2204.10332).

**B. Villasenor**, B. Robertson, P. Madau, and E. Schneider, “Inferring the Thermal History of the Intergalactic Medium from the Properties of the Hydrogen and Helium Lyman-alpha Forest”, 2021, [ApJ](https://doi.org/10.1093/apj/933/59V), 933, 59V.

N. Drakos, **B. Villasenor**, B. Robertson, et al, “Deep Realistic Extragalactic Model (DREaM) Galaxy Catalogs: Predictions for a Roman Ultra-Deep Field”, 2021, [Apj](https://doi.org/10.1093/apj/926/194), 926, 194.

**B. Villasenor**, B. Robertson, P. Madau, and E. Schneider, "Effects of Photoionization and Photoheating on Lyman-alpha Forest Properties from Cholla Cosmological Simulations", 2021, [ApJ](#), **912**, 138.

**B. Villasenor**, R. Zamora-Zamora, D. Bernal, and V. Romero-Rochn, "Quantum turbulence by vortex stirring in a spinor Bose-Einstein condensate", 2014, [Phys. Rev. A](#) **89**, 033611.

## TEACHING EXPERIENCE

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Teacher Assistant: **Intro. to Scientific Computing**, Astronomy Dept. UCSC. Winter 2016, Spring 2017

Teacher Assistant: **Computational Physics**, 7th semester, UNAM. Semester: 2016-1.

Teacher Assistant: **Scientific Computing Using GPU's**, Advanced, UNAM. Semester: 2012-1.

## HONORS AND AWARDS

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Excellence in Teaching: UCSC Astronomy Department Award Recipient, 2017.

CONACyT-UCMEXUS Doctoral Fellow, 2016 - 2022.

Second place at the III Mexican Olympiad of Astronomy, INAOE, Mexico, 2007.

Participant at the XXXVII International Physics Olympiad, Iran, 2007.

Participant at the XXXVI International Physics Olympiad, Singapore, 2006.

Silver medal at the X Ibero-American Physics Olympiad, Uruguay, 2005.

First place at the XVI Mexican Physics Olympiad, Mexico, 2005.

Second place at the XV Mexican Physics Olympiad, Mexico, 2004.

## TALKS AND SEMINARS

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*Inferring the Thermal History of the IGM from Models of the Large Scale Ly-alpha Flux Power Spectrum*, Recorded for SAZERAC conference, Jun 2021, [Youtube Link : https://youtu.be/GYfQZkYfAJ4](https://youtu.be/GYfQZkYfAJ4).

*The Thermal History of the IGM After Reionization*, Astronomy Department, UCSC, 2020.

*Studying the Intergalactic Medium with Cholla*, Applied Math Department, UCSC, 2020.

## TECHNICAL SKILLS

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<b>Basic Knowledge</b>	R, Matematica
<b>Intermediate Knowledge</b>	Fortran, Java, Matlab, HTML
<b>Advanced Knowledge</b>	Python, C/C++, CUDA/HIP, MPI, OpenMP, Julia

## ADDITIONAL EDUCATION

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First Mexican AstroCosmoStatistics School, Guanajuato, Mexico, 2016

Sixth Mexican Summer School of Nuclear Physics, ICN, UNAM, Mexico, 2010.

Mexican delegate at the 2005 National Youth Science Camp, West Virginia, U.S. 2005.

### Selected Online Courses:

- Algorithms and Data Structures, Microsoft. (EdX).
- Designing a Technical Solution, Microsoft. (EdX).

- Machine Learning, Coursera. (Stanford).
- Heterogeneous Parallel Programming, Coursera. (University of Illinois).
- Algorithms: Design and Analysis, Part 1 Part 2, Coursera. (Stanford).
- Algorithms: Design and Analysis, Part 2, Coursera. (Stanford).
- Coding the Matrix: Linear Algebra through CS Applications, Coursera.
- Intro to Parallel programming, Udacity. (NVIDIA).
- Differential Equations in Action, Udacity.