

# Francisco Leal Machado

## Curriculum Vitae

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### Education

- 2013–2016 **Massachusetts Institute of Technology,**  
*Candidate for Bachelor of Science Degree in Physics,*  
Cambridge, MA,  
**GPA – 5.0/5.0.**
- 2012–2013 **Universidade de Coimbra,**  
*Candidate for Licence in Physics,*  
Coimbra, Portugal,  
**GPA – 5.0/5.0.**

### Experience - Research

- 2015–Present **Undergraduate Research,** MIT SOLID STATE SOLAR THERMAL ENERGY CONVERSION (S<sup>3</sup>TEC), Cambridge, Massachusetts.  
Research in surface plasmon induced enhancement in electronic transitions
- Developing the code that will calculate the rates of the electronic transitions with different electromagnetic backgrounds.
  - Designing different plasmon plasmon modes in order to selectively enhance particular transitions for an atom near the surface of our material.
- 2015 **Undergraduate Research,** MIT CENTER FOR MATERIAL SCIENCE AND ENGINEERING, Cambridge, Massachusetts.  
Research in transport properties of electrons in low-dimensional materials.
- Fabricated devices which included selecting proper material flakes, characterizing their properties and assembling in final device to be used in measurements.
  - Developed new device configurations to allow the better measurement of transport properties.
- 2014 **Undergraduate Research,** MIT KAVLI INSTITUTE FOR ASTROPHYSICS AND SPACE RESEARCH, Cambridge, Massachusetts.  
Research in spectral data from galaxies from a simulation of the galaxy
- Analyzed how to make use of the simulated galaxies informations to better understand the properties of observable galaxies.
  - Developed tools that allow the matching between simulated and observed galaxies.
- 2014 **Undergraduate Research,** MIT AEROSPACE COMPUTATIONAL DESIGN LAB, Cambridge, Massachusetts.  
Research in optimization of a numerical simulation of a stationary fluid flow
- Analyzed and discovered the source of the major slow down in the program's run time.
- 2012–2013 **Undergraduate Research,** UNIVERSIDADE DE COIMBRA - PHYSICS DEPARTMENT, Coimbra, Portugal.  
Research in the topic of the dynamics of proteins and their protein reporter using computer simulations and stochastic models.
- Developed the simulation code used to run the simulations in the project.
  - Compiled and analyzed the data, presenting it at a conferences
  - Presented results in poster format at the International Conference on Stem Cells for Drug Screening and Regenerative Medicine (2013)

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## Experience - Work

- 2014 **Summer Intern**, MEMSQL, San Francisco, US.
- Worked directly on their C++ codebase
  - Developed and implemented features that were shipped to customers promptly.
- 2013 **Senior Developer**, JEKNOWLEDGE, Coimbra, Portugal.
- 2012–2013 **Junior Developer**, JEKNOWLEDGE, Coimbra, Portugal.
- Active Member of the Technology Department.
- Helped on the development of a human body detection software to analyze the correct movement of the body in various exercises.
  - Developed a glove prototype of a new product using Arduino technology.
  - Helped in the development of the data acquisition software for a new product in a start-up.

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## Awards

- 2015 Winner of the Edward C. Pickering Award for the most Outstanding Original Project in the MIT Physics Junior Lab
- 2013 3% Best Students Award at the University of Coimbra
- 2013 Bronze Medal at the ACM SouthWestern Regional Contest
- 2012 Bronze Medal at the International Physics Olympiads
- 2012 Bronze Medal at the International Olympiads of Informatics
- 2012 Gold Medal at the Portuguese University Programming Marathon
- 2012 Third Place in the Portuguese Olympiads of Informatics
- 2011 Honorable Mention at the IberoAmerican Mathematics Olympiads
- 2011, 2012 Silver Medal at the Portuguese Mathematics Olympiads

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## Publications

Paul Torrey, Sarah Wellons, *Francisco Machado*, Brendan Griffen, Dylan Nelson, Vicente Rodriguez-Gomez, Ryan McKinnon, Annalisa Pillepich, Chung-Pei Ma, Mark Vogelsberger, Volker Springel, and Lars Hernquist. An analysis of the evolving comoving number density of galaxies in hydrodynamical simulations. *Monthly Notices of the Royal Astronomical Society*, 454(3):2770–2786, 2015.

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## Conferences

- 2013 **International Conference on Stem Cells for Drug Screening and Regenerative Medicine.**
- Presented poster “Following the Stochastic Dynamics of Nanog Through a Fluorescent Reporter - A Computational Study” on work on DNA dynamics

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## Summer Schools

- 2015 Novos Talentos Em Matemática Dynamical Systems Summer School

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## Languages

Portuguese	Mother tongue
English	Fluent
Spanish	Basic
French	Basic
German	Basic