

# Victor Calderon

*Problem Solver • Model Builder • Rapid Learner • Servant Leader*

## Current Address

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## EDUCATION

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### Vanderbilt University

Nashville, TN

- *Ph.D. in Physics with focus in Astrophysics; Adviser: [Andreas Berlind](#)* Aug. 2013 – Aug. 2019  
Title: *Understanding the Galaxy-Halo connection through galaxy group catalogues* 🔗

### Florida Institute of Technology

Melbourne, FL, USA

- *B.Sc. degrees in Astrophysics, Physics and Mathematics; Magna Cum Laude* Aug. 2009 – July. 2013

## WORK EXPERIENCE

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### HCA Healthcare

Nashville, TN

- *Data Scientist I - Data Science Department - Clinical Operations Group (COG)* Sep 2019 - Present
  - **Machine Learning Development:** Performed descriptive, exploratory and inferential statistical analysis as well as supervised machine learning. Developed high quality, modular, reusable code that can be easily used by other data scientists from the team. Use my background and expertise in high-performance computing, statistical analysis, software development, and machine learning to help the COG Data Science team create novel ML models that help innovate the healthcare technology
  - **Data Science Project Delivery and Leadership:** Actively collaborate with my team in code review sessions, and assist in collaboration efforts between teams in the organization.

### Vanderbilt University

Nashville, TN

- *Ph.D. candidate in computational Physics/Astrophysics* Aug 2013 - Aug 2019
  - **Machine learning in galaxy catalogues:** Applied machine learning techniques to determine the masses of galaxy systems. My analysis improved on current mass estimates of galaxy systems by up to factors of 10x improvement over more traditional methods of determining masses of galaxy systems. I trained Random Forest, XGBoost, and a neural network on synthetic galaxy catalogues to predict the masses of galaxy systems. 📄
  - **Galaxy Formation and Evolution:** Ran N-body simulation of the Universe to study the formation and clustering of galaxies. Constructed various algorithms to analyze astronomical data, and made statistical inferences about how galaxies form and evolve in simulations. I analyzed >200 GB of astronomical data in order better understand how galaxies are clustered at various scales on the sky. Constructed packages and tools to handle the analyses of the various datasets. 🍷🍷

### Massachusetts Institute of Technology

Cambridge, MA

- *MSRP Summer Research Intern - Aerospace Engineering* Jun 2012 - Aug 2012
  - **CubeSats:** Design and fabrication of an electrospray system capable of producing sub-micron glass droplets, ultimately enabling the manufacturing of high-power nano-structured emitters on planar surfaces. I developed mathematical models and algorithms to depict the physical characteristics of borosilicate glass, such as viscosity, volumetric flux, and thermal expansion.

## PROGRAMMING SKILLS

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- **Languages:** Python (esp. `scipy`, `pandas`, `matplotlib`, `numpy`, `scikit-learn`, `seaborn`, `Bokeh`), C, Cython, Bash, SQL, high-performance computing, multiprocessing, Unix/Linux; *Beginner:* Keras, Tensorflow
- **Data Science Skills:** Parameter estimation, hypothesis testing, machine learning (linear and logistic regression, random forests, k-NN, clustering, neural networks, decision trees, and gradient boosting), data visualization, and web scraping.
- **Technologies:** TravisCI, ReadTheDocs, Git, Apache Kafka, Red Hat OpenShift
- **Technical Writing:** HTML/CSS, Markdown, reStructuredText, L<sup>A</sup>T<sub>E</sub>X

## TEACHING AND PROJECTS

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- **sdss-cats-utils** and **cosmo-utils**: Open-source python libraries for analyzing cosmological datasets of the large-scale structure and galaxies.
- **Workshops and Tutorials** 📺: Designed and taught a set of computational workshops and tutorials meant to introduce PhD students to data-science techniques and good-coding practices.
- **Other tools and packages** 📺: I have developed command-line packages that handle the file and folder structure of different kinds of projects, e.g. dissertations, data-science-related projects, etc.

## HONORS AND AWARDS

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- Author on 7 research papers and counting Ongoing
- Offered an **Insight Data Science Fellowship** - *declined* 2019
- Offered a **The Data Incubator Data Science Fellowship** - *declined* 2019
- 2nd Best Poster Award with \$500 prize - *Big Data Symposium* at Vanderbilt University 2018
- Summer Research Awards at *Vanderbilt University* 2013, 2014
- Best Poster Presentation Award - *NSF 2012 AGMUS Research Symposium* in Puerto Rico 2012
- Outstanding Senior in Astrophysics & Astronomy Award at *Florida Institute of Technology* 2012
- Distinguished Student Scholar Award at *Florida Institute of Technology* 2011
- Elected to Phi Kappa Phi Honor Society at *Florida Institute of Technology* 2011
- Elected to Phi Eta Sigma Honor Society at *Florida Institute of Technology* 2010
- Dean's List at *Florida Institute of Technology* 2009 - 2013

## 1ST-AUTHOR PUBLICATIONS

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- **Calderon, Victor F.**, Berlind, Andreas A. “*Prediction of Galaxy Cluster and Group masses in SDSS DR7 via a machine learning approach*“, 2019, (*submitted to Monthly Notices of the Royal Astronomical Society*)
- **Calderon, Victor F.**, Berlind, Andreas A., Sinha, Manodeep “*Probing the Stellar Content of Galaxy Groups with Value-Added Group Catalogues in the SDSS DR7*“, 2019, (*submitted to Monthly Notices of the Royal Astronomical Society*)
- **Calderon, Victor F.**, Berlind, Andreas A., Sinha, Manodeep “*Small- and Large-Scale Galactic Conformity in SDSS DR7*“, 2018, Monthly Notices of the Royal Astronomical Society, 480, 2, 2031 - 2045

## ACADEMIC SERVICE

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- Maintainer of **Vanderbilt Astro - Starting Grad School Guide** 2018 - Present
- Instructor of the **Vanderbilt-Fisk Computational Bootcamp** 2018
- Local Organizing Committee member of **SciCoder** Nashville 2017
- Co-leader of the **Vanderbilt Computational Workshop** 2017
- **MIT Summer Research Program** Review Committee 2016 - Present
- Web Admin for the Vanderbilt **Astronomy Group website** 2015 - Present
- Host for Vanderbilt **Astronomy Journal Club** 2015 - Present

## CONTRIBUTED TALKS/POSTER AND WORKSHOPS

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- **Big Data Analysis in Astronomy** and Machine Learning at *La Laguna, Tenerife, Spain* 2018
- **.Astronomy X** Workshop in *Baltimore, MD* 2018
- **Sugar Rush 2018** in *Shanghai, China* 2018
- **Center for Quantitative Science - Machine Learning & Statistics** workshop in *Nashville, TN* 2018
- Vanderbilt Data Science Symposium at *Nashville, TN* 2018
- **Quantifying and Understanding the GalaxyHalo Connection** in *Santa Barbara, CA* 2017
- **SnowPAC 2016: Galaxy-Halo Connection** in *Salt Lake City, UT* 2016
- **AAS 227<sup>th</sup>** Winter Meeting in *Kissimmee, FL* 2016

- Inclusive Astronomy 2015 in *Nashville, TN* 2015
- **AAS 225<sup>th</sup>** Winter Meeting in *Seattle, WA* 2015
- School on **School on Dark Energy and Galaxy Redshift Surveys** in *Corfu, Greece* 2014
- Summer School in **Statistics and Bayesian Modeling** for Astronomers in *State College, PA* 2014
- **SciCoder** Workshop at New York University in *New York City, NY* 2013
- **National Collegiate Research Conference** at Harvard University at *Cambridge, MA* 2013