

# Lucas F. Secco

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## Education

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### Ph.D. in Physics & Astronomy

*University of Pennsylvania*

2015–2020

### M.Sc. in Physics

*University of São Paulo (Brazil)*

2013–2015

### B.Sc. in Physics

*Federal University of Rio Grande do Sul (Brazil)*

2009–2013

## Research and Analysis Experience

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### University of Chicago

*Postdoctoral Fellow at Kavli Institute for Cosmological Physics*

2020–2024

- Led analysis of correlations of 500 million galaxies with statistical models in Python, compressing information down to one parameter with 2% accuracy (2× improvement over state-of-the-art) leading to publication with over 150 citations.
- Extracted faint signals from galaxy shapes in complex datasets by optimally engineering features, thereby obtaining the first-ever detection of an effect predicted 20 years prior; invited to communicate findings at top universities worldwide.
- Forecasted capabilities of datasets 10 years into the future, helping optimize the strategy of upcoming multi-billion dollar astronomical surveys and determine the priorities of ongoing efforts, resulting in publication by undergraduate mentee.
- Optimized predictive models by selectively cleaning parts of the data that failed core assumptions via comparison with simulations; reduced model biases by 75%, enhanced interpretability of results and enabled 5 impactful publications.

### University of Pennsylvania

*Research Assistant (Dark Energy Survey Collaboration)*

2015–2020

- Led large (>20) and small (<5) teams of physicists, astronomers and data scientists in processing/maintaining large astronomical datasets; rewarded with exclusive data access rights to one of the largest astronomical surveys in the world.
- Created thousands of mock datasets including realistic experimental errors in order to quantify statistical fluctuations, uncertainties and risks in modeling strategies, with results featured in more than 6 publication with over 100 citations.
- Collaboratively wrote Python and SQL code to process astronomical images; created data visualizations that enabled fast identification and treatment of data anomalies and reduced incidence of errors by 90% based on signal-to-noise metrics.

### University of São Paulo (Brazil)

*Research Scholar*

2013–2015

- Improved extraction of information from noisy datasets by numerically minimizing uncertainty factors, forecasting a ten-fold improvement of experimental sensitivity; awarded scholarship granted to top 3% of all STEM students in Brazil.

## Technical Skills

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**Statistics:** Estimation of uncertainties, likelihood inference, statistical significance evaluation, Bayesian statistics.

**Data Science and Computing:** Data visualization, large-scale data analytics, exploratory data analysis, hypothesis testing, supervised and unsupervised machine learning, model selection, Python (incl. Pandas, Scikit-Learn), SQL, github, MS Office.

## Communication Skills and Additional Information

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**Academic publications:** 50 peer-reviewed publications in cosmology & astrophysics (see *NASA/ADS* or *Google Scholar* )

**Volunteer work:** Weekend math lectures to adult Brazilian immigrants without high school education (NYC 2016-2017).

**Public speaking:** 20+ invited seminars/colloquia at international universities and outreach talks at museums/libraries.

**Languages:** English (fluent), Portuguese (native), Spanish & Italian (basic).

**Hobbies:** Chess (rapid ELO 1607, 97th percentile chess.com), Triathlon (2223th/2622 Chicago 2023, olympic distance).