

# Jorge Alejandro Preciado-López

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## SKILLS

Three years of experience developing software for international scientific collaborations, and core developer of the parameter estimation software used to study the [first image of a black hole](#) obtained by the Event Horizon Telescope.

**Programming.** 5+ years of programming experience using Python (Scikit-learn, Pandas, Seaborn, Matplotlib, NumPy), MATLAB, C++, shell scripting. Familiar with SQL, HTML/CSS, SPSS, Fortran.

**Machine Learning.** Multiple projects using regression, classification, time series analysis and Bayesian parameter estimation. Basic knowledge of Natural Language Processing.

**Tools.** Version control (Git, Gitflow), web scrapping (Selenium, BeautifulSoup), web deployment (Flask, Dash), software documentation (Doxygen, Sphinx), Linux/UNIX systems.

**High Performance Computing.** 2.5 years of experience developing parallelized software with MPI in HPC systems.

**Teaching.** 7 years of teaching experience. Trained medal winners of several Physics competitions and Olympiads.

## EXPERIENCE

### Data Scientist & Researcher

Nov 2016 – Present

*Event Horizon Telescope (EHT) Collaboration*

- Captured the first-ever image of a black hole with a global collaboration of 200+ members.
- Co-developed a C++ Bayesian parameter estimation software (see THEMIS in projects section).
- Devised and coded the parametrized models used by the EHT to estimate black hole parameters.
- Developed a Python module to generate and visualize astrophysical data from black hole images.

### Data Science Fellow

Jan 2019 – April 2019

*Insight Data Science (Toronto, Canada)*

- Developed a Python module to track crowdfunding campaigns (see CwdProphet in projects section).
- Tracked 10,000 projects and built a SQL database with campaign data from crowdfunder.co.uk.
- Estimated campaign success rate using kNN classifiers and time series analysis.
- Documented Python software using *Sphinx*.

### Postdoctoral Researcher in Computational Astrophysics

Nov 2016 – Jan 2019

*Perimeter Institute for Theoretical Physics (Waterloo, Canada)*

- Parallelized software using MPI reducing execution time from months to days.
- Validated and tested analytical/numerical models using High-Performance Computing (HPC) systems.
- Developed Python software to simulate and analyze astrophysical data.
- Implemented a differential equation solver in Fortran to find and classify stable star configurations.
- Automated C++ software documentation using *Doxygen*.

## PROJECTS

- **THEMIS.** Parallelized Bayesian parameter estimation framework to analyze astrophysical data and estimate black hole parameters using Markov Chain Monte Carlo methods (C++, MPI, High Performance Computing, Doxygen).
- **CwdProphet.** Module to track and analyze historical donation data from crowdfunding campaigns using classifiers and time series analysis & forecasting (Python, web scrapping, time series & software documentation).
- **Predictors of Self-Rated Health.** Identified predictors and used regression models to predict the self-rated health status of individuals using socio-economic, physical and nutritional data (IBM SPSS, statistical analysis).
- **Fault Prediction of Induction Motors.** Harmonic analysis of electrical current signals to predict electro-mechanical faults (MATLAB, anomaly detection, time series analysis).

## EDUCATION

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|---------------------------------|-----------------------------------|-------------|
| PhD, Physics                    | University of Guanajuato (Mexico) | 2010 - 2015 |
| Masters, Physics                | University of Guanajuato (Mexico) | 2008 - 2010 |
| B. Eng., Electrical Engineering | University of Guanajuato (Mexico) | 2002 - 2008 |

## AWARDS & ACHIEVEMENTS

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- Captured the first-ever image of a black hole with a collaboration of 200+ members (April 2019).
- Graduate Researcher with best academic record of the PhD and MSc in Physics programs.
- **Bronze Medal** in the VII Iberoamerican Physics Olympiads (2002).
- **Gold medal** in the XII National Physics Olympiads (Mexico 2001).

## MEDIA COVERAGE OF MY RESEARCH

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- **New York Times**, [Astronomers Capture First Ever Image of a Black Hole](#).
- **Periódico Correo**, [Salmantino es parte de una Hazaña Estelar](#).
- **Meganoticias Salamanca**, [Salamantino participa en captura de Agujero negro](#).
- **Tlamatiliztli Blog**, [Desde Salamanca hasta el Event Horizon Telescope: un cazador de agujeros negros](#).
- **El Salmantino**, [Salmantino que participó en el proyecto EHT cuenta su historia](#).

## PUBLICATIONS

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With the Event Horizon Telescope (EHT) Collaboration *et al* in *The Astrophysical Journal* (ApJ):

- First M87 EHT Results. [I. The Shadow of the Supermassive Black Hole](#), *ApJ Letters*, 875 (2019) L1.
- First M87 EHT Results. [II. Array and Instrumentation](#), *ApJ Letters*, 875 (2019) L2.
- First M87 EHT Results. [III. Data Processing and Calibration](#), *ApJ Letters*, 875 (2019) L3.
- First M87 EHT Results. [IV. Imaging the Central Supermassive Black Hole](#), *ApJ Letters*, 875 (2019) L4.
- First M87 EHT Results. [V. Physical Origin of the Asymmetric Ring](#), *ApJ Letters*, 875 (2019) L5.
- First M87 EHT Results [VI. The Shadow and Mass of the Central Black Hole](#), *ApJ Letters*, 875 (2019) L6.
- [The EHT General Relativistic Magnetohydrodynamic Code Comparison Project](#), to appear in *ApJ Supplement Series* ([arXiv:1904.04923](#)).

Other publications:

- THEMIS: A Parameter Estimation Framework for the Event Horizon Telescope. *To be submitted to ApJ*.
- [Well-posed Cauchy formulation for Einstein-æther theory](#), submitted to *Classical and Quantum Gravity*.
- [Quantum cosmology in Hořava-Lifshitz gravity](#), *Phys Rev. D* 86, 063502 (2012).
- [A quantum cosmological model in Hořava-Lifshitz gravity](#), AIP Conference Proceedings 1396, 151 (2011).