**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](https://www.nytimes.com/2019/04/10/science/black-hole-picture.html) 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. Familiar with Natural Language Processing.

**Tools.** Version control (Git, Gitflow), web scrapping (Selenium, Beautiful Soup), 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**

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| **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. | |
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| **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*. | |
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| **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++ softwaredocumentation 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**](https://github.com/Alex-Preciado/crowdfunding-prophet). Module to track and analyze historical donation data from crowdfunding campaigns using classifiers and time series analysis (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**

* **Diamond Achievement Award**. Presented to the team of researchers who captured the first-ever image of a black hole (May 2019).
* **Bronze Medal** in the VII Iberoamerican Physics Olympiads (2002).
* **Gold medal** in the XII National Physics Olympiads (Mexico 2001).
* Graduate Researcher with best academic record of the PhD and MSc in Physics programs.

**PUBLICATIONS**

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](https://iopscience.iop.org/article/10.3847/2041-8213/ab0ec7), ApJ Letters, 875 (2019) L1.
* First M87 EHT Results. [II. Array and Instrumentation](https://iopscience.iop.org/article/10.3847/2041-8213/ab0c96), ApJ Letters, 875 (2019) L2.
* First M87 EHT Results. [III. Data Processing and Calibration](https://iopscience.iop.org/article/10.3847/2041-8213/ab0c57), ApJ Letters, 875 (2019) L3.
* First M87 EHT Results. [IV. Imaging the Central Supermassive Black Hole](https://iopscience.iop.org/article/10.3847/2041-8213/ab0e85), ApJ Letters, 875 (2019) L4.
* First M87 EHT Results. [V. Physical Origin of the Asymmetric Ring](https://iopscience.iop.org/article/10.3847/2041-8213/ab0f43), ApJ Letters, 875 (2019) L5.
* First M87 EHT Results [VI. The Shadow and Mass of the Central Black Hole](https://iopscience.iop.org/article/10.3847/2041-8213/ab1141), *ApJ Letters*, 875 (2019) L6.
* [The EHT General Relativistic Magnetohydrodynamic Code Comparison Project](https://arxiv.org/pdf/1904.04923.pdf), 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](https://arxiv.org/abs/1902.05130), submitted to *Classical and Quantum Gravity*.
* [Quantum cosmology in Hořava-Lifshitz gravity](https://journals.aps.org/prd/abstract/10.1103/PhysRevD.86.063502), Phys Rev. D 86, 063502 (2012).
* [A quantum cosmological model in Hořava‐Lifshitz gravity](https://aip.scitation.org/doi/abs/10.1063/1.3647539), AIP Conference Proceedings 1396, 151 (2011).