

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 (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](#), *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).