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, 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

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

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

- 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

- **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

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).