# Justin Ellis | Resumé

Jet Propulsion Laboratory, 4800 Oak Grove Drive
Pasadena, CA 91109
+1 (304) 995-6951 • Justin.A.Ellis@jpl.nasa.gov
justin.ellis18@gmail.com • jellis18.github.io • jellis18
justin-ellis

## Qualifications

Skilled scientist and researcher with expertise in problem-solving, mathematics, software development, data and statistical analysis, and data visualization. I have many years of experience in scientific computing using Python, C/C++, Fortran, Matlab, Linux, and Mathematica. I also have extensive research experience in data analysis theory and application, time-series analysis, technical writing and public speaking. I am accustomed to working with and leading large teams and collaborations. Finally, I am a fast learner and really enjoy working on new projects in a variety of fields.

## Goals

To work on technical and intellectually challenging projects that would benefit from my expertise in data analysis, problem-solving, and mathematics. I am particularly interested in extracting valuable insights from large and/or noisy data sets and discovering new and effective ways to visualize these data. I am interested in learning more about big data tools and machine learning. Currently finishing up a 3-year academic fellowship but will be available for full-time, part-time, or contract work beginning in the summer of 2017.

## Scientific Experience

**Einstein Postdoctoral Fellow**
*Jet Propulsion Laboratory/California Institute of Technology* *September 2014–present*

- Chair of gravitational wave detection working group for NANOGrav
- Develop and maintain a large Python code base for pulsar timing data analysis
- Have mentored graduate and undergraduate students
- Organized several data analysis workshops and schools
- Beginning work on machine learning classification of Quasar candidates

**Graduate Research Assistant**
*UWM Center for Gravitational, Cosmology, and Astrophysics* *July 2011–June 2014*

- Played a leading role in the development of several pulsar timing data analysis pipelines
- Developed several simulation techniques for gravitational wave sensitivity projections used in successful NSF grants

**Graduate Research Assistant**
*WVU Department of Physics and Astronomy* *August 2009–June 2011*

- Began research career in pulsar timing data analysis
- Taught and tudored for algebra and calculus based introductory physics courses

## Technical skills

**Machine Learning**: classification, regression, clustering, feature engineering, data cleaning

**Statistical Methods**: time series, regression models, hypothesis testing and confidence intervals, principal component analysis and dimensionality reduction, Bayesian modeling, Markov Chain Monte-Carlo

**Programming**: Python (scikit-learn, pandas, numpy, scipy, matplotlib), C/C++, Fortran, Matlab, Mathematica, R, Linux, Git, HTML, CSS

**Typography**: LaTeX, Microsoft Office, Pages, OpenOffice, Keynote

**Data Science**: Scikit-learn, Pandas, R

## Education

**University of Wisconsin Milwaukee** — **Milwaukee, WI**
*PhD in Physics* — *2014*

**West Virginia University** — **Morgantown, WV**
*B.S. in Physics, (Mathematics and Astronomy minor)* — *2009*

## Recent Scientific Highlights

- Leading the development of a new data analysis suite written in Python. This code base leverages many tools and techniques from software development including unit tests, continuous integration, auto-generated documentation, and a modular object oriented design.
- Devised a new method to model non-gaussian transient features in pulsar timing data using reversible jump Markov Chain Monte-Carlo and model averaging techniques. This work is reported in my 2016 *Physical Review D* paper.
- Developed and implemented complex and robust noise models for pulsar timing data. Worked with the pulsar timing working group within NANOGrav to implement these models in to the standard pulsar timing software and analysis packages. These new techniques allow for more robust and unbiased estimation of pulsar timing parameters and lead to new pulsar mass measurements, tests of General Relativity, and tests of fundamental physics.
- Led the NANOGrav detection group in and extensive study of upper limits on gravitational waves due to supermassive black hole binaries. This study was the first of its kind it that it attempted to place constraints on physical parameters related to galaxy evolution and dynamics instead of just on the gravitational waves emitted. This work was part of a NASA and NRAO press release and was reported in several popular science outlets.
- Have authored or co-authored 17 peer-reviewed scientific publications available on my personal website.
- Have run several workshops and schools training undergraduate and graduate students in data analysis, particularly for time series analysis using Bayesian methods.
- Have given many scientific presentations at astronomy and physics conferences and invited lectures at various universities.

**References**: available upon request