Jon Zink, Ph.D

Basic Information

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Professional Experience

California Institute of Technology
NASA Hubble Postdoctoral Fellow **September, 2021 - Present**

- Extracted a novel population trend with 99.99% confidence from a sparse exoplanet dataset through meticulous accounting of sample completeness and reliability. This ground-breaking work showed that planets are not uniformly distributed about the Milky-way galaxy and was highlighted in a NASA press release.
- Identified an intra-system correlation in giant planet systems using Bayesian hierarchical modeling. This work resolved a 30 year old mystery on the origin of Hot Jupiters.
- Contributed to open source, telescope operation, Python software through bug fixes and feature additions: see KPF pipeline on GitHub.
- Lead and coordinated team of 16 scientists to perform quality control tasks; deliver science products; and produce peer-reviewed publications.

Projects

- Created a fully autonomous Python algorithm capable of searching 5 TB of noisy time-series data to identify planet signals with 94% reliability. This peer-reviewed work identified 372 new planets (a 7% increase in the total known population) and was highlighted in Forbes and Newsweek.
- Produced a Pip installable Python software package able to parse statistical and instrumental fluctuations from exoplanet signals in time-series data: see EDIunplugged on Github.
- Implemented random forest regression to characterize $\sim 200,000$ stars with limited available data, given a training set of $\sim 25,000$ well characterized stars, resulting in a highly cited a peer-reviewed publication.
- Developed forward modeling software in Python and R (ExoMult), able to account for intra-system correlations and sample biases. This work produced an estimate for the occurrence of an Earth-like planet around a given star, which reduced the uncertainty of previous work by 50%.
- Derived Poisson point process expansion, which addressed sample bias issues attributed to the order in which planets were detected within a given dataset. This publication resolved a mysterious over abundance of single planet systems, which had beset researcher for a decade.
- Produced novel likelihood function for forward modeling, using the Anderson-Darling EDF and a modified Poisson statistic, which enabled the algorithm to converge on a solution 10X faster than competing software.
- Awarded $300k NASA grant for independent research.

Skills

Machine Learning: Linear Models, Random Forest, SVM, PCA, Clustering, and Survival Analysis
Statistical Methods: Bayesian Analysis, Time-Series Analysis, Hypothesis Testing, Error Analysis, Monte Carlo Methods, Forward Modeling, EDF Testing, and Order Statistics
Software and Computing: Open Source Contributor, Python, R, C++, Java, SQL, HTML, and Javascript

Education

University of California, Los Angeles
- Ph.D, Astrophysics, 2021
- B.S., Astrophysics, 2014