



## **Astronomy Program Opening Workshop August 22-26, 2016**

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“Inference for non-Stationary, non-Gaussian, Irregularly-Sampled Processes”

Most statistical time series courses emphasize inference for regularly-sampled continuously-distributed data, often with an implicit assumption of Gaussianity (through use of least-squares methods) and an explicit assumption of stationarity. At the frontiers of science, data bearing on the shakiest pillars of our scientific understanding are usually sparse, irregularly sampled, sometimes featuring extremes, and often presented as binned counts. The Central Limit Theorem does not apply, and the methods taught in our statistics courses are not applicable. This talk presents a few methods and examples for addressing and making inference for these data. The key ideas are: 1. Even if data are sampled at discrete times, it can be useful to model the underlying phenomena in continuous time to overcome the problem of irregularly-sampled data; 2. Poisson, negative Binomial, alpha Stable, and other Infinitely-Divisible Distributions offer a rich alternative to the Gaussian for modeling and inference, with some exciting new features; 3. Stationary processes can be used as building blocks or starting points for modeling non-stationary phenomena.