BAYESIAN ANALYSIS OF STELLAR OPTICAL INTERFEROMETER DATA

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Abstract

I describe a work in progress that uses Bayes theorem, model selection, and marginalization in the analysis of photon count data frames from a stellar optical interferometer (the Navy Prototype Optical Interferometer). These data frames in general have between 1-6 stellar fringes (baselines) present. I will show how Bayes factors provide a direct way of determining the number of fringes that are present in each data frame. I will briefly describe the traditional Fourier based technique for computing optical interferometry data products. A Bayesian approach, in addition to providing model selection directly from the data frames, also provides a way of combining the computed data products from each data frame in a manner that intrinsically handles the varying SNRs between the data frames. I use simulated and actual stellar optical interferometry data to show comparisons between my Bayesian approach and the traditional Fourier based technique for the analysis of such data.

Key Words: Optical Interferometry, Bayesian data analysis