Space Science Seminar
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Improving the Odds (Ratio) for Gravitational Wave Detection

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The detection of gravitational waves amounts to comparing different models of the data and deciding which, if any, are preferred. The comparison is done using Bayesian inference algorithms which output the evidence for each model under consideration. The evidence itself is a conditional probability that depends on all of our assumptions about the data, including models for the signal, noise, and instrument response to incoming gravitational waves. Mis-modeling of the signal or the noise can introduce false positive detections and/or biases in our analysis. To combat the potential for significant systematic errors in LIGO/Virgo detections, alongside continued developments in template waveforms, work has begun in earnest to improve our model of the detectors. Together these improvements allow us to boost the dependability of our analysis methods for detecting gravitational waves, measuring the equation of state of neutron stars, and constraining modified theories of gravity. In this talk I will highlight some of the key assumptions about the data which we feel are the least well founded, discuss what has been done already to mitigate their impacts, and lay out our strategy going forward.

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