

Lecture Week No. 2, 2014



Experimental Lectures	Power Spectral Density and friends Danzmann	Shot Noise, Power Recycling, SR, RSE Danzmann	Transfer Functions, Bode diagrams etc. Willke	Control systems Heurs	Gaussian optics, DWS Heinzel
General Relativity Lectures	Review: linearized theory, action on detectors Babak	Generation of GWs in linearized theory Babak	Post-Newton gravity; full Schwarzschild solution Babak	Spherical stars and rotating black holes Babak	Cosmology Babak
Data Analysis	- Probability as extended logic *Cox's desiderata *The 3 laws of probability *Bayes' theorem - worked example: estimating the "bias of a coin" Prix	- Hypothesis testing *Bayes factor, posterior odds *Classical framework: Neyman-Pearson optimality *Neyman-Pearson lemma Prix	- 'Build your own coalescing binary search' - Discrete Fourier transform - CBC chirp signal in time and frequency domain - Matched filter for CBC signals - Horizon distance Dent	- Application: Detecting signals in noise *simple vs composite hypotheses *Bayesian marginalization vs maximum-likelihood methods *generalized Neyman-Pearson theorem *[parameter estimation] Prix	- Matches, template banks and coincidence testing - Non-Gaussian noise: signal consistency tests - Data quality vetoes - Background estimation - Inference on astrophysical rates Dent