



High time-resolution calibration information

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Problem

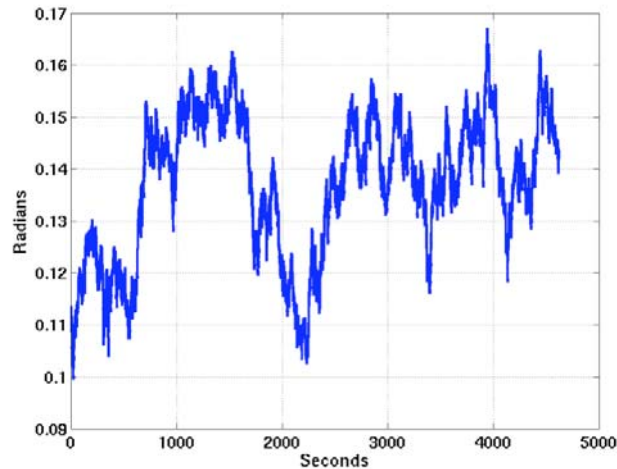
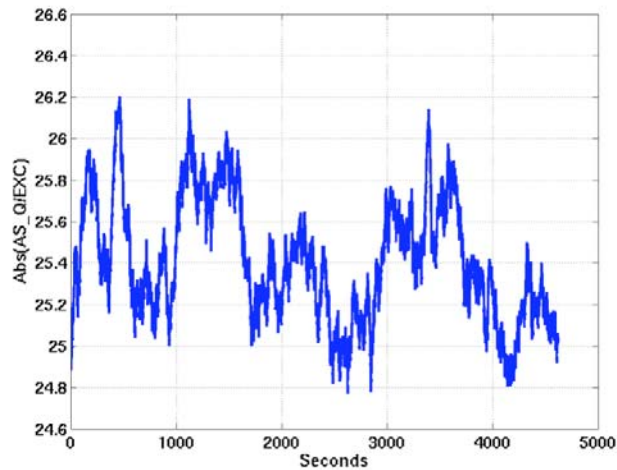
- Calibration currently provided with minute granularity
- Evidence that calibration changes on sub-minute time-scale affects stochastic analysis
- Would generally like greater calibration time resolution



LIGO Adaptive measurement of calibration line amplitude and phase

- Focus on narrow (~ 10 Hz) band about calibration line freq
 - » $AS_Q \approx \text{white noise} + A(t) e^{i\phi(t)}$ (calib line)
 - » Calibration line is $A_0 e^{2\pi i f t}$
- Kalman adaptive filter designed to seek phaser rotating with calibration line frequency in AS_Q , EXC_ETMX and track changes with time in presence of measurement noise
- Report ratio $A(t)/A_0(t)$, $\phi(t)$

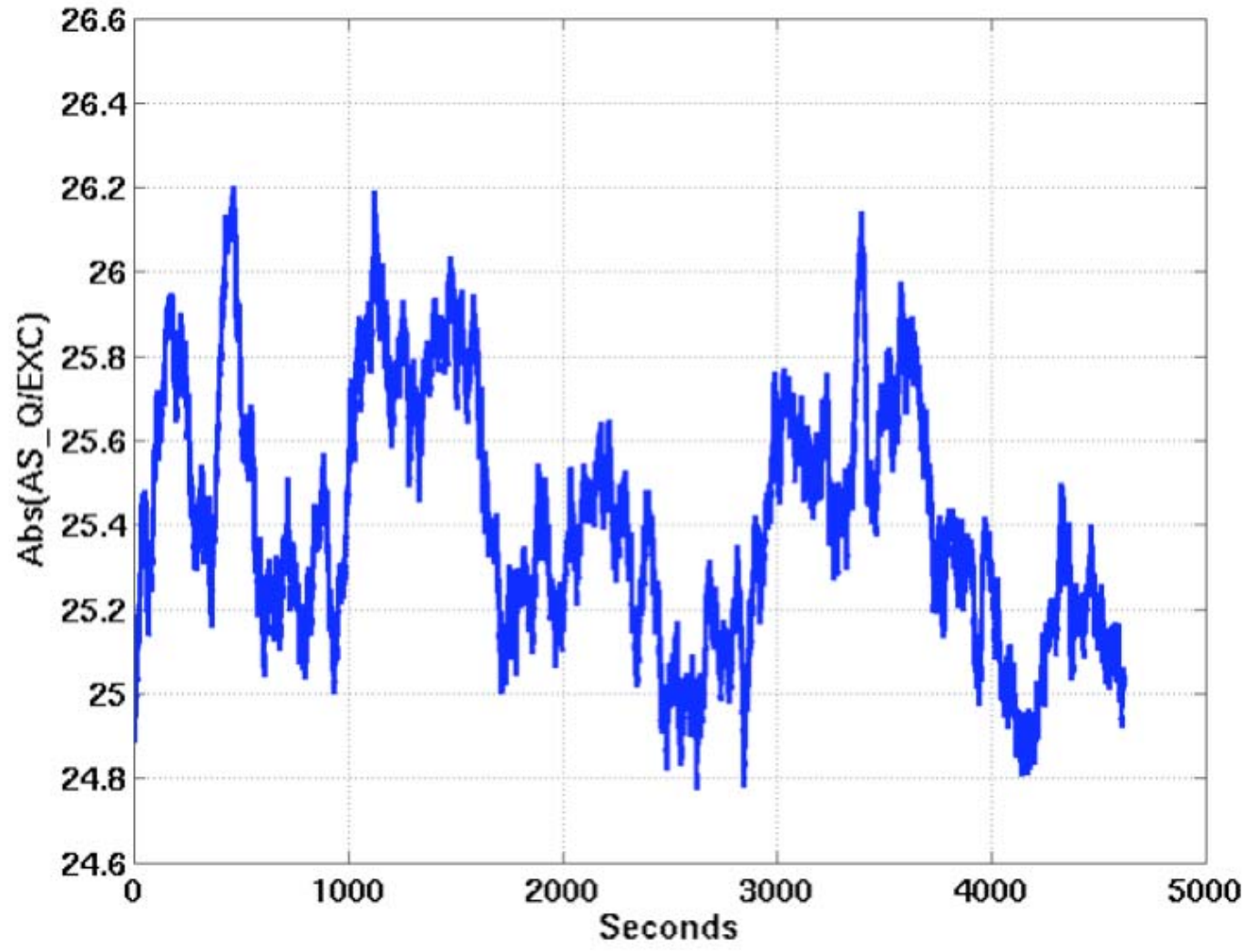
Example



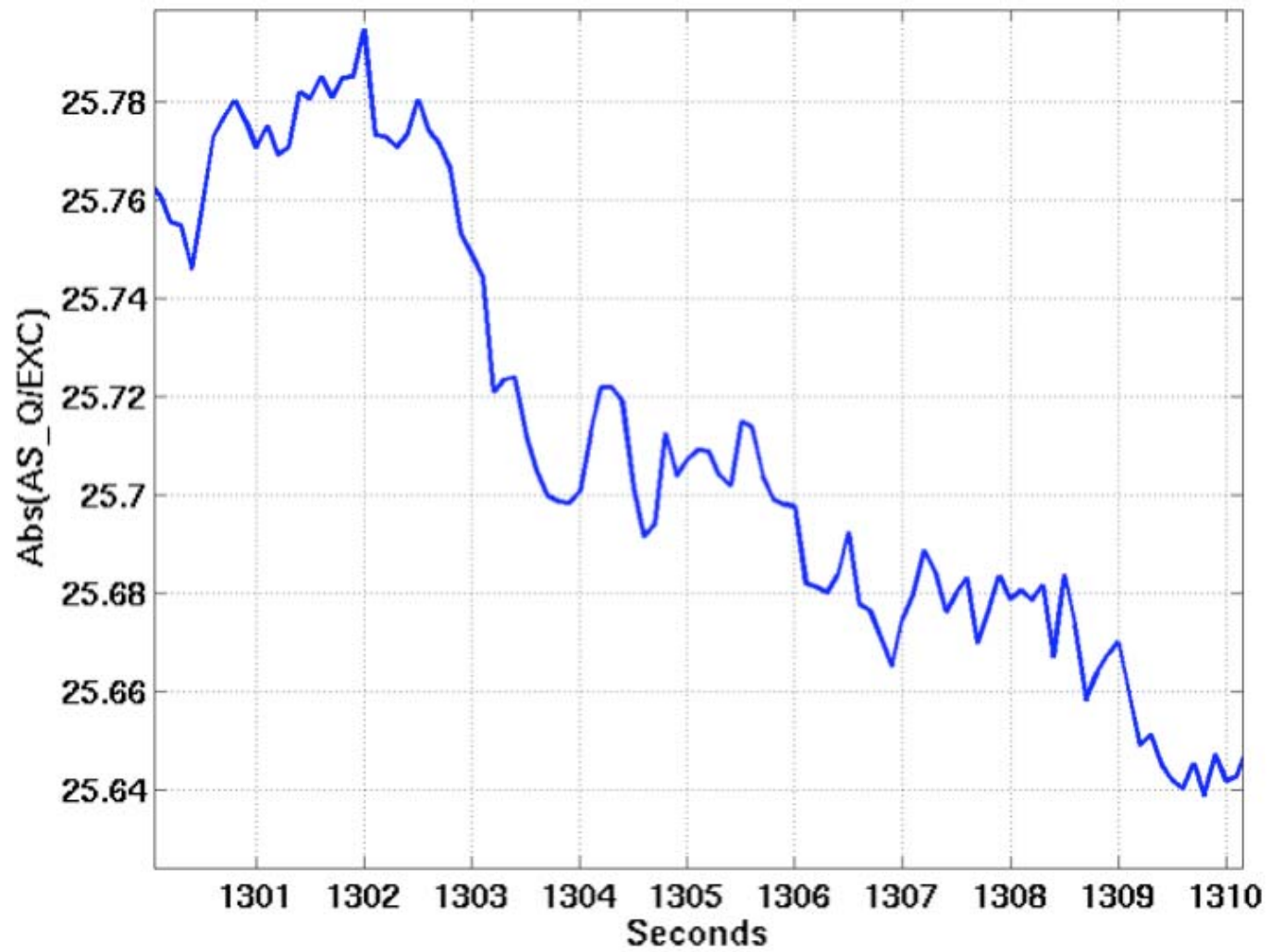
- H1 973.3 Hz line, triple coincidence S2 segment 2, 10 Hz time resolution

- $\langle A/A_0 \rangle = 25.41$

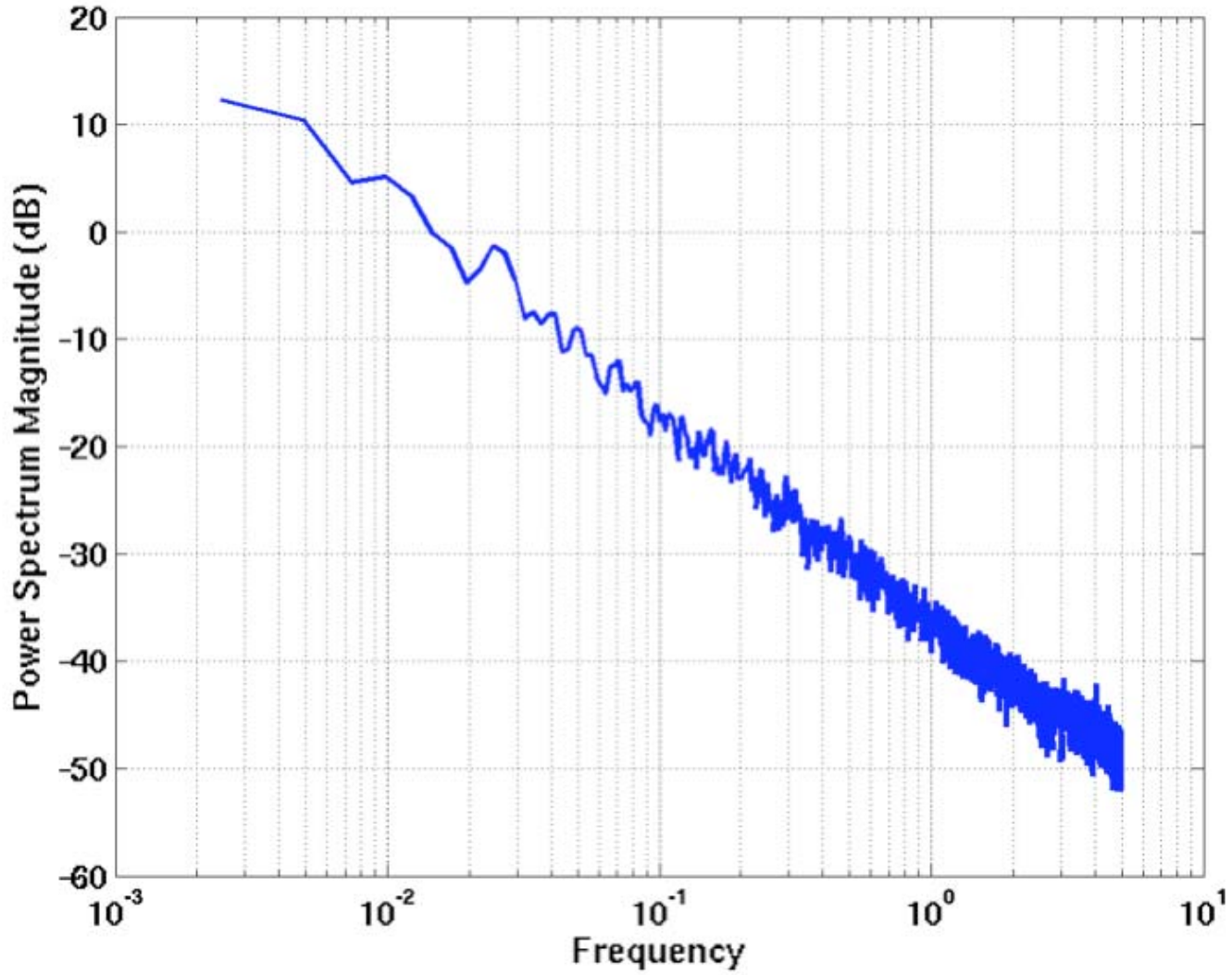
- $\langle (A/A_0)^2 \rangle = 0.30$



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