

40-Meter Interferometer Update

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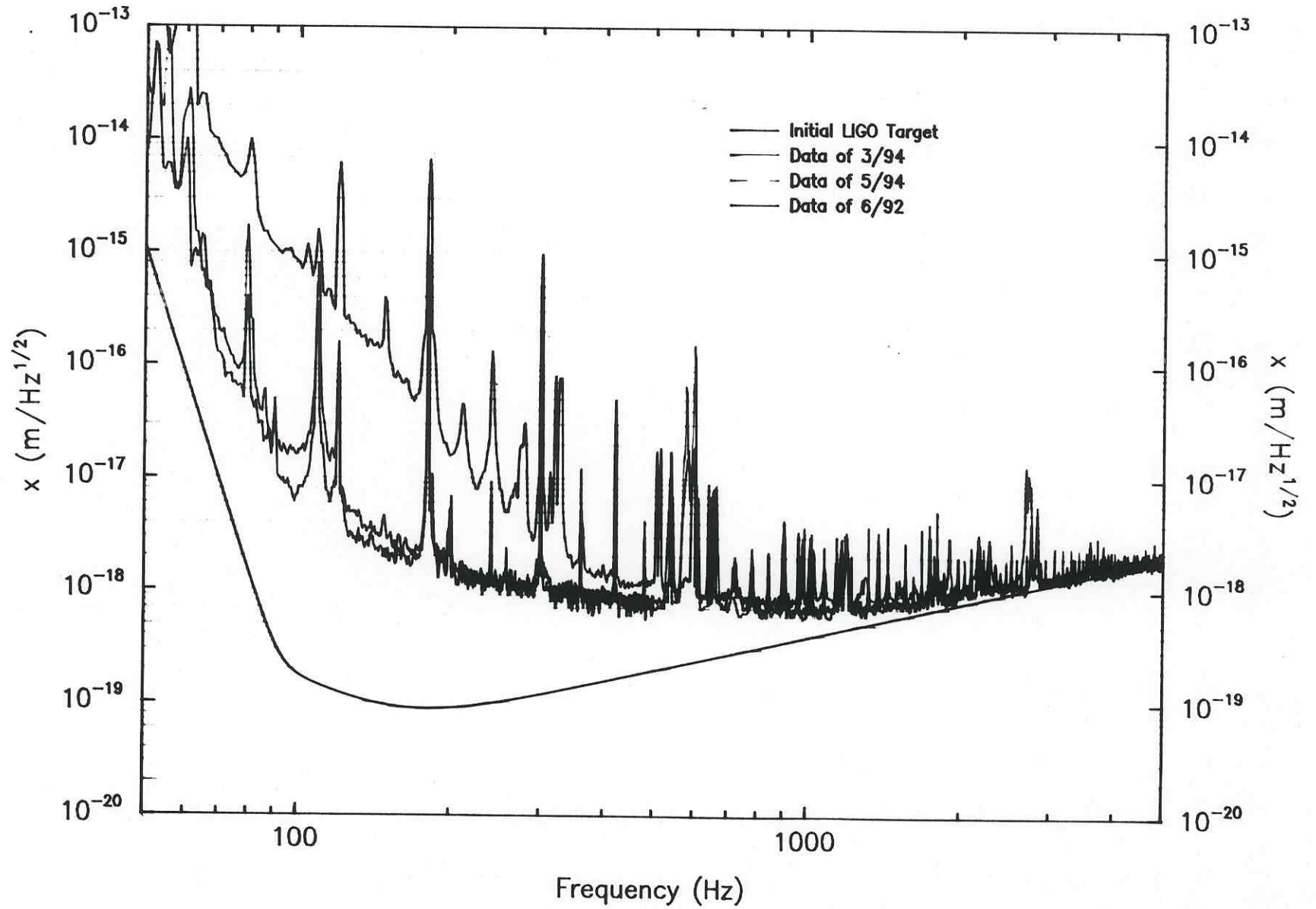
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Interferometer R&D Update

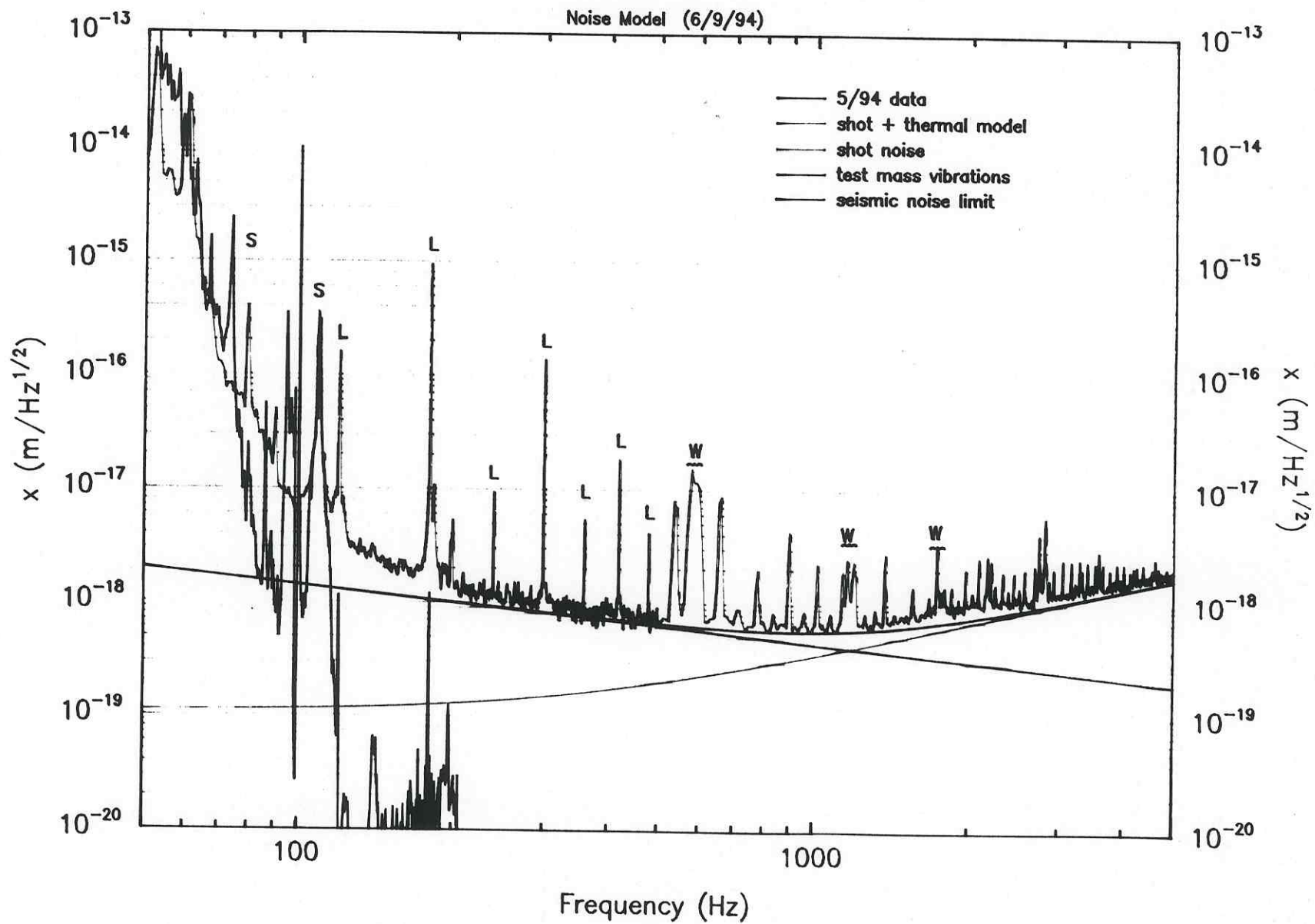
- **Modifications to Servosystems:**
 - Beam splitter control
 - Laser frequency stabilization
 - Laser power stabilization
 - Secondary arm length control
- **Reduced Potential Sources of Pendulum Thermal Noise**
- **Began Monolithic Test Mass Installation**
 - seek reduction in thermal noise contribution from internal vibrations
 - evaluate optical properties and any noise sources associated with increased optical aperture or pathlength in test mass
 - gain experience in preparation and handling of larger optics
- **Improved Diagnostics for Cavity Optical Properties**
- **Measured (preliminary) Sensitivity to Pulses**
 - calibrate pulse sensitivity
 - evaluate non-gaussian noise
 - develop/test analysis software on real data

Displacement Sensitivity of Caltech 40 m Interferometer



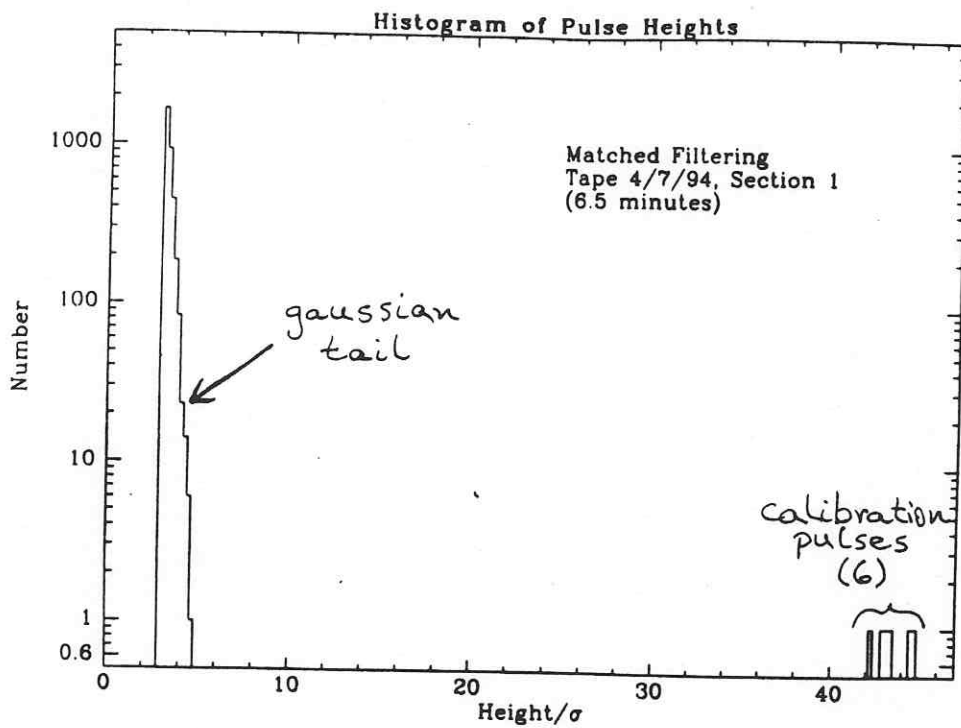
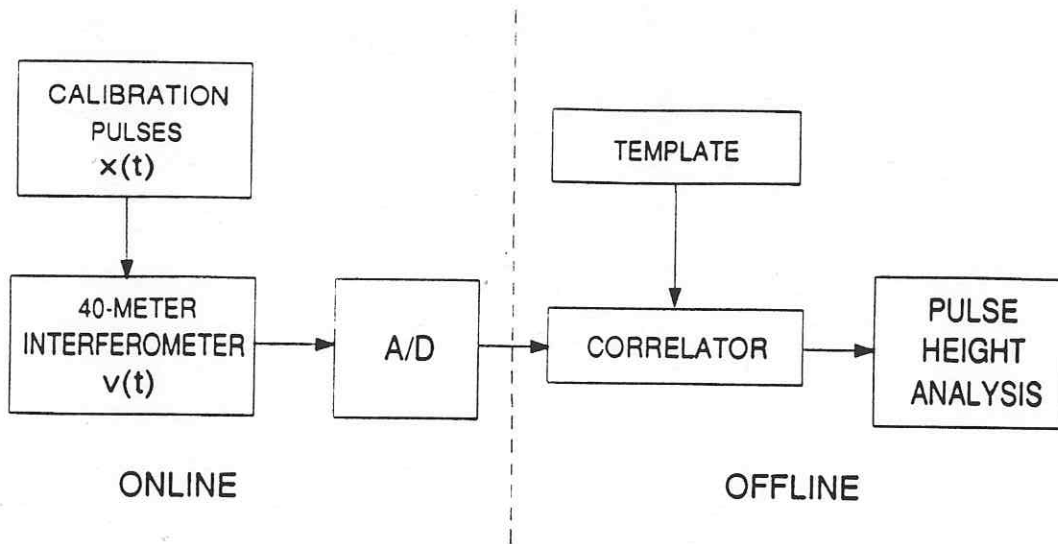
Displacement Sensitivity of 40-Meter Interferometer

Noise Model (6/9/94)



Pulse Sensitivity

(preliminary data)



Recent Results

- Reduced 40–Meter Interferometer noise at frequencies from 70 Hz to 500 Hz.
- Improved technique for attachments to monolithic test masses.
- Successfully tested chemical cleaning technique on monolithic test masses; should be scalable to large mirrors.
- Sensitivity to benchmark pulses (single sinusoidal cycle at 1 kHz) about 4×10^{-17} m_{rms}. Spurious pulse rates are below a few per hour, well within the allowable rate for triple coincidence searches.