**Implementing Real-Time Calibration in Advanced LIGO Control Software**[1] DANE STOCKS, Stanford Univ, LIGO SCIENTIFIC COLLABORATION (LSC) COLLABORATION[2] — The digital error and control signals of Advanced LIGO's differential arm length control servo are used to reconstruct gravitational wave strain, $h(t)$. Currently, three different calibration pipelines produce $h(t)$ with varying errors and latencies. The real-time operating system in the front end computers runs CALCS, which performs infinite impulse response (IIR) filtering and control operations on 16384 Hz clock cycles. Current limitations of these filters yield systematic errors which a second pipeline, the GDS, corrects in low-latency using finite impulse response (FIR) filtering on computers distinct from the front end computers. The third pipeline, the DCS, implements FIR filtering to condition archived data, and is used to recalibrate entire data sets when dropouts occur in real-time. To prepare for O3 in late 2018, we construct a new, self-contained calibration pipeline in the front end computers which uses FIR filtering to yield strain. This new front end pipeline produces calibrated $h(t)$ within 1% of the magnitude of the DCS pipeline output across all relevant frequencies. It will replace the current online calibration system in use, remove the redundancy of the CALCS-GDS system, and provide refined GW strain measurements with a latency of $\approx 3$ seconds

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