

Noise in IFO Subsystems

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Radio Frequency (RF) signals are used in the sensing and control subsystem of the interferometer to lock the output port to a dark fringe. This is necessary to maintain the sensitivity of the instrument. RF noise in this subsystem can cause the interferometer to lose lock or cause incorrect readings such as whistles in the differential arm length signal (DARM) as read at the output port. It was previously discovered that a significant contributor to RF noise in the sensing and control system were the ground isolation transforms known as baluns, making a redesign of the component necessary. A corrected design is proposed and prototyped and the resulting attenuation of RF noise is measured.

High precision GPS disciplined oscillators are utilized in the data acquisition subsystem to supply a clock for the analog to digital converters (ADC) used to record various signals, including the DARM signal. Jitter of the one pulse per second signal used to discipline these oscillators was previously measured to be ± 40 ns. This jitter becomes phase/frequency noise in the oscillator output, resulting in small variations in the sampling period of the ADC. We present a model of the noise and assess its potential effects on the DARM output of the interferometer.