

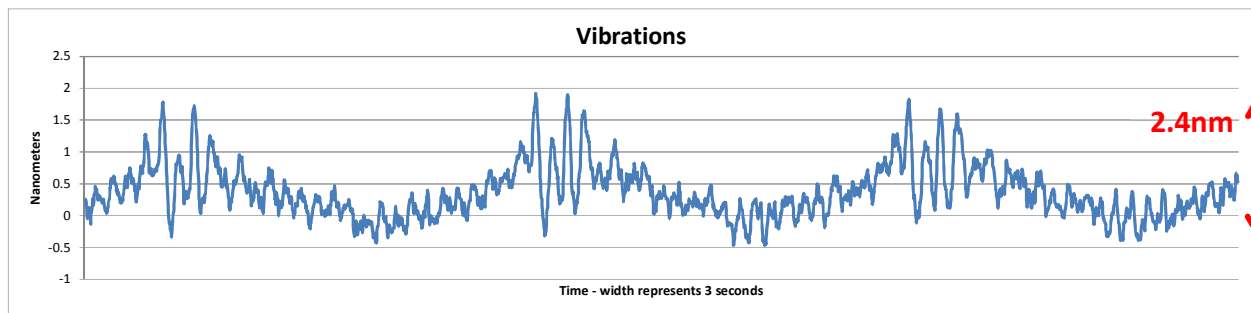
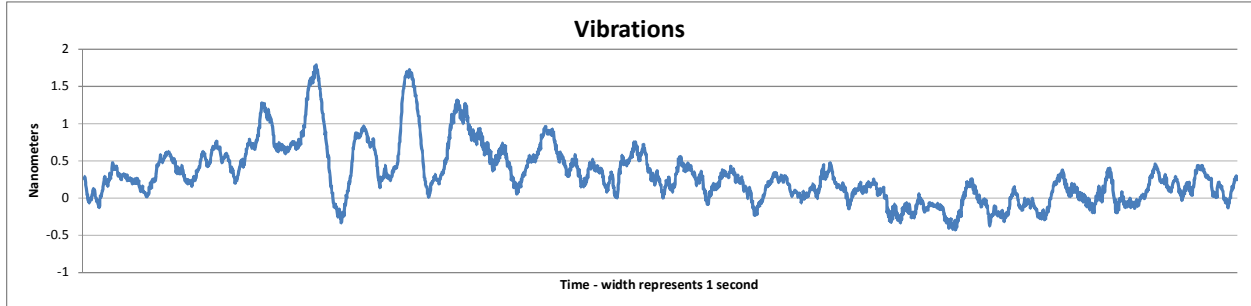
Cryostation Vibration Study (Short Report)

Introduction

One powerful feature of the Cryostation is the low vibrations. This is unique to closed cycle cryostats, and enables many experiments which otherwise would be not possible. This report highlights some data from our longer vibration study conducted in May, 2011. This longer report shows how the data was captured and how vibrations of less than 0.5nm may be achieved.

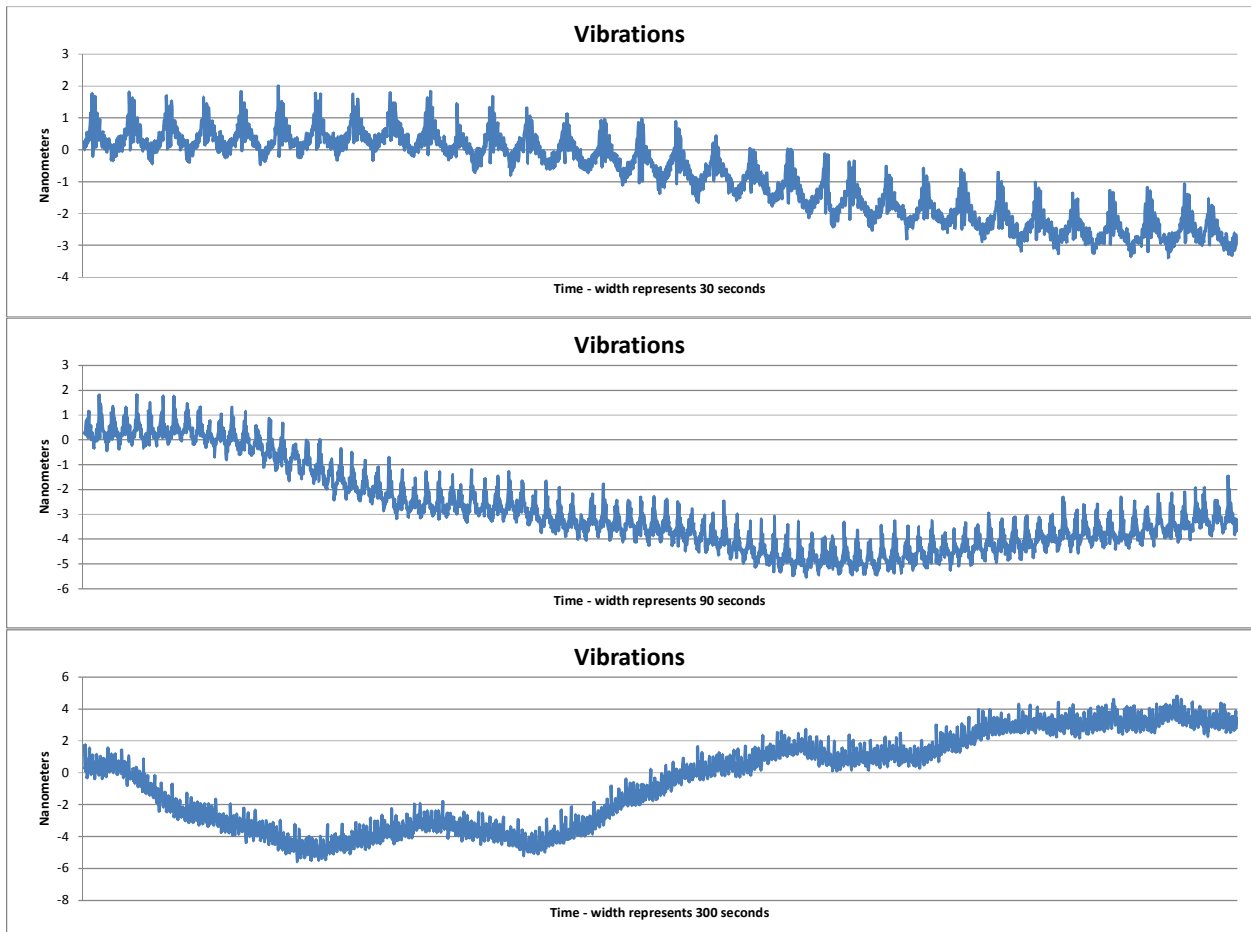
Data Set 1 - Vibration Results at 3.3K

Below are the graphs of the system vibrations for periods ranging from 1 second to several minutes.



First note the peak to peak vibration (position variation) is less than 2.5nm. The plot is dominated by large pulses at an interval of 1.00 seconds. Additionally, there is a much smaller dominant frequency of 22 Hz. This is likely due to a resonant frequency in the cryocooler structure and could potentially be reduced if desired.

Below are graphs for 30, 90, and 300 second periods, taken from the same data set.



When we look at these larger timeframes, we see these waveforms along with a small DC drift. This is due to small temperature variations in our laboratory optical table setup. The temperature variation in the lab was estimated to be about 1 degree during these 5 minutes. Even without any temperature control of the room environment, the overall variation of the signal was still less than 10nm peak to peak. With better temperature control, the peak to peak variation could be limited to 3nm.