CHARACTERIZATION OF THE SENSITIVITY AND STABILITY OF THE LIGO INTERFEROMETERS USING SENSEMONITOR

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Abstract. I developed SenseMonitor – a software tool that runs in real-time under the Laser Interferometer Gravitational Wave Observatory (LIGO) Scientific Collaboration's Data Monitor Tool (DMT) programming environment. I used it to estimate the LIGO instrument's sensitivity to the gravitational waves produced by the inspirial of two 1.4 $M_{\odot}$ neutron stars. The sensitivity of the instrument to this standard source of gravitational radiation is computed as the volume of space scanned and reported as the radius of a sphere centered on the Earth with that volume. The instantaneous feedback provided by SenseMonitor to the instrument operators regarding the current data quality allows adjustments to be made in a timely fashion to maximize the quality of the data obtained. Moreover, the range estimate produced by SenseMonitor has become a standard figure-of-merit for interferometer performance across the LIGO Scientific Collaboration.