

Abstract Submitted  
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**Thermal neutron probe of trace elements in synthetic sapphire for LIGO optics**<sup>1</sup> S.C. MCGUIRE, Southern University, G.P. LAMAZE, E.A. MACKEY, NIST — In pursuing the direct detection of gravity waves the Laser Interferometer Gravitational-wave Observatory (LIGO) experiment continues to push the limits of technology. In advanced versions of the interferometer more than 800 kW of laser power is expected to be stored in the Fabry-Perot cavities that make up LIGO's 4-km long arms. As part of an effort to assess the suitability of synthetic sapphire as a test mass material we have implemented a program of trace element measurements with the goal of identifying correlations between optical absorption at 1064 nm and trace element content of high purity sapphire. Small commercially-produced synthetic sapphire samples ( $\sim 50 - 200$  mg) have been exposed to thermal neutrons in the NIST 20 MW reactor at fluxes of  $\sim 8 \times 10^{13}$  neutrons /cm<sup>2</sup>s and subsequently counted on calibrated high resolution gamma-ray spectrometers. Initial measurements show a broad range of elements present, most of which occur at concentrations at or below the parts-per-billion level. Details of the experiments will be presented with results.

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