Abstract Submitted
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The metrology of New Source and Test Masses for G Experiments[1] KOFI ASSUMIN-GYIMAH, Mississippi State Univ — There are serious inconsistencies in the current understanding of the universal gravitational constant, G despite the long history of measurements. The scatter in experimental results could be an indication of the incompleteness of general relativity, the current accepted description of gravity, or due to underestimated biases in the metrology of small forces. The metrology of test and source masses, typically made of high density metals, is of prime importance. There are however, some inherent limitations in the previous evaluations of systematic uncertainties associated with them. We propose to address these by developing high density transparent materials such as $PbWO_4$, for use in the next generation of experiments. This is motivated by the fact that density variation in glass and single crystals are significantly smaller than in metals and can be measured nondestructively. We have developed a laser interferometer for the measurement of the internal density gradients of these masses. An independent measurement was also completed using the cold neutron beam and the grating phase neutron interferometer at NIST. The preliminary analysis and results for two 2x2x12cm^3 $PbWO_4$ samples will be shown.

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Kofi Assumin-Gyimah
Mississippi State Univ

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