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Towards a Meter Scaled Grating Neutron Interferometer for Fundamental Physics Applications MG HUBER, P BAJCSY, B HEACOCK, DS HUSSEY, P KIENZLE, N KLIMOV, K WEIGANDT, NIST, C KAPAHI, DA PUSHIN, D SARENAC, U Waterloo — Researchers at NIST in collaboration with the NIH, U. Waterloo and NC State have recently developed a new type of neutron interferometer based on phase gratings and operating in the far field. This phase grating moiré interferometer (PGMI) consists of 3 independent nanofabricated silicon phase gratings. Because the separation between the gratings is adjustable from centimeters to several meters, the PGMI has the potential to be more phase sensitive than traditional single-crystal neutron interferometers which are limited to <100 centimeters in overall length. The PGMI has the potential to impact many fields including material characterization of microporous structures, study quantum systems, and measure weak potentials. NIST is currently commissioning a new facility devoted to developing a PGMI for fundamental physics applications. To quantify the PGMI's ultimate sensitivity, the facility's first aim is to perform a precision measurement using a strong potential. Namely, that of the Earth's local gravitational field (g). The ultimate goal is to measure g over increasing longer grating separations.

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