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Feasibility of measuring the Shapiro time delay over meter-scale distances[1] PETER SHAWHAN, University of Maryland, STEFAN BALLMER, LIGO - Caltech, SZABOLCS MÁRKA, Columbia University — The time delay of light as it passes by a massive object, first calculated by Shapiro in 1964, is a hallmark of the curvature of space-time. To date, all measurements of the Shapiro time delay have been made over solar-system distance scales using radio ranging. We show that the new generation of kilometer-scale laser interferometers being constructed as gravitational wave detectors, in particular Advanced LIGO, will be sensitive enough to measure the Shapiro time delay produced by a suitably designed rotating object placed near the laser beam. We show that such an apparatus is feasible (though not easy) to construct, present an example design, and calculate the signal that would be detectable by Advanced LIGO. This offers the first opportunity to measure space-time curvature effects on a laboratory distance scale.

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