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Testing Gravity Using Pulsar Scintillation Measurements HUAN YANG, Perimeter Inst for Theo Phys, ATSUSHI NISHIZAWA, California Institute of Technology, UE-LI PEN, Canadian Institute for Theoretical Astrophysics — We propose to use pulsar scintillation measurements to test predictions of alternative theories of gravity. Comparing to single-path pulsar timing measurements, the scintillation measurements can achieve a factor of $10^4 \sim 10^5$ improvement in timing accuracy, due to the effect of multi-path interference. The self-noise from pulsar also does not affect the interference pattern, where the data acquisition timescale is 10^3 seconds instead of years. Therefore it has unique advantages in measuring gravitational effect or other mechanisms (at mHz and above frequencies) on light propagation. We illustrate its application in constraining scalar gravitational-wave background and measuring gravitational-wave speed, in which cases the sensitivities are greatly improved with respect to previous limits. We expect much broader applications in testing gravity with existing and future pulsar scintillation observations.

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