Title:	Ultrathin picoscale white light interferometer
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Abstract:	White light interferometry is a well established technique with diverse precision applications, however, the conventional interferometers such as Michelson, Mach-Zehnder or Linnik are large in size, demand tedious alignment for obtaining white light fringes, require noise-isolation techniques to achieve sub-nanometric stability and importantly, exhibit unbalanced dispersion causing uncertainty in absolute zero delay reference. Here, we demonstrate an ultrathin white light interferometer enabling picometer resolution by exploiting the wavefront division of a broadband incoherent light beam after transmission through a pair of micrometer thin identical glass plates. Spatial overlap between the two diffracted split wavefronts readily produce high-contrast and stable white light fringes, with unambiguous reference to absolute zero path-delay position. The colored fringes evolve when one of the ultrathin plates is rotated to tune the interferometer with picometric resolution over tens of μm range. Our theoretical analysis validates formation of fringes and highlights self-calibration of the interferometer for picoscale measurements. We demonstrate measurement of coherence length of several broadband incoherent sources as small as a few micrometer with picoscale resolution. Furthermore, we propose a versatile double-pass configuration using the ultrathin interferometer enabling a sample cavity for additional applications in probing dynamical properties of matter.
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