Abstract Submitted
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The Development and Testing of a Low-cost, High Definition Heterodyne Phase Camera[1] COLE PERKINS, KADEN LORING, MAURICIO DIAZ-ORTIZ, University of Florida, FRITZGERALD DUVIGNEAUD, Massachusetts Institute of Technology, FABIAN MAGAA-SANDOVAL, PAUL FULDA, RYAN GOETZ, University of Florida — Precision interferometry experiments like Advanced LIGO are increasingly limited by imperfections in the spatial properties of the interfering beams, especially with the advent of squeezed-light enhanced sensitivities. In order to correct these imperfections, it is first necessary to measure them. This is not a trivial task, because the transverse phase profile of a beam is just as important as the intensity in determining the spatial mode purity. We will present the methods of creating a Heterodyne Phase Camera (HPC) and describe its measured performance. The HPC maps the spatial wave front of two interfering laser beams by detecting the phase of the beat note as resolved by different pixels of a CMOS camera. These phase maps can be displayed real-time or processed offline for a more detailed analysis. By illuminating the entire CMOS sensor with two spatially homogenous beams the transverse phase error of the HPC was found to be 0.058 radians which corresponds to a precision of 9.8nm. We will show how the HPC can be used to characterize novel optical components such as electro-optic beam deflectors and electro-optic lenses. This work is supported by NSF PHY-1806461

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