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Axion Dark Matter Search with Interferometric Gravitational Wave Detectors

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Axion dark matter differentiates the phase velocities of the circular-polarized photons. In this work, we present a scheme to measure its phase difference by using a linear optical cavity. We applied this scheme to the Fabry-Perot arm of gravitational wave detectors such as aLIGO, CE, and DECIGO. We found that their potential sensitivities to the axion-photon coupling constant, g_{aγ}, can reach beyond the current limit of CAST with several orders of magnitude, at a wide axion mass range 10^{-16}eV < m < 10^{-9} eV. Our sensitivity can be achieved without loosing any sensitivity to gravitational waves. This work is based on our recent paper [arXiv: 1903.02017].

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