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Analysis of cold-atom interferometer with optical beam splitting and recombination EBUBECHUKWU ILO-OKEKE, ALEX ZOZULYA, Worcester Polytechnic Institute — Cold atom interferometers with optical beam splitting and recombination use off-resonant laser pulses to split a cloud of Bose-Einstein condensates (BECs) into two clouds that travel along different paths. During the interferometric cycle, spatial phase distortion and phase diffusion develop across the clouds in addition to the environment-introduced phase of interest accumulated during the interferometric cycle. At the end of the interferometric cycle, the same optical laser pulses used at the splitting of the clouds are used to recombine the clouds. After recombination, the population of atoms found in the cloud at rest and the moving clouds is dependent on the relative phase between the two clouds. We derive an analytical expression for the probability density of counting any number of atoms within each cloud and discuss its features as function of inter-atomic strengths and the spatial phase distortion.

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