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Two dimensional analysis of a free oscillation atom interferometer
RUDRA KAFLE, ALEX ZOZULYA, Worcester Polytechnic Institute, Worcester, MA 01609 — In a free oscillation atom Michelson interferometer, a Bose Einstein condensate in the ground state of a harmonic oscillator potential is split by a sequence of laser pulses and then the split wave packets are allowed to undergo a free oscillation. The wave packets are recombined at the splitting location after they make one or more full cycle oscillations. The motion of the wave packets becomes two dimensional if they are misaligned from the axis of the wave guide at the time of splitting. The dynamics of the split condensates becomes more complicated in this situation than a purely one dimensional oscillation. We develop a simple two dimensional model to analyze the effects of a slightly misaligned atomic wave packets on interferometry.

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