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A new Michelson interferometer for Bose-Einstein condensates[1]
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We have implemented a Michelson interferometer for Bose-Einstein condensates using ^{87}Rb atoms confined in a novel magnetic waveguide structure. Features of the guide include a rotating bias field that suppresses noise from external magnetic fields and weak confinement strength that reduces the decohering effects of atomic interactions. The atoms are manipulated using Bragg scattering from an off-resonant standing light wave, with which we have demonstrated a new and efficient way to reverse the atomic motion. For short propagation times, we observe nearly perfect interferometer contrast. The sensitivity of an atom interferometer typically scales quadratically with the interaction time that can be achieved. We have so far achieved an interaction time of 24 ms while maintaining 70% fringe visibility. To our knowledge, this is more that twice as long as the best previous observations. We shall discuss progress and barriers towards extending the time further.

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