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Diffraction Phases and Atomic Interactions in a Bose-Einstein Condensate Interferometer ALAN JAMISON, BEN PLOTKIN-SWING, SUBHADEEP GUPTA, University of Washington — We report on recent progress from our Yb Bose-Einstein condensate (BEC) matter-wave interferometer. We have studied, both theoretically and experimentally, large phase shifts due to diffraction of the matter waves from standing waves of light. These shifts constitute the largest systematic effect for a contrast interferometer. The second largest systematic effect comes from atomic interactions. Several different types of interaction effect have been studied, verifying our theoretical models. We also report long interrogation times (up to 22ms), showing no degradation of interferometer contrast, with which we are able to achieve the highest precision yet for a matter-wave interferometer using a BEC as a source. We will briefly discuss a new machine dedicated to precision interferometry and prospects for studying phase transitions with our BEC interferometer.

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