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A spinor Bose-Einstein condensate phase-sensitive amplifier for SU(1,1) interferometry[1] JONATHAN WRUBEL, Creighton University, PAUL LETT, Joint Quantum Institute, National Institute of Standards and Technology and the University of Maryland — A spinor Bose-Einstein condensate in the $m_F = 0$ hyperfine sublevel can be manipulated to spontaneously produce pairs of entangled atoms in the $m_F = \pm 1$ sublevels. These pairs of entangled atoms serve as a resource for building an interferometer with phase sensitivity beyond the standard quantum limit, such as the SU(1,1) interferometer. Here we use simulations to extend the usual model of the spinor SU(1,1) interferometer to include the case of initial coherent seeds in the $m_F = \pm 1$ modes, which make the input a phase-sensitive amplifier. We show that for the ideal case such a spinor interferometer not only retains Heisenberg-limited scaling but also has absolute sensitivity greater than what could be achieved with the same number of atoms in a coherent state input Mach-Zehnder interferometer.

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