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Two-beam coupling in quantum-correlated images MENG-CHANG WU, NICHOLAS BREWER, RORY SPEIRS, Joint Quantum Institute, National Institute of Standards and Technology and the University of Maryland, College Park, Maryland 20742, USA, KEVIN JONES, Department of Physics, Williams College, Williamstown, Massachusetts 01267, USA, PAUL LETT, Quantum Measurement Division, National Institute of Standards and Technology, Gaithersburg, Maryland 20899, USA — We study the effects of 2-beam coupling on quantum imaging in a four-wave mixing medium. In our previous work [1] we demonstrated sub-10 Hz bright intensity-difference squeezed light from dual-seeded four-wave mixing (4WM) in Rb vapor. In this work we have observed excess noise at frequencies below the natural linewidth of Rb due to the two-beam coupling mechanism [2]. This noise, which destroys the quantum correlations between the beams, can be avoided by making sure that the input seeds do not intersect each other in the pump region. The problem is similar in the case of generating quantum-correlated images. We can eliminate this problem by imaging the seed into the 4WM region, rather than focusing it. That is, amplifying in the imaging plane rather than the Fourier plane. With sub-10 Hz squeezed light and "cross-talk" free imaging, we are closer to taking pixel-by-pixel quantum correlated images via 4WM with a CCD camera. [1] M.-C. Wu, et al., Optics Express 27, 4769 (2019). [2] M. Kauranen, et al., Phys. Rev. A 50, R929 (1994).

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