Abstract Submitted for the MAR17 Meeting of The American Physical Society

Quantum enhanced interferometry using imperfect repeaters. SIDDHARTHA SANTRA, BRIAN KIRBY, U.S. Army Research Laboratory, Adelphi, ALEJANDRA MALDONADO-TRAPP, University of Maryland, College Park, MICHAEL BRODSKY, U.S. Army Research Laboratory, Adelphi — The baseline size of telescopic arrays used in stellar interferometry - maximum distance between two telescopes in the array - determines the angular resolution of the array. Larger baselines lead to finer resolution of the intensity distribution of the distant extended source. Since interferometry relies on bringing the photons, collected at the distant telescopes, together for eventual interference their loss in the connecting optical channels limits how far the baselines may be practically extended. One can use shared entangled states between the nodes of a quantum network to mitigate the effects of photon loss that leads to a loss in the sensitivity of the telescopic array. We show how using distributed entangled quantum states between two telescopes - the size of the baselines can be increased. This leads to improve angular resolution of the telescope array in the weak source regime where the light from distant sources may be considered at the single-photon level. In our work we consider quantum networks with access to imperfectly entangled quantum states and determine their utility towards optical interferometry of signals from distant sources.

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Date submitted: 11 Nov 2016

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