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On direct geneation of ion-photon entanglement at telecom wavelengths in 171Yb+ WANCE WANG, CONNOR GOHAM, ANDREW LAUGHARN, University of Maryland, College Park, MD, JOSEPH W BRITTON, [A] University of Maryland, College Park, MD [B] Army Research Lab, Adelphi, MD — Entanglement between small-scale quantum processors and flying qubits is the building block of quantum networking. Leading ion-photon entanglement demonstrations at telecom wavelengths achieve high-fidelity over distances up to 50 km [0,1]. These demonstrations used quantum frequency conversion and 40Ca+ ions. Here, we explore entanglement between 171Yb+ ions and photon polarization states at 1350 nm (P3/2-D3/2) and 1650 nm (P3/2-D5/2). A cavity-mediated Raman interaction increases IR photon generation and collection efficiency. Driving the S-D quadrupole transition can map D-state coherences to the long-lived HF qubit. We also consider photon frequency qubits as an approach that decreases sensitivity to birefringence. Relative to two-species proposals, our approach avoids QFC, secondary ion species and swap gates [2]. [0] M. Bock, et al, Nature Communications (2018)9:1998 [1] V. Krutyanskiy, et al, NPJ Quantum Information (2019)5:72 [2] C. Crocker, et al, Optics Express(2019)27:20:28143

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