

Abstract Submitted  
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**A Non-destructive Quantum Gas Microscope for Fermions<sup>1</sup>** YOGESH PATIL, SRIVATSAN CHAKRAM, MUKUND VENGALATTORE, Cornell University — We have demonstrated a two photon fluorescence imaging technique which allows in situ imaging of a lattice gas of *Rb* atoms. We report progress on extending this technique to fermionic species, in our case, <sup>6</sup>*Li*. In contrast to demonstrated means of quantum gas microscopy using molasses cooling [1,2], our scheme is not restricted to atomic species amenable to polarization gradient cooling. Furthermore, our imaging scheme is nondestructive in the limit of zero duty cycle of using the Raman transition for imaging and cooling. This presents new opportunities for non-equilibrium many-body studies involving the continuous measurement of system dynamics, measurement based many-body control of the lattice gas and quantum zeno physics. We also describe progress towards augmenting our current system with single site resolution imaging.

[1] W. Bakr *et al.*, Nature 462, 74-77 (2009)

[2] J. F. Sherson *et al.*, Nature 467, 68 (2010)

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