A cryogenic quantum gas scanning magnetic microscope\textsuperscript{1}
MATTHEW NAIDES, RICHARD TURNER, RUBY LAI, JACK DISCIACCA, BENJAMIN LEV, Stanford University — Atom chip trapping of quantum gases will enable single-shot, large area imaging of transport through strongly correlated and topologically non-trivial materials via detection of magnetic flux at the $10^{-7}$ flux quantum level and below. By harnessing the extreme sensitivity of atomic clocks and Bose-Einstein condensates to external perturbations, the cryogenic atom chip technology we have recently demonstrated \cite{1} will provide a magnetic flux detection capability that surpasses other techniques, while allowing sample temperatures spanning $<10$ K to room temperature. We report on experimental progress toward developing this novel quantum gas scanning magnetic microscope \cite{1} and describe our recent proposal \cite{2} to image topologically protected transport through a non-ideal topological insulator in a relatively model-independent fashion.


\textsuperscript{1}U.S. DOE, BES, Division of Materials Sciences and Engineering under award \#DE-SC0001823

Matthew Naides
Stanford University

Date submitted: 12 Nov 2013