Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Towards Ramsey Magnetic Field Detection and High Resolution Imaging of Cardiac Cells with Nitrogen-Vacancy Diamond MATTHEW TURNER, CONNOR HART, Harvard University, JENNIFER SCHLOSS, MIT, RON WALSWORTH, University of Maryland — NV Diamond based wide-field magnetic imaging enables the possibility of detecting and imaging biomagnetic fields with high spatial and temporal resolution. Following up from previous work detecting the magnetic field from a single giant axon [1], improvements in sensitivity, methodology, and device engineering have been needed to move towards detection and imaging electrically active mammalian cells, such as cardiac cells and neurons due to the fast time scales (˜kHz), small length scales (um) and small magnetic field magnitudes (˜nT) associated with their activity. To achieve these goals, we have worked on optimizing diamond material properties [2], carried out a thorough review [3] and demonstration [4] of DC sensitivity improvement techniques, and improved our methodology and engineering to allow for a more biocompatible and stable experimental apparatus. Realistic improvements in sensitivity will enable real time detection of spontaneous cardiac events and repeated stimulation and averaging of events can give a window into the impedance properties and conduction pathways of cardiac tissue at high spatial resolution. [1] Barry et al. 2016 [2] Kehayias et al. 2019 [3] Barry et al. 2019 [4] Bauch et al. 2018

Matthew Turner
Harvard University

Date submitted: 31 Jan 2020 Electronic form version 1.4