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**Progress towards correlated defect magnetometry with nitrogen vacancy centers in diamond** AEDAN GARDILL, MATTHEW CAMBRIA, PHILLIP FLINCHUM, WANGPING REN, SHIMON KOLKOWITZ, University of Wisconsin - Madison — Nanoscale metrology has applications in fields ranging from industrial fabrication to biophysics to the study of complex condensed matter systems. Color center defects in diamond enable local measurements of material properties and dynamics at the nanometer scale. We report recent progress towards the use of nitrogen vacancy (NV) centers in diamond as local nanoscale probes, including experimental results from an ongoing study of relaxation and decoherence of individual NV centers in nanodiamonds. We will discuss the prospects for novel subdiffraction limited magnetic microscopy and correlated defect magnetometry techniques. Finally, we will present plans for utilizing NV centers to study the microscopic nature of decoherence in promising qubit platforms as a first step towards a next generation of “decoherence-free” quantum technologies.

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