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Towards Environmentally-Enhanced Magnetometry using Nitrogen-Vacancy Centers in Diamond CHINMAY BELTHANGADY, NIR BAR-GILL, Harvard-Smithsonian Center for Astrophysics, MY LINH PHAM, Harvard University, DAVID LE SAGE, Harvard-Smithsonian Center for Astrophysics, PAOLA CAPPELLARO, MIT, RONALD WALSWORTH, Harvard-Smithsonian Center for Astrophysics — The sensitivity of nitrogen-vacancy (NV) diamond magnetometers improves as the number of NV-centers in the probe volume increases. The conversion efficiency of implanted Nitrogen (N) atoms to NV-centers in chemical-vapor-deposition-grown diamond is at best about 10 percent, but in most cases is much lower. Due to this poor conversion efficiency, the environment around each NV center is dominated by several N electron spins. This N-spin-rich environment and the consequent NV-N dipolar interaction is considered, in conventional NV-based magnetometers, to be a source of dephasing and is sought to be eliminated by using various decoupling techniques. However, being more numerous per unit volume than NV-centers, the N spins can themselves be used for magnetic-field sensing. The NV-N interaction may then be exploited to combine the ease of initialization and read-out of NV-centers with the magnetic-field sensing capabilities of the more numerous N spins to enhance the sensitivity of NV-based magnetometers. In our talk we will describe recent progress towards such environmentally- enhanced NV diamond magnetometry.

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