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Optical magnetometry with sub-wavelength spatial resolution using individual spins in diamond JERONIMO MAZE, PETER MAURER, Harvard University, PAUL STANWIX, Harvard-Smithsonian Center for Astrophysics, LIANG JIANG, JONATHAN HODGES, ALEXEY GORSHKOV, ALEXANDER ZIBROV, Harvard University, RONALD WALSWORTH, Harvard-Smithsonian Center for Astrophysics, MIKHAIL LUKIN, Harvard University — The ability to map weak magnetic fields with nanometer resolution is of great importance in biological science and high precision metrology of nanoscale structures. We describe and demonstrate a new technique that combines high spatial resolution in the spirit of stimulating-emission-depletion (STED) fluorescence microscopy [1] and nanoscale magnetic sensing with individual spins in diamond [2,3]. This new magnetic sensing and nanometer resolution fluorescence microscopy approach (m-STED) will allow detection of single electronic spins at a distance of 10 nm with 5-7 folds improvement beyond the diffraction limit lateral resolution.

[1] Hell, S. W. and J. Wichmann, Opt. Lett. 19, 780 (1994).
[2] J.R. Maze, et al., Nature 455, 644 (2008).
[3] J.M. Taylor, et al., Nature Physics 4, 810 (2008).

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