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Progress Towards Room-Temperature Electron Spin Detection in Biological Systems NICHOLAS CHISHOLM, IGOR LOVCHINSKY, ALEX SUSHKOV, Harvard University, DAVID HUNGER, Max-Planck-Institut für Quantenoptik Garching, Ludwig-Maximilians-Universität München, ALEXEY AKIMOV, PEGGY LO, AMY SUTTON, JACOB ROBINSON, NORMAN YAO, STEVEN BENNETT, HONGKUN PARK, MIKHAIL LUKIN, Harvard University — We report on recent progress of room-temperature electron spin sensing for biological applications using nitrogen-vacancy (NV) centers in diamond. Room-temperature detection of a small number of electron spins, situated outside the measurement substrate, has yet to be accomplished. Such an advance could lead to a number of applications, including detection of magnetic resonance signals from individual electron or nuclear spins of complex biological molecules, measurement of concentrations of radicals in living cells, and monitoring the ion channel function across cell membranes (important for exploring drug delivery mechanisms). Thus, the ability to measure magnetic fields with sensitivity allowing detection of a small number of electron spins with sub-micrometer resolution would be of major importance to the biological sciences.

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