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High-Sensitivity and High-Resolution Magnetic Gradiometry and Thermometry with Nitrogen—Vacancy Diamond Tipped Fiber Probes¹ SEAN BLAKLEY, Department of Physics and Astronomy, Texas A&M University, ILYA FEDOTOV, EVGENIY SEREBRYANNIKOV, LYUBOV DORONINA-AMITONOVA, Physics Department, International Laser Center, M.V. Lomonosov Moscow State University, HECTOR PEREZ, JOE BECKER, Department of Physics and Astronomy, Texas A&M University, NIKOLAI SAFRONOV, Physics Department, International Laser Center, M.V. Lomonosov Moscow State University, SERGEI KILIN, VLADIMIR VELICHANSKY, Russian Quantum Center, PHILIP HEMMER, MARLAN SCULLY, ALEKSEI ZHELTIKOV, Department of Physics and Astronomy, Texas A&M University — This talk will demonstrate the performance of our high-sensitivity and high-resolution nitrogen—vacancy diamond (NVD) gradiometer and thermometer fiber probes. By employing an optically detected magnetic resonance (ODMR) technique involving through-fiber optical interrogation and readout of an NVD on a fiber tip with fiber integrated microwave excitation, we are able to assess the temperature and field gradient environment around the probe. We use multiple probe designs to achieve gradient sensitivities of 10^{-7} nT/nm(Hz) $^{1/2}$, resolutions of 5 microns, and millikely in accuracies in a package amenable to in situ measurements in challenging biological environments.

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