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Development of a microwave probe for the optical study of microwave-excited spin physics[1] YU-SHENG OU, YI-HSIN CHIU, ROHAN ADUR, The Ohio State University, Dept. of Physics, PATRICK ODENTHAL, University of California Riverside, Dept.of Physics, ROLAND KAWAKAMI, P. CHRIS HAMMEL, EZEKIEL JOHNSTON-HALPERIN, The Ohio State University, Dept. of Physics — We have developed an experimental probe that allows simultaneous broadband microwave excitation and optical excitation/detection at variable temperature and magnetic field. Specifically, we have designed a unique sample probe with a microwave stripline based sample mount that allows for direct optical access to the sample under study within a magneto- optical cryostat. This powerful combination enables optical studies of spintronic systems under microwave excitation using both CW (e.g. photo- and electro-luminescence) and time resolved (e.g. time resolved absorption/transmission and time resolved Kerr rotation, TRKR) techniques. To benchmark the capabilities of this probe we present data demonstrating simultaneous ferromagnetic resonance (FMR) and TRKR in a Fe/MgO/GaAs heterostructure. Such studies have potential applications in the study of FMR driven spin pumping and interaction of free carrier spins with native and engineered defects.

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