Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

A photonic bandgap resonator to facilitate GHz frequency conductivity experiments in millisecond duration pulsed magnetic fields. ROSS MCDONALD, Los Alamos National Lab., PAUL GODDARD, NEIL HARRISON, CHARLES MIELKE, JOHN SINGLETON, Los Alamos National Lab. — We report the details of a novel, all-dielectric, microwave resonator measurement system for used in pulsed magnets. In dynamic magnetic field environments, the large rate of change of flux places strict constraints upon the use of metallic components, i.e. avoiding unwanted eddy current heating and destructive magnetic forces and torques. Our solution to this problem is to use dielectric photonic bandgap structures to confine the radiation, producing a high Q-factor resonator. We are thus able to attain sufficient sensitivity to perform a wide range of experiments, such as the measurement of quantum oscillations and electron spin resonance in correlated electron systems. These GHz-frequency techniques are not only an exciting addition to the National High Magnetic Field Laboratory's pulsed field User Program, but also mark an important milestone in the development of instrumentation for dynamic ultra-high B/T environments such as the 300 Tesla single-turn magnet facility currently under construction at the NHMFL in Los Alamos.

Ross McDonald
Los Alamos National Lab.

Date submitted: 30 Nov 2004 Electronic form version 1.4