Abstract Submitted
for the SES05 Meeting of
The American Physical Society

Development of ultra-high frequency microwave instrumentation for low-loss magnetic resonance spectroscopy at high magnetic fields.[1]
S.-S. KIM, S.-C. LEE, A. WILSON, S. TAKAHASHI, S. HILL, Dept. of Physics, Univ. of Florida, R. WYLDE, Thomas Keating Ltd., UK, P. GOY, AB Millimetre, France — We have developed a range of techniques for performing high-field angle-dependent microwave spectroscopies of low-dimensional conductors, superconductors and magnets. A combination of methods enables wide frequency coverage (8-700 GHz, 0.3-23 cm^{-1}), and all instrumentation is fully compatible with the high field facilities at the National High Magnetic Field Laboratory (NHMFL).We employ two kinds of probe: (1) a cavity perturbation technique, where the cavity is coupled to the spectrometer via rectangular waveguides (8-350 GHz); and (2) a broadband non-resonant technique, employing corrugated waveguide and a quasioptical bridge ($>$ 170 GHz). The corrugated waveguides are optimized for propagation of the HE11 cylindrical mode more commonly associated with high-power plasma applications. The losses are extremely low at high frequencies, enabling detection of small signals. The sample is coupled to the bottom of the waveguide via a near-field perturbation. All components associated with these instruments are insensitive to the stray fields found in proximity to the high-field magnets at the NHMFL. We will present brief examples of applications of these instruments.

[1]This work is supported by NHMFL/NSF In-House Research Program.

Sheng-Chiang Lee
Department of Physics, University of Florida, FL 32611

Date submitted: 04 Aug 2005 Electronic form version 1.4