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Variable temperature measurements in cryogenic probe stations; Measurements with Magnetic Fields JEFFREY LINDEMUTH, Lake Shore Cryotronics — Electrical and magnetic property measurements of nanoscale materials are important for characterization and understanding of materials and devices. Equally important is to measure these properties at various temperatures. These measurements are facilitated with cryogenic probe stations that provide a variable temperature environment over a wide range of temperatures. However, until this time a major inconvenience was caused by the thermal expansion of the probe tips and probe station as the temperature changed. To prevent the tip movement from damaging the sample, the normal procedure is to lift the probe tips as the temperature changes. This prevents the implementation of totally automated variable temperature measurements. We present results using a new probe design that allows the probe tips to remain in contact to sample during temperature changes. With this new design we demonstrate, with optical microscopy, the total tip movement of less than 2 microns when the temperature of the sample changes from 4.2K to 300K. The same probes that eliminate the movement from thermal expansion also improve the isolation of the measurements to external vibrations. To show the performance of this probe design, variable temperature magnetotransport measurements were preformed. These measurements show that the probe tips do not move with changing temperature and magnetic fields.

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