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Development of Side-gated Carbon Nanotubes for Terahertz Studies[1] CHRIS MCKITTERICK, JOEL CHUDOW, DANIEL SANTAVICCA, DANIEL PROBER, Yale University — The single-walled carbon nanotube is a truly one-dimensional conductor. The currently accepted theory describing propagation of electrons in the nanotube is Luttinger liquid theory, which predicts collective charge modes moving at a velocity greater than the Fermi velocity. By modeling the carbon nanotube as a transmission line, this propagation velocity can be determined from the standing wave resonances in the system. Due to the high resistance of carbon nanotubes, a length on the order of one micron must be used, resulting in resonances which occur at terahertz (THz) frequencies. These resonances can be measured using the heating of the nanotube electron system [1]. To avoid the use of a conducting substrate that absorbs THz, we use a side gate. We describe the development of nanotube samples with side gates for the proposed THz experiment.

[1] D.F. Santavicca, J.D. Chudow, D.E. Prober, M.S. Purewal and P. Kim, Nano Lett. 10, 4538 (2010).

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