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Carbon Nanotube Devices for GHz to THz Applications PETER BURKE, ZHEN YU, SHENGDONG LI, U.C. Irvine — In this talk I will present an overview of the high-frequency applications of carbon nanotubes, one realization of nano-electronic devices, and where the challenges and opportunities lie in this new field. Specifically, I will first discuss the passive RF circuit models of one-dimensional nanostructures as interconnects[1]. Next, I will discuss circuit models of the ac performance of active 1d transistor structures, leading to the prediction that THz cutoff frequencies should be possible[2]. We recently demonstrated the operation of nanotube transistors at 2.6 GHz[3]. Third, I discuss the radiation properties of 1d wires, which could form antennas linking the nanoworld to the macroworld[4]. This could completely remove the requirements for lithographically defined contacts to nanotube and nanowire devices, one of the greatest unsolved problems in nanotechnology. [1] P.J. Burke "An RF Circuit Model for Carbon Nanotubes" IEEE Transactions on Nanotechnology 2(1), 55-58 (2003). [2] P.J. Burke, "AC Performance of Nanoelectronics: Towards a Ballistic THz Nanotube Transistor" Solid State Electronics, 48(10), 1981-1986 (2004). [3] Shengdong Li, Zhen Yu, Sheng-Fen Yeng, W.C. Tang, Peter J. Burke, "Carbon Nanotube Transistor Operation at 2.6 GHz" Nano Letters, 4(4), 753-756 (2004). [4] Peter J. Burke, Shengdong Li, Zhen Yu "Quantitative theory of nanowire and nanotube antenna performance," http://xxx.lanl.gov/abs/cond-mat/0408418 (cond-mat/0408418) (2004).

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