Carbon nanotube nanomechanical mass sensors HSIN-YING CHIU, PETER HUNG, California Institute of Technology, HENK POSTMA, California State University Northridge, MARC BOCKRATH, California Institute of Technology — Single-walled carbon nanotubes are arguably the lightest and smallest wires in the world, and have recently been shown to act as nanomechanical resonators [1]. As a result, single-wall carbon nanotubes are excellent candidates for highly sensitive mass sensing [2]. We observed the down shift of the resonant frequency of a suspended double-clamped carbon nanotube resonator at cryogenic temperatures upon helium mass loading. Using a straightforward estimate of the nanotube mass, the observed frequency shift corresponds to the mass of \( \sim 1000 \) helium atoms, which is the zeptogram range. This is considerably smaller than found previously with nanotube resonators, and comparable to that found using nanowire resonators [3]. Our noise floor is currently \( \sim 1 \) Xenon atom per root Hz, which may enable single-atom detection in future experiments. [1] Vera Sazonova, et al., Nature 431, 284 (2004). [2] H. B. Peng, et al. Phys. Rev. Lett. 97, 087203 (2006) [3] Y. T. Yang, et al. Nano Lett. 6, 583 (2006).