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**Theory of Auger Recombination of Excitons in One-Dimensional Nanostructures**[1] FENG WANG, YANG WU, MARK S. HYBERTSEN, TONY F. HEINZ, Columbia University — The effective Coulomb interaction is greatly enhanced in one-dimensional (1D) systems. As has been recently demonstrated for single-walled carbon nanotubes [1], this strong Coulomb interaction causes the formation of tightly bound exciton states upon optical excitation of semiconducting materials. The strength of the Coulomb interaction in 1D systems leads to a second consequence: Auger recombination of excitons, also known as exciton-exciton annihilation, can be very efficient. Here we investigate the 1D Auger process using a point-contact model for the Coulomb interaction. We show that the Auger process is essentially temperature independent, in contrast to the behavior of weakly bound excitons and free carriers in bulk semiconductors. We apply the explicit expression that we have derived to single-walled carbon nanotubes. We obtain an Auger rate of $\sim$0.6 ps$^{-1}\mu$m, comparable to the reported experimental value [2]. [1] F. Wang et al., Science **308**, 838 (2005); [2] F. Wang et al., Phys. Rev. B **70**, 241403 (2004).

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