

Abstract Submitted  
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**Spectral tuning of optical coupling between air-mode nanobeam cavities and individual carbon nanotubes**<sup>1</sup> HIDENORI MACHIYA, TAKUSHI UDA, AKIHIRO ISHII, The University of Tokyo and RIKEN, YUICHIRO K. KATO, RIKEN — Air-mode nanobeam cavities allow for high efficiency coupling to air-suspended carbon nanotubes due to their unique mode profile that has large electric fields in air<sup>2</sup>. Here we utilize heating-induced energy shift of carbon nanotube emission<sup>3</sup> to investigate the cavity quantum electrodynamics effects. In particular, we use laser-induced heating which causes a large blue-shift of the nanotube photoluminescence as the excitation power is increased. Combined with a slight red-shift of the cavity mode at high powers, detuning of nanotube emission from the cavity can be controlled. We estimate the spontaneous emission coupling factor  $\beta$  at different spectral overlaps and find an increase of  $\beta$  factor at small detunings, which is consistent with Purcell enhancement of nanotube emission.

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<sup>2</sup>R. Miura, S. Imamura, R. Ohta, A. Ishii, X. Liu, T. Shimada, S. Iwamoto, Y. Arakawa, and Y. K. Kato, *Nature Commun.* **5**, 5580 (2014).

<sup>3</sup>P. Finnie, Y. Homma, and J. Lefebvre, *Phys. Rev. Lett.* **94**, 247401 (2005).

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