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Exploring adiabatic/non-adiabatic phase transitions in suspended metallic carbon nanotubes SHUN-WEN CHANG, Department of Physics and Astronomy, Univeristy of Southern California, ROHAN DHALL, Department of Electrical Engineering, Univeristy of Southern California, ZUWEI LIU, Department of Physics and Astronomy, Univeristy of Southern California, STEPHEN CRONIN, Department of Electrical Engineering, Physics and Astronomy, and Chemistry, Univeristy of Southern California, CRONIN'S GROUP TEAM — We investigate the non-adiabatic Kohn anomaly in suspended pristine metallic single-walled carbon nanotubes by studying the dependence of the Raman G band and $2D$ band frequency on Fermi energy. We find that by varying temperature, metallic nanotubes can switch between a regime in which the non-adiabatic Kohn anomaly is clearly observed, to a regime where the non-adiabatic Kohn anomaly is absent. Furthermore, we find that the non-adiabatic Kohn anomaly is always accompanied by a dramatic gate-induced modulation of the G band Raman intensity. By establishing a quantitative correlation between the strength of the non-adiabatic Kohn anomaly and the modulation of Raman intensity, we determine that the underlying mechanism that leads to both these effects is the same.

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