Carbon nanotubes coupled to superconducting impedance matching circuits\textsuperscript{1} SCHONENBERGER CHRISTIAN, MINKYUNG JUNG, VISHAL RANJAN, Departement of Physics, Univ. of Basel, GABRIEL PUEBLA-HELLMANN, Department of Physics, ETH-Zurich, THOMAS HASLER, ANDREAS NUNNENKAMP, Departement of Physics, Univ. of Basel, MATTHIAS MUOTH, CHRISTOFER HIEROLD, Micro- and Nanosystems, ETH-Zurich, ANDREAS WALLRAFF, Department of Physics, ETH-Zurich, RF-HYBRID-COLLABORATION COLLABORATION — Coupling carbon nanotube devices to microwave circuits offers a significant increase in bandwidth and signal-to-noise ratio. These facilitate fast non-invasive readouts important for quantum optics, shot noise and correlation measurements. Here, we successfully couple a carbon nanotube (CNT) double quantum dot to a GHz superconducting matching circuit using a mechanical transfer technique. The device shows a tunable bipolar double dot behavior, reaching the few-electron/ hole regime. The resonance response reflected by the matching circuit is a sensitive probe of the charge state of the device, allowing a determination of the absolute charge number. The resonance response at the inter-dot charge transitions enables quantitative parameter extraction. Presented results open the path for novel studies of microwave photons interacting with electrons in carbon nanotubes.

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