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Abstract:Quantum interference control of electrical currents is well established in bulk semiconductors. It arises from the interference of one- and two-photon absorption pathways. Here, the concept is transferred to one-dimensional semiconductor nanostructures. First, currents are optically injected into aligned single-walled carbon nanotube ensembles by phase-related 700 and 1400 nm, 150 fs pulses. These transient currents are detected via the emitted THz radiation. In a second set of experiments, a phase-stable superposition of ∼100 fs pulses from a compact erbium-doped fiber source and their second harmonic is shown to induce ultrashort ∼μA current bursts in single unbiased GaAs nanowires. The current flow is characterized by charge accumulation and the related potential difference between the contacted ends of the ∼10 μm long wires.