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Self-consistent model for ultrashort laser-pulse propagation and quantum kinetics of electron-hole plasmas in quantum wires[1] JEREMY GULLEY, Department of Physics, Kennesaw State University, DANHONG HUANG, Space Vehicles Directorate, Air Force Research Laboratory — We present a quantum-kinetic model for strong coupling between ultrashort laser pulses and the carrier-scattering dynamics and nonlinear transport of photo-excited electron-hole plasmas in semiconductor nanowires. These low-temperature plasmas are further driven by an applied DC electric field along the wires, including resistive forces for momentum relaxation due to Coulomb scattering and collisions with the lattice. Simulations solving this strong-coupling model allow us to study the correlation between the localized plasma response of quantum wires and the spatial-temporal features and phases of the scattered light pulses. The model also makes it possible to reveal a unique correlation between the DC current from the driven electron-hole plasma and the localized longitudinal electromagnetic field due to induced long-lasting plasma oscillations in the quantum wires.

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