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Charging dynamics of single InGaAs quantum dots under resonant excitation GARY LANDER, DISHENG CHEN, West Virginia University, GLENN SOLOMON, National Institute of Standards and Technology, University of Maryland, EDWARD FLAGG, West Virginia University — We investigate the rates of charge state fluctuation in single InGaAs quantum dots under resonant excitation and with an additional low-power above-band laser. Resonant excitation of either a neutral or charged quantum dot can cause a transition to the opposite charge state, which greatly diminishes the fluorescence and reduces a dot's suitability to act as an efficient photon source. A counter to this effect is a low-power above-band laser that supplies the local charge environment with extra electrons and holes in the bulk GaAs. These charge carriers can be captured by either a charged quantum dot, resulting in neutralization and allowing resonant excitation of the exciton state, or a neutral quantum dot, allowing resonant excitation of the trion state. We characterize as a function of laser power both the steady-state regime and the time-dependent dynamics of the system by modulating either the above-band or resonant laser. The time-resolved fluorescence is recorded and fit with a population evolution model to extract the charging and discharging rates of both the trion and neutral exciton.

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