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High excitation density, quenching, and radiative kinetics in CsI:Tl scintillator[1] JOEL Q. GRIM, QI LI, K.B. UCER, R.T. WILLIAMS, Wake Forest University, W.W. MOSES, Lawrence Berkeley National Laboratory — Non-proportionality of scintillator light yield *vs* particle energy is a significant issue in new-generation radiation analyzers for homeland security, medical, and astrophysical applications. To study kinetics of quenching at high excitation densities characteristic of electron track ends, we have used 0.3 ps pulses of 5.9-eV light to excite up to 5 x 10^{20} e-h/cm^3 in CsI. Streak camera luminescence and transient absorption data show high-density e-h pair excitation yielding partially quenched self-trapped exciton (STE) luminescence and activator-trapped e-h population yielding Tl^{+}* luminescence, as a function of excitation density and Tl concentration in CsI:Tl. Observation of quenching as accelerated decay in the STE channel is consistent with results for $CdWO_4$, another intrinsic excitonic scintillator [1], whereas Tl^{+}* luminescence exhibits quenched yield without observable accelerated decay.

[1] M. Kirm *et al*, Phys. Rev. B 79, 233103-1 (2009).

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Richard T. Williams
Wake Forest University

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