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Branching Transport Model of NaI (Tl) Scintillator[1] BOIAN ALEXANDROV, LANL and University of New Mexico, KIRIL IANAKIEV, LANL, PETER LITTLEWOOD, Cavendish Laboratory, UK — The time dependence of NaI(Tl) fluorescence was measured long time ago with the delayed coincidences method and two decay time components were observed. Because 95% of the total light yield is collected within the first 800 ns, the influence of the second component has been neglected. We claim that there are two dominant *nonexponential* light components with strong temperature redistribution. We experimentally measured the time dependence of the NaI(Tl) light-emission pulses and found that the amplitude ratio of these two components shows Arrhenius temperature dependence. We found that the slow component occupies up to 40% of total light at -20°C. Our model for the temperature-dependent behavior of the NaI(Tl) scintillators is based on two dominant pathways for reaching the Tl level in the scintillator, which lead to two effective, main *nonexponential* components of the time shape of the light pulse. These two effective exponents correspond to the two different transport processes in the crystal. First of them is hopping transport from Self Trapped Exciton (STE) levels to Tl activator sites, and the second is multi-phonon assisted dissociation of the STE followed by binary diffusion of separated holes and electrons to the Tl level.

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Boian Alexandrov
LANL

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