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Quantum Dot Localization with Time Resolved Super-Resolution Tracking Microscopy MEGAN DUNLAP, Department of Chemistry, Colorado State University, Fort Collins, CO 80523, DUNCAN RYAN, MARTIN GELFAND, Department of Physics, Colorado State University, Fort Collins, CO 80523, PETER GOODWIN, JAMES WERNER, Center for Integrated Nanotechnologies, Los Alamos National Laboratory, Los Alamos, NM 87545, ALAN VAN ORDEN, Dept. of Chemistry, Colorado State University, Fort Collins, CO 80523 and Materials Research Institute, Los Alamos National Laboratory, Los Alamo — A novel setup provides simultaneous measurement of the photoluminescence decay time and local position of single emitters with 100 ps time resolution. For the method, a pulsed laser excites a fluorophore positioned in the confocal optical probe region. The subsequent photons are collected with a high numerical aperture microscope objective and imaged onto a 2x2 array of optical fibers in the image plane. Each fiber is connected to one of four single photon counting detectors. To regulate the emitter position, a piezoelectric stage actively adjusts its location with proportional-based feedback from the four detector intensities, so the emitter remains in the center of the probe region. The time-dependent emission observed on the four detectors is used to monitor the spatial position of the emitter with approximately 10 nm precision. This study provides a foundation for later work that will investigate the structural basis of energy transfer among nanoparticles in higher order configurations.

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