Colloidal quantum dots are very small semiconductor nanocrystals that show fluorescence of bright colors tunable across the visible part of the electromagnetic spectrum by the size of the nanocrystal (Fig. 1a; increasing size of CdSe nanocrystals from left to right). Although all vials appear very bright under ultraviolet illumination, zooming in would show particle-to-particle variations of the emission intensity (Fig. 1b). Interestingly, even on the single-particle scale the emission intensity fluctuates seemingly random in time between a high-intensity ON level and a low-intensity OFF level (Fig. 1c). This phenomenon is called blinking and has been observed in nearly all types of semiconductor nanocrystals, *e.g.* CdSe,InP, CuInS2, CsPbBr3. [1] Blinking is unwanted for many applications like lighting and television displays where bright emission is important. On the other hand, in super-resolution microscopy, blinking is used to disentangle the emission from multiple single emitters from overlapping diffraction limited spots.

In my project, we investigate the physical origin of blinking with the goal to eventually control its behavior to match the application at hand. Recently, it has been suggested that blinking is related to temporal storage of excitations in nanocrystals by imperfections in the crystal and/or on the surface. [2] Release of the excitation by optical pulses could prevent switches from the ON to the OFF state and could serve as a tuning knob to control blinking.