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Resonant creation of positive trion in coupled InAs/GaAs quantum dots SWATI RAMANATHAN, KUSHAL C. WIJESUNDARA, MAURICIO GARRIDO, ERIC A. STINAFF, Department of Physics and Astronomy, Ohio University, A. S. BRACKER, D. GAMMON, Naval Research Laboratory — Recent photoluminescence excitation (PLE) experiments have revealed the unexpected resonant creation of a positive trion in a coupled InAs/GaAs quantum dot system. Positive trion creation is a two photon process requiring the second photon to have a different energy from the first due to the presence of the photogenerated hole. This leads us to conclude that the positive trion may be created through two indirect absorptions, along with two tunneling events. To verify this scenario, experiments using circularly polarized excitation should result in hole spin states with either spin -3/2 or +3/2. This should lead to Pauli blocking of spins, resulting in a reduced intensity of positive trion emission under excitation with circularly polarized light when compared to unpolarized light. High resolution PLE will also provide additional insight into the details of this mechanism. It may be possible to use resonant excitation processes such as this to create defined hole spin states in coupled quantum dot systems.

Swati Ramanathan
Department of Physics and Astronomy, Ohio University

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