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Exchange interactions in coupled quantum dots observed through polarized photoluminescence KUSHAL C. WIJESUNDARA, MAURICIO GARRIDO, SWATI RAMANATHAN, ERIC STINAFF, Department of Physics and Astronomy, and Nanoscale and Quantum Phenomena Institute, Ohio University, Athens, OH 45701, USA, ALLAN BRACKER, DAN GAMMON, Naval Research Laboratory, Washington, DC 20375, USA — Identification and manipulation of the exchange interaction between different spin configurations may be useful for implementing quantum logic operations. Coupled quantum dots offer the possibility of controlling the exchange interaction by continuously tuning between direct and indirect excitonic configurations. The effect of the anisotropic part of the exchange energy was clearly identified from polarization dependent photoluminescence (PL) results arising from the direct and indirect configurations of the neutral exciton. We also observe direct experimental evidence of the isotropic exchange interaction via PL measurements from positive trion configurations. The isotropic exchange interactions observed to be an order of magnitude larger than the anisotropic splitting as expected. High resolution measurements of this charged exciton configurations are expected to reveal additional insight into the details of the exchange interaction.

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