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Spin interactions in a coupled InAs/GaAs quantum dot studied by polarization dependent 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, MICHAEL SCHEIBNER, ALLAN BRACKER, DAN GAMMON, Naval Research Laboratory, Washington, DC 20375 — Spins in a quantum dot molecule are of interest for possible quantum information and spintronic applications. By studying in detail the polarization dependent photoluminescence in the region where the ground state energy levels are in resonance and therefore behaving molecular-like we can gain insight into the various relevant interactions. Vertically stacked, self-assembled, InAs QDs grown by molecular beam epitaxy (MBE) on GaAs substrate were used in this study where the relative dot heights were controlled using a GaAs capping layer and the indium flush technique. The QDMs were embedded in a Schottky diode to control the electric field and selectively charge them. QDMs are brought into resonance which results in anticrossings at the positive trion states. The positive trion states demonstrated a high and low polarization for positive trion like, neutral exciton like, configurations respectively. Detailed polarization results show spin fine structure along with a continuous variation between the high and low values indicating an electric field tunable exchange interaction.

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