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In situ tuning biexciton antibinding-binding transition and fine structure splitting through hydrostatic pressure in single InGaAs quantum dots HAI WEI, Key Laboratory of Quantum Information, University of Science and Technology of China, Hefei, 230026, PR China, XUEFEI WU, XIUMING DOU, KUN DING, YING YU, HAIQIAO NI, ZHICHUAN NIU, YANG JI, SHUSHEN LI, DESHENG JIANG, Institute of Semiconductors, CAS, Beijing, 100083, PR China, GUANG-CAN GUO, LIXIN HE, Key Laboratory of Quantum Information, University of Science and Technology of China, Hefei, 230026, PR China, BAOQUAN SUN, Institute of Semiconductors, CAS, Beijing, 100083, PR China, INSTITUTE OF SEMICONDUCTORS, CAS, PR CHINA TEAM, KEY LABORATORY OF QUANTUM INFORMATION, UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA, PR CHINA TEAM — We demonstrate that the exciton and biexciton emission energies as well as exciton fine structure splitting (FSS) in single (In,Ga)As/GaAs quantum dots (QDs) can be efficiently tuned using hydrostatic pressure *in situ* in an optical cryostat at up to 4.4 GPa. The maximum exciton emission energy shift is up to 380 meV, and the FSS is up to 150 μeV. We successfully produce a biexciton antibinding-binding transition in QDs, which is the key experimental condition that generates color- and polarization-indistinguishable photon pairs from the cascade of biexciton emissions and that generates entangled photons via a time-reordering scheme. We also perform the atomistic pseudopotential calculations on realistic (In,Ga)As/GaAs QDs to understand the physical mechanism underlying the hydrostatic pressure-induced effects.

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