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Nearly degenerate light- and heavy-hole trions bound to isoelectronic centers GABRIEL ETHIER-MAJCHER, PHILIPPE ST-JEAN, SEBASTIEN FRANCOEUR, Polytechnique Montreal — Many optical quantum control schemes of spin qubits in semiconductors rely on the existence of trion states. In this work, we investigate the fine structure of negative trions bound to isoelectronic centers formed from a pair of nitrogen isovalent impurities in GaAs, which represent interesting candidates for optical quantum information processing. Using polarization resolved microluminescence, we find that the fine structure is composed of two unpolarized lines, characteristic of light- and heavy-hole trion states, evolving into two quadruplets under a longitudinal magnetic field. The availability of both light- and heavy-hole states on the same trion could lead to new powerful optical quantum control schemes where both spin initialization and single-shot readout could be conveniently realized.

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