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Effects of Strain and Quantum Confinement in Optically Pumped Nuclear Magnetic Resonance in GaAs: Interpretation Guided by Spin-Dependent Band Structure Calculations CLIFFORD BOWERS, RYAN WOOD, SAHA DIPTA, JOHN TOKARSKI, LAUREN MCCARTHY, GARY SANDERS, CHRISTOPHER STANTON, Univ of Florida - Gainesville, STEPHEN MCGILL, ARNEIL REYES, PHIL KUHNS, National High Magnetic Field Laboratory FSU, JOHN RENO, Sandia National Labs — A combined experimental-theoretical study of optically pumped NMR (OPNMR) has been performed in a $GaAs/Al_{0.1}Ga_{0.9}As$ quantum well film epoxy bonded to a Si substrate with thermally induced biaxial strain. The photon energy dependence of the Ga OPNMR signal was recorded at magnetic fields of 4.9 and 9.4 T at a temperature of 4.8-5.4 K. The data were compared to the nuclear spin polarization calculated from the differential absorption to spin-up and spin-down states of the electron conduction band using a modified Pidgeon Brown model. Comparison of theory with experiment facilitated the assignment of features in the OPNMR energy dependence to specific interband Landau level transitions. The results provide insight into how effects of strain and quantum confinement are manifested in optical nuclear polarization in semiconductors.

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