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Ultrafast Time Resolved Transient Absorption and Photoluminescence (PL) Studies of $In_{0.2}Ga_{0.8}As/GaAs$ Quantum Wells in High Magnetic Fields[1] JINHO LEE, X. WANG, D.H. REITZE, Physics Dept., University of Florida, S. MCGILL, NHMFL, Y.D. JHO, Dept. of Information and Communications, GIST, J. KONO, Dept. of Electrical and Computer Engineering, Rice University, A.A. BELYANIN, Physics Dept., Texas A&M University, G. SOLOMON, NIST — We investigate the temporal dynamics of dense magneto-plasmas excited by intense femtosecond laser pulses in $In_{0.2}Ga_{0.8}As/GaAs$ multiple quantum wells in high magnetic fields. To fully fill the Landau levels (LLs), we pump to carrier densities near $10^{13}/cm^2$ using 150 fs pulses. Time-resolved transient absorption experiments probe the occupancy of each e1h1 LL, revealing a dramatic decrease in decay times above the zero field e1h1 transition dynamics. Our PL results reveal evidence for multiple short bursts of emission pulses at the highest fields (17.5T) from in-plane PL emission compared with zero field emission. In addition, qualitatively different temporal dynamics from in-plane and out-of-plane collection geometries are observed. Our results are analyzed in the context of ultrafast cooperative emission mechanisms from dense electron-hole plasmas.

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