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Many-body Effects and the Role of Indirect Excitons in Asymmetric InGaAs/GaAs Double Quantum Wells CHRISTOPHER SMALLWOOD, JILA, University of Colorado, NIST, TAKESHI SUZUKI, ROHAN SINGH, Dept. of Physics, University of Michigan, TRAVIS AUTRY, MATTHEW DAY, JILA, University of Colorado, NIST, FAUZIA JABEEN, Laboratory of Quantum Optoelectronics, cole Polytechnique Fdrale de Lausanne (EPFL), STEVEN CUNDIFF, Dept. of Physics, University of Michigan — In semiconductor research, a fundamental question is how excitons in nearby but distinct spatial locations interact and exchange energy. In quantum well heterostructures, these interactions can be conveniently probed via optical coherent multidimensional spectroscopy (CMDS). Recently, it has been shown using CMDS that reducing the GaAs barrier from 30 nm to 10 nm between two asymmetric InGaAs quantum wells results in interactions driven by many-body effects. Here, we use the technique to show that for narrower barrier thicknesses, the interactions are accompanied by an emergence of spatially indirect excitons. Quantitative measurements of the effects are presented, which will be useful in tailoring GaAs heterostructure devices, and may also inform the role that excitonic interactions play in more complicated systems like microcavity polariton structures and/or photosynthetic light harvesting complexes.

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