

Abstract Submitted
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Linewidth Broadening of Coupled Quantum Dot Pairs¹ PARVEEN KUMAR, C. JENNINGS, C. CZARNOCKI, J. CASARA, A. R. JACOBS, M. SCHEIBNER, University of California, Merced CA 95343, S. E. ECONOMOU, Virginia Tech, Blacksburg, VA 24061, A. S. BRACKER, B. C. PURSLEY, D. GAMMON, S. G. CARTER, Naval Research Laboratory, Washington, DC 20375 — We report on linewidth analysis of optical transitions in InAs/GaAs coupled quantum dots (CQDs) as a function of temperature and tunnel coupling strength. A significant line broadening, up to 25 times that of the typical lifetime-limited linewidth of single-dot excitons is observed. This broadening occurs at tunnel resonances where the coherent tunnel coupling between spatially direct and indirect exciton states is considerable. With increasing temperature, the linewidth shows a characteristic temperature broadening. The linewidth as a function of tunnel coupling strength track the theoretical prediction of linewidth broadening due to the phonon assisted transitions, and is indirectly proportional to the energy splitting of the two exciton branches. These results highlight the linewidth broadening mechanisms and fundamental aspects between the interaction of these systems to that of the local environment.

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Parveen Kumar
University of California, Merced CA 95343

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