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Influence of coherent level mixing on the resonant currents at anti-crossings between two single particle levels of a vertical quantum dot C. PAYETTE, D.G. AUSTING, NRC, McGill University (Canada), G. YU, J.A. GUPTA, NRC (Canada), S.V. NAIR, University of Toronto (Canada), B. PARTOENS, Universiteit Antwerpen (Belgium), S. AMAHA, ICORP-JST (Japan), Y. TOKURA, NTT-BRL (Japan), S. TARUCHA, ICORP-JST, University of Tokyo (Japan) — We study single electron resonant tunneling through weakly coupled vertical quantum dot molecules. Using the ground state of one of the constituent dots as an energy filter, we can probe the single particle energy spectrum of the other dot. Overall, the spectra are well modeled by assuming the dots are either circular or elliptical and parabolic, except in the regions where two or more single particle states approach each other. In these regions, we observe pronounced level mixing behavior. Here, we focus on the numerous two level anti-crossings, examining the conditions which lead to either simple transfer of the resonant current strengths between the two branches or concurrent enhancement and suppression of the resonant current in the two branches. We show that both types of behavior can be understood using a simple coherent level mixing model.

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