

Response: The comment by Wolak *et al.*¹ does not resolve the important issue addressed in our paper.² As already mentioned in our paper, the experiment does not rule out unambiguously the possibility of resonant enhancement of tunneling current in the device structure investigated. However, it is hard to expect a significant coherent resonant tunneling component in a double barrier structure with vastly different barrier transparencies.³ It is probably more reasonable to take the view that our interpretation may be competing with a sequential resonant tunneling process in which an electron having tunneled into the quantum well (QW) then leaves it sequentially by a Fowler–Nordheim-like tunneling through the second barrier, rather than by drifting toward the drain as we have suggested. It is this possibility that one should take seriously, not the competition of the process we have suggested with a hypothetical coherent process. This would be in the spirit of what Wolak *et al.* are suggesting, but the estimate for J given in their comment would not apply. Their expression for J may be a gross overestimation of the expected current density in a realistic situation that includes scattering.

It is awfully hard to make a realistic estimate of the probability for tunneling out of the QW. However, it still appears unlikely to us that this process wins against our drift mechanism. Indeed, in this case we can think of the two paths (tunneling through the second barrier and drifting laterally) as being two resistances in parallel: i.e., the equivalent circuit contains a first barrier R (which has an inherent negative differential resistance) in series with two parallel R_{tunnel} and R_{drift} . If, as Wolak *et al.* suggest (or as we interpret them to suggest), $R_{\text{tunnel}} < R_{\text{drift}}$ then it would contradict a number of other experiments, notably those with the

CHINT/NERFET device structure.⁴ In that structure, a source-to-drain channel is separated from a collector by an AlGaAs barrier of thickness about 1500 Å. We conclude, therefore, that our interpretation remains the most probable one. Ours is not a radical view. Sequential resonant tunneling should certainly be considered before coherent resonant tunneling. The latter, being fancier and a much more delicate process, should be invoked only if the sequential process can be ruled out—not the other way around! Still, in light of the fundamental interest of resonant tunneling, more careful experiments are clearly welcome. In our view, any claim on the observation of a true resonant tunneling (as opposed to a sequential process) should be accompanied by an experimental proof.

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