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Probing the mobility-limiting mechanisms in undoped Si/SiGe heterostructures[1] XIAO MI, THOMAS M. HAZARD, CHRISTOPHER M. PAYETTE, KE WANG, DAVID M. ZAJAC, JEFFREY V. CADY, JASON R. PETTA, Department of Physics, Princeton University — Silicon is an ideal host material for spin-based semiconductor quantum dot qubits due to weak hyperfine coupling and a route to isotopic purification. Si quantum dots formed in undoped Si/SiGe quantum wells have recently allowed measurements that were previously only possible in the GaAs system [1, 2]. We report the growth of Si/SiGe quantum wells with mobilities reaching 260,000 cm^2/Vs at a density of 7×10^{11} $/cm^2$. We systematically investigate a series of 26 wafers with different growth profiles and impurity levels, and find that the mobility is limited by scattering from both oxygen impurities in the quantum wells and interface charges at the surface of the wafer.

[1] B. M. Maune *et al.*, Nature **481**, 344 (2012).
[2] K. Wang, C. Payette, Y. Dovzhenko, P. W. Deelman, and J. R. Petta, Phys. Rev. Lett. **111**, 046801 (2013).

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