Exploiting engineered quantum wells in Si/SiGe

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A variety of heterostructure profiles have been proposed for Si/SiGe quantum wells, to enhance desirable properties for quantum dot qubits. These include sharp interfaces, narrow wells, Wiggle Wells, and Ge spikes. Such structures share a common goal: to generate one (or both) of the specific wavevectors that govern the valley coupling, referred to as k_0 and k_1. In this talk, I will focus on the k_1 wavevector, which has previously been studied mainly in the context of Wiggle Wells, and which plays a role in both valley splitting and spin-orbit coupling. I will discuss recent proposals for using these engineered heterostructures to enhance EDSR, and to provide “giant” valley splitting without a Wiggle Well.