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Rasbha Spin-Orbit Interaction in Digital Alloys JOSEPH PINGENOT, KIERAN MULLEN, The University of Oklahoma Department of Physics and Astronomy — The Rashba spin-orbit interaction couples the electron spatial wavefunction to its spin through breaking the inversion symmetry of a structure. From work by Lange[1], the Rashba spin-orbit effect can be divided into a structural component, originating primarily in the valence band offsets within the nanostructure, and an electric field component, originating primarily in the internal self-consistent electric field and in an applied electric field. A common growth technique, digital alloying, breaks the well into discrete steps and then varies the material composition for each step by constructing a well within the step such that the average material across the step corresponds to the desired percentage, e.g. a $Ga_{0.5}In_{0.5}As$ well would be pure GaAs through half the step, followed by pure InAs for the rest of the step. With digital alloying, the electron wavefunction is approximately the same as is obtained by using a real alloy. The Rashba spin-orbit couplings, however, are considerably smaller for the digital alloy than the real alloy. This comes about because the digital alloy has a series of positive and negative interfaces at each step, whereas the real alloy has a series of identical steps. We calculate the Rashba coefficient for a variety of realistic well geometries, for both digitial and continuous alloying, and discuss how the consequences for experiment. [1] Jens Lange, *Quantentransport in Halbleiter-Heterostrukturen* (1996).

Joseph Pingenot
The University of Oklahoma / Department of Physics and Astronomy

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