

Abstract Submitted  
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**Spin current in an asymmetric quantum well: 2x2 effective Hamiltonian vs multi-band model**<sup>1</sup> A. A. KISELEV, K. W. KIM, North Carolina State University, Raleigh, NC 27695-7911 — We have conducted an analysis of the problem of electron spin currents in two-dimensional systems with structural asymmetry. It is shown that an attempt to derive this quantity based exclusively on the 2x2 effective Hamiltonian is internally inconsistent and actually misses the dominant contribution to the spin current. In short, this happens because "effective" (i.e., obtained via partial diagonalization of multi-band Hamiltonian and truncation) forms of spin and velocity operators are not sufficient, alone, to define the effective form of their superposition. Proper approach should start with the multi-band Hamiltonian explicitly incorporating spin-orbit-split bands and define an operator of the spin current on a complete system, not on one of its effective subspaces. Understandably, this also resolves ambiguities, associated with the order of spin and velocity operators in the superposition, that are inherently present in the 2x2 approach.

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