Abstract Submitted
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Intrinsic spin Hall effect at oxide interfaces: a simple model[1] LORIEN HAYDEN, University of Missouri-Columbia, ROBERTO RAIMONDI, Universita' di Roma Tre, MICHAEL FLATTE', University of Iowa, GIOVANNI VIGNALE, University of Missouri-Columbia — An asymmetric triangular potential well provides one of the simplest model for the confinement of mobile electrons at the interface between two insulating oxides, such as $LaAlO_3$ and $SrTiO_3$ (LAO/STO). In this paper we study the intrinsic spin Hall effect due to Rashba coupling in an asymmetric triangular potential well. Besides splitting each subband into two branches of opposite chirality, the spin-orbit interaction causes the wave function in the direction perpendicular to the plane of the quantum well (i.e., the growth direction) to depend on the in plane wave vector kv. In contrast to the extreme asymmetric case, i.e., the wedge-shaped quantum well, for which the intrinsic spin Hall effect is known to vanish due to vertex corrections, we find that the asymmetric well supports a non-vanishing intrinsic spin Hall conductivity, proportional to the square of the spin-orbit coupling constant. Its origin lies in the non-vanishing matrix elements of the spin current between subbands corresponding to different states of quantized motion perpendicular to the plane of the well. Vertex corrections are carefully considered, both for the intra-band and the inter-band contributions to the spin Hall conductivity.

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