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Boundary conditions for spin diffusion VICTOR GALITSKI, Condensed Matter Theory Center, Physics Department, University of Maryland, ANTON BURKOV, Physics Department, Harvard University, SANKAR DAS SARMA, Condensed Matter Theory Center, Physics Department, University of Maryland — We introduce a general method of deriving boundary conditions for spin-charge coupled transport in disordered systems with spin-orbit interactions and derive boundary conditions for spin diffusion in the Rashba model for various types of boundaries. Due to the surface spin precession, the boundary conditions are generally non-trivial and may contain terms, which couple different components of the spin density. We argue that boundary conditions and the corresponding electric-field-induced spin accumulation depend on the nature of the boundary and therefore the spin Hall effect in a spin-orbit coupled system can be viewed as a non-universal edge phenomenon.

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