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Nonballistic two-channel Datta-Das spin field effect transistor
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of Science and Technology — Scattering by impurities is believed to be harmful for
a Datta- Das spin field effect transistor (SFET). We present a quantum mechani-
cal analysis of a nonballistic SFET in the small width limit, where only two (two
from spin) channels are allowed, and find that the SFET can show diverse behaviors
depending on relative magnitudes of various important energy scales. We identify
these scales and show that the nonballistic SFET can operate successfully in certain
regimes of the energy scales.

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