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Anholonomic spin manipulation in drift transport in semiconductors BEN J. MOEHLMANN, MICHAEL E. FLATTÉ, Optical Science and Technology Center and Department of Physics and Astronomy, University of Iowa — We find that the electronic spin rotation induced by drift transport around a closed path in a wide variety of nonmagnetic semiconductors at zero magnetic field depends solely on the physical path taken. Physical paths that produce any possible spin rotation due to transport around a closed path are constructed for electrons experiencing strain or electric fields in (001), (110), or (111)-grown zincblende semiconductor quantum wells. Spin decoherence due to travel along the path is negligible compared to the background spin decoherence rate. The small size of the designed paths ($<$ 100 nm scale in GaAs) may lead to applications in nanoscale spintronic circuits. This work was supported by an ONR MURI.[1]

[1]B. J. Moehlmann and M. E. Flatté, arXiv:1007.0909

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