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Controlling spin lifetime with Dresselhaus and Rashba fields in the 2D semiconductor MX[1] IAN APPELBAUM, PENGKE LI, Univ of Maryland-College Park — It is widely believed that whenever spin encodes logic state in a semiconductor device, transport channel materials with the longest spin lifetime are the most suitable choice. However, once a logic operation is completed, residual spins can and will interfere with those involved in future operations. We propose to solve this problem by utilizing the unique properties of spin-orbit effects in the electronic structure of monolayer of group-III metal-monochalcogenide (MX) semiconductors. The interplay of Dresselhaus and Rashba effective magnetic fields in these materials will be shown to provide effective external control over spin polarization lifetime, potentially useful for future spin-enabled digital devices.

[1]Based upon: Pengke Li and Ian Appelbaum, arxiv:1508.06963 (to appear in Phys. Rev. B). We acknowledge support from NSF, DTRA, and ONR.

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