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.

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