

Abstract Submitted  
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**Unified theory of spin-dynamics in a two dimensional electron gas with arbitrary spin-orbit coping strength at finite temperature**<sup>1</sup> XIN LIU, Department of Physics, The Pennsylvania State University, University Park, Pennsylvania 16802-6300, SINOVA JAIRO, Department of Physics, Texas A&M University, College Station, TX 77843-4242, USA — We study the spin dynamics in the presence of impurity and electron-electron (e-e) scattering in a III-V semiconductor quantum well with arbitrary spin-orbit coupling (SOC) strength and symmetry at finite temperature. In the regime where the strength of the Rashba and linear Dresselhaus SOC match, known as the SU(2) symmetry point, experiments have observed the spin-helix mode with a large spin-lifetime whose unexplained nonmonotonic temperature dependence peaks at around 75 K. As a key test of our theory, we are able to naturally explain quantitatively this nonmonotonic dependence and show that it arises as a competition between the Dyakonov-Perel mechanism, suppressed at the SU(2) point, and the Elliott-Yafet mechanism. In the strong SOC regime, we show that our theory directly reproduces the previous known analytical result at the SU(2) symmetry point in the ballistic regime.

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