Gate-control of spin polarization waves

LUYI YANG, J.D. KORALEK, J. ORENSTEIN, UC Berkeley and LBNL, D.R. TIBBETTS, J.L. RENO, M.P. LILLY, SNL — We report on control of the persistent spin helix (PSH) in semiconductor quantum wells with tunable spin-orbit (SO) coupling via external gates. The PSH is a collective spin excitation of two-dimensional electron systems that emerges as a new conserved quantity of the SU(2) symmetry. It occurs when the strengths of Rashba and linear Dresselhaus SO coupling are equal. Previously, this effect was demonstrated by a set of samples with different doping asymmetry and well width [1]. Now we fabricate samples with both front and back gates aiming to control Rashba SO coupling continuously and increase the lifetime-enhancement by reducing the symmetry-breaking cubic Dresselhaus term.


Supported by DOE under Contract No. DE-AC02-05CH11231 and DE-AC04-94AL85000.

Luyi Yang
University of California Berkeley and Lawrence Berkeley National Lab

Date submitted: 18 Nov 2012

Electronic form version 1.4