Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Radial spin helix in two-dimensional electron systems with Rashba spin-orbit coupling VALERIY SLIPKO, Department of Physics and Technology, V. N. Karazin Kharkov National University, 4 Svobody Sq., Kharkov 61077, Ukraine, YURIY PERSHIN, Department of Physics and Astronomy and USC Nanocenter, University of South Carolina, 712 Main Street, Columbia, SC 29208, USA — We suggest a new long-lived spin-polarization structure, a radial spin helix [1], and study its relaxation dynamics. For this purpose, starting with a system of equations for spin-polarization density, we find its general solution in the axially symmetric case. It is demonstrated that the radial spin helix of a certain period relaxes slower than homogeneous spin polarization and plain spin helix [2]. Importantly, the spin polarization at the center of the radial spin helix stays almost unchanged at short times. At longer times, when the initial nonexponential relaxation region ends, the relaxation of the radial spin helix occurs with the same time constant as that describing the relaxation of the plain spin helix. Experimentally, such a structure can be created using spin injection or extraction in a system with cylindrical electrodes or, possibly, by a modified spin gratings technique.

[1] Y. V. Pershin and V. A. Slipko, Phys. Rev. B 82, 125325 (2010).
[2] Y. V. Pershin, Phys. Rev. B 71, 155317 (2005).

Yuriy Pershin
Department of Physics and Astronomy and USC Nanocenter,
University of South Carolina, 712 Main Street, Columbia, SC 29208, USA

Date submitted: 22 Nov 2010 Electronic form version 1.4