Unique Signatures of Rashba Effect in Angle-Resolved Magnetoresistance

Anshu Gupta
Deepak S. Kathyat, Arnob Mukherjee, Anamika Kumari, Ruchi Tomar, Yogesh Singh, Sanjeev Kumar, Suvankar Chakraverty
Quantum Materials and Devices Unit, Institute of Nano Science and Technology, Sector-81, P. O. Manauli, Mohali-140306, India.
Department of Physical Sciences, Indian Institute of Science Education and Research, Sector-81, P. O. Manauli, Mohali-140306, India.
Anshu.ph19221@inst.ac.in

Abstract

$KTaO_3$ has emerged as the new kid in the spintronics block, showing the emergent phenomena in bulk and in heterostructures, interfaces, and thin films. In this, we have studied the angular dependence of the longitudinal and planar magnetoresistance at the conducting interface of $LaVO_3$-$KTaO_3$ having strong spin-orbit coupling strength and showing the existence of the Rashba effect. The system exhibited negative longitudinal magnetoresistance, planar Hall effect, and anisotropic magnetoresistance which are the signature of chiral anomaly which is also the signature of Dirac and Weyl semimetals. The observance of negative magnetoresistance for all in-plane angles is an unusual feature. These features of quantum origin arise from strong spin-orbit coupling and pave a path to engineering non-magnetic materials as sensors for vector magnetic fields.

References

[1] A. Gupta et. al., Adv. Quantum Technol, (2021), 2100105 (1-8).

[2] A. Gupta et. al., *Adv. Mater.* (2022), 2106481.

Figures

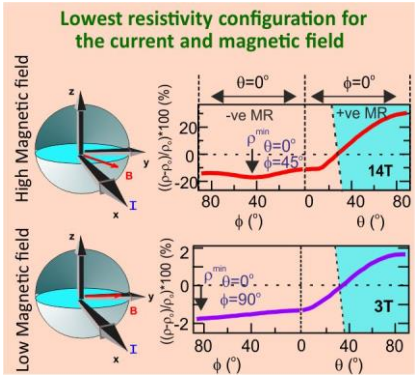

Figure 1: Lowest resistivity configuration for the current and magnetic field direction