

## Is the shear induced spin polarization non-dissipative?

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The shear-induced polarization plays a crucial role in understanding the local polarization of  $\Lambda$  and  $\Lambda$  hyperons. A key puzzle is whether the shear-induced polarization is non-dissipative or not. In this work, we analyzed the shear-induced polarization and the anomalous Hall effects using the entropy flow and H-theorem introduced from quantum (chiral) kinetic theory. While the shear-induced polarization and the anomalous Hall effect do not directly contribute to the entropy production rate, the perturbations associated with the shear tensor lead to an increase in entropy, similar to the role of the shear tensor in classical kinetic theory. We also examined these effects within the framework of linear response theory using Zubarev's approach. These findings highlight the limitations of the current theoretical framework in fully characterizing the dissipative properties of these phenomena.

**Primary authors:** YANG, Di-Lun; WANG, Jia-rong (中国科学技术大学); PU, Shi; FANG, Shuo

**Presenter:** WANG, Jia-rong (中国科学技术大学)

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