Abstract Submitted
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Thermal Hall Effect and Geometry with Torsion[1] ALEXANDER ABANOV, ANDREY GROMOV, Stony Brook University — We formulate a geometric framework that allows to study momentum and energy transport in non-relativistic systems. We show how momentum and energy current can be computed as responses to variations in geometry. It turns out that in the absence of Lorentz invariance the appropriate geometry is not Riemannian, but the Newton-Cartan geometry with temporal torsion. Our approach generalizes the classic Luttinger's formulation of thermal transport. In particular, we clarify the geometric meaning of the fields conjugate to energy and energy current. These fields describe the geometric background with non-vanishing temporal torsion. We use the developed formalism to construct the equilibrium partition function of a non-relativistic system coupled to the NC geometry in 2+1 dimensions and to derive various thermodynamic relations. As a by-product we argue that the bulk thermal Hall conductance is not topologically protected.

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Andrey Gromov
Stony Brook University

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