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Anomaly-induced transport regime in Weyl semimetals

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In conventional conductors, transport can be classified as diffusive, ballistic, or hydrodynamic, depending on the primary scattering mechanism of electrons. In this talk I will discuss the presence of a hitherto neglected transport regime in Weyl semimetals, related to the presence of chiral anomalies. In this regime the relation between the current and the electric field becomes nonlocal as a result of diffusion of the axial charge into the bulk of the material. We propose to use this novel regime as a diagnostic of the presence of chiral anomalies in optical conductivity measurements. These results are obtained from a generalized kinetic theory which includes various relaxation mechanisms, allowing us to investigate different transport regimes of Weyl semimetals.

Presenter: MATUS, Pawel (Max Planck Institute for the Physics of Complex Systems)

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