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## Effect of interactions on the topological expression for the chiral separation effect

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In the absence of interactions the conductivity of chiral separation effect (CSE) in the system of massless fermions is given by topological expression. Interactions might change the pattern drastically. However, we prove that the CSE conductivity is still given by the topological invariant composed of the Green functions at zero temperature as long as the chiral symmetry is present, and if the renormalized axial current is considered. This allows to predict its appearance with the standard value of conductivity per Dirac fermion in quark-gluon matter at zero temperature and sufficiently large baryon chemical potential, in the hypothetical phase with restored chiral symmetry and without color superconductivity. This phase may be realized inside the neutron stars. We also argue that the same topological expression for the CSE may be observed in Weyl semimetals, which realize the system of interacting relativistic fermions in solid state systems. In order to estimate the non-perturbative corrections to the CSE conductivity within QCD at finite temperatures we apply method of field correlators developed by Yu.A.Simonov. As expected, above the deconfinement crossover the topological expression is approached within the quark-gluon plasma phase, when the quark chemical potential is sufficiently large. However, we observe that this occurs only when quark chemical potential is much larger than the thermal (Debye) mass. This range of parameters appears to be far out of the region accessible at the modern colliders.

### Is this abstract from experiment?

No

### Name of experiment and experimental site

N/A

### Is the speaker for that presentation defined?

Yes

### Details

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### Internet talk

No

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