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Chiral Symmetry Breaking in Reduced QED with a Chern-Simons term

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Content

We study the gap equation for the fermion propagator in Reduced QED coupled with a Chern-Simons term. In the ordinary theory, the electromagnetic coupling needs to exceed a critical value in order for mases to be generated. Adding the influence of a Chern-Simons term, it is observed that there exists a critical value of the theta-term above which chiral symmetry is restored regardless the strength of the coupling. These findings are of direct relevance in graphene physics to understand the semimetal-insulator transition in the presence of parallel electric and magnetic fields. Connections with the chiral magnetic effect are also explored.

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