

## Phase transition in Topologically Massive QED with 4-component fermion

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### Abstract

There is chiral like symmetry for 4-component massless fermion in (2+1)-dimensional gauge theory. Since QED<sub>3</sub> with Chern-Simons term contains vortex solution for vector potential, one may expect vortex driven phase transition as Kosterlitz-Thouless type where chiral condensate is washed away at zero temperature. To study this possibility, we evaluate the fermion propagator by Dyson-Schwinger equation numerically. It is shown that massless fermion is unstable against mass shift by Chern-Simons term. For quenched case we adopt Ball-Chiu vertex to keep gauge invariance of the results. The critical value of topological mass, above which chiral condensate washed away, turned out to be  $O(10^{-2})e^2$  at least for weak coupling in both cases.