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Berry Phase in in Fermi and Non-Fermi Liquids JING-YUAN CHEN, Stanford University, DAM T. SON COLLABORATION — In the recent year it has been realized that Berry phase is a unified theme underlying a lot of interesting physics, such as anomalous Hall effect, chiral anomaly transport etc. However, much of the discussions of Berry phase were based on the picture of non-interacting single fermions. We want to justify which Berry phase properties survive upon the inclusion of interactions, and whether there are new effects arising from interactions. We first consider Fermi liquids and show, from quantum field theory, that Landau's low energy kinetic formalism can be extended to incorporate Berry phase. Next we consider certain non-Fermi liquids and show certain transport properties are given purely by the Berry phase and are not mixed up by the mysterious nature of excitations in non-Fermi liquids.

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