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A Route to Dirac Liquid Theory: A Fermi Liquid Description for Dirac Materials MATTHEW GOCHAN, KEVIN BEDELL, Boston College — Since the pioneering work developed by L.V. Landau sixty years ago, Fermi Liquid Theory has seen great success in describing interacting Fermi systems. While much interest has been generated over the study of non-Fermi Liquid systems, Fermi Liquid theory serves as a formidable model for many systems and offers a rich amount of of results and insight. The recent classification of Dirac Materials, and the lack of a unifying theoretical framework for them, has motivated our study. Dirac materials are a versatile class of materials in which an abundance of unique physical phenomena can be observed. Such materials are found in all dimensions, with the shared property that their low-energy fermionic excitations behave as massless Dirac fermions and are therefore governed by the Dirac equation. The most popular Dirac material, graphene, is the focus of this work. We present our Fermi Liquid description of Graphene. We find many interesting results, specifically in the transport and dynamics of the system. Additionally, we expand on previous work regarding the Virial Theorem and its impact on the Fermi Liquid parameters in graphene. Finally, we remark on viscoelasticity of Dirac Materials and other unusual results that are consequences of AdS-CFT.

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