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Probing the Interaction of Graphene and Correlated Electron Systems by STM and Magnetotransport[1] MICHAEL ALTVATER, MARC REYNAUD, ADITYA SRIPAL, ALICE HUANG, GUOHONG LI, EVA Y. ANDREI, Rutgers University, Department of Physics and Astronomy, RUI ZHAO, JOSHUA ROBINSON, Pennsylvania State University, Materials Science and Engineering, Center for Two-Dimensional and Layered Materials — Since the discovery of 2D materials including graphene and TMDs, many have been shown to exhibit a wide variety of properties including correlated electronic phases, metal-insulator transi- tions, and highly tunable material properties leading to a rapid increase in research interest. Recent advances in nanostructure fabrication allow us to further study the interaction of these materials by creating heterostructures, layered devices made from low dimensional materials. In this work, we investigate the interaction of Dirac electrons in graphene with the charge density wave formed in 1T-TaS2, a van der Waals stacked TMD exhibiting a number of electronic phases including a high temperature metallic phase, several charge density wave phases, a Mott insulating phase, and superconductivity with the addition of pressure or dopants. Using STM, STS, and magnetotrans- port, we probe the effects of graphene on the phase transition properties of the CDW in TaS2 as well as the effect of the highly correlated substrate on the electronic spectrum in graphene. Our work will provide insight into the effects of correlated physics in heterostructures and how we might take advantage of these effects to produce novel devices and applications.

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