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Electron-Hole Puddle Induced Scattering and 1/f Noise Behavior in Graphene[1] GUANGYU XU, Dept. Electrical Engineering, UCLA (UCLA), CARLOS TORRES JR., UCLA, YUEGANG ZHANG, Molecular Foundry, LBNL, FEI LIU, IBM T. J. Watson Research Center, MINSHENG WANG, YI ZHOU, CAIFU ZENG, KANG WANG, UCLA, UCLA TEAM, LBNL TEAM, IBM TEAM — We report the observation of electron-hole puddle induced scattering in both monolayer and bilayer bulk graphene at the low carrier density regime (near the Dirac point) using four-probe low frequency noise measurements. For monolayer graphene, the non-uniformity of the localized density of states in the presence of puddles results in an abnormal noise reduction in low carrier densities in the order of 1012 cm-2. For bilayer graphene, a similar noise reduction near the Dirac point is observed, but with a different carrier density dependence of the noise behavior due to the bandgap-related screening modulation by the gate bias. The noise decreases near the Dirac point since the carriers transport along the puddles and interact with fewer impurity scattering centers near the graphene-SiO2 interface.

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