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Quantum Linear Magnetoresistance in Multilayer Epitaxial Graphene ADAM L. FRIEDMAN, Code 6876 NRL, JOSEPH L. TEDESCO, Code 6882 NRL, PAUL M. CAMPBELL, JAMES CULBERTSON, Code 6876 NRL, EDWARD AIFER, Code 6818 NRL, KEITH PERKINS, Code 6876 NRL, RACHEL L. MYERS-WARD, JENNIFER K. HITE, CHARLES R. EDDY, JR., D. KURT GASKILL, Code 6882 NRL — A conductor in an applied magnetic field normally exhibits a quadratic magnetoresistance (MR) that saturates at low fields and displays a relatively small MR ratio. However, the introduction of impurities or inhomogeneities into the system can result in a phenomenon where the normal quadratic dependence of the resistance on the field gives way to a non-saturating linear magnetoresistance (LMR) and an MR in the giant or colossal range. Due to its unique band structure, graphene is the perfect platform for the observation and control of LMR. Here, multilayer epitaxial graphene grown on SiC is shown to display linear magnetoresistance. Raman spectroscopy studies show that the material is quite inhomogeneous with varying thickness and grain size. Observed LMR is quantum in nature even up to room temperature as it is shown to not match the classical models for linear magnetoresistance. This is expected when comparing the results to LMR models. The magnitude of the magnetoresistance reaches as high as 250% above the zero field resistance at 12 T and 4.2K, which opens the door to future giant magnetoresistance graphene devices and sensors.

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