Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Tunable band structure in double gated trilayer graphene MONICA CRACIUN, SAVERIO RUSSO, MICHIHISA YAMAMOTO, Department of Applied Physics, The University of Tokyo, Japan, JEROEN OOSTINGA, ALBERTO MORPURGO, DPMC & GAP, University of Geneva, Switzerland, SEIGO TARUCHA, Department of Applied Physics, The University of Tokyo, Japan — Graphene based materials are promising candidates for nano electronic applications. It is currently unclear which layer thickness is better suited for a given application, as only the properties of monolayers and bilayers have been investigated systematically. For the optimization of future devices, it is important to understand how the electronic properties of graphene based materials evolve from Dirac particles, in monolayer, to massive particles in bulk graphite. We experimentally address this question by investigating trilayer graphene, the thinnest few layer graphene system in which all the parameters determining the band structure of graphite are first found. Contrary to monolayer and bilayer (which are both zero gap semiconductors), we find that trilayer is a semimetal with a finite overlap of conduction and valence bands. We show that the low energy band structure of trilayer graphene can be tuned by a large amount by means of an external perpendicular electric field, achieving 100% change in band overlap a property not known to occur in any other semimetal.

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Date submitted: 25 Nov 2008 Electronic form version 1.4