Abstract Submitted
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Designing the Gauge Potential for Dirac Fermions in Nanoscale Strain-Engineered Graphene[1] JIAQING WANG, C.-C. HSU, MARCUS TEAGUE, M.-H. JAO, N.-C. YEH, Dept. of Physics, Caltech — Non-trivial strain in graphene is known to induce pseudomagnetic fields (B_s) that can significantly affect the properties of Dirac fermions. We have employed nearly strain-free PECVD-grown graphene[1] to induce controllable strain and gauge potentials by placing graphene on substrates with either lithographically prepared nanostructures or synthesized nanocrystals.[2] Here we report the use of Pd tetrahedron nanocrystals (55nm laterally and 45nm in height) for strain-engineering of graphene. The nanocrystals were spin-coated on a Si substrates and then covered by a monolayer of h-BN followed by a monolayer of graphene. Comparison between the Raman 2D band of strained-graphene and that of as-grown graphene confirmed an increase of average strain in the former. Molecular dynamics simulations revealed alternating signs of B_s with three-fold symmetry, and the maximum magnitude of B_s was up to ~2000 T. These results will be compared with scanning tunneling spectroscopic studies for spatially varying B_s and alternating presence and absence of the zero mode at two inequivalent sites of graphene due to local time-reversal symmetry breaking.[3]

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