Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Wave Packets Dynamics in Graphene with Gaussian Bump.[1]
RAMON CARRILLO-BASTOS, Universidad Autonoma de Baja California, MARYSOL OCHOA, Centro de Nanociencias y Nanotecnologia de la UNAM, SAUL ZAVALA, Tecnologico Nacional de Mexico, FRANCISCO MIRELES, Centro de Nanociencias y Nanotecnologia de la UNAM — In monolayer graphene, out-of-plane strain-induced centro-symmetric deformations can be described as a six-folded pseudo-magnetic field in the low energy approximation [1]. It has been shown that such pseudo-magnetic field profiles can cause the formation of bound states [2], valley splitting, valley polarized, and valley filtering [3-5] of great interest in the realm of valleytronics and strain engineering. In this work, we study the dynamics of wave packets in graphene sheets that experiences local out-of-plane strain deformations in the form of Gaussian bumps. The study is carried out within the continuum Dirac Hamiltonian for graphene employing the time splitting spectral method for the time evolution operator. We present numerical results for different initial conditions (angle and energy of incidence) that shows wave packet focusing and beam splitting effects that can be exploited in the implementation of valleytronic devices. [1] Yang et al., J. Appl. Phys. 112, 073710; [2] Carrillo-Bastos et al. Phys. Rev. B 90, 041411R; [3] Settnes, et al., arXiv:1608.04569; [4] Milovanovic and Peeters, arXiv:1610.09916; [5] Carrillo-Bastos et al., Phys. Rev. B 94, 125422.

[1]Work supported by PRODEP , PAPIIT and DGTIC (Projects No. IN111317 and SC15-1-S70)

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Date submitted: 11 Nov 2016 Electronic form version 1.4