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Peng Xie* (xiep14@mails.tsinghua.edu.cn), Zhou Pei-Yuan Center for Applied Mathematics, Tsinghua University, Beijing, 100084, Peoples Rep of China, and **Yi Zhu** (yizhu@tsinghua.edu.cn), Zhou Pei-Yuan Center for Applied Mathematics, Tsinghua University, Beijing, 100084, Peoples Rep of China. *Wave-packet dynamics in a slowly modulated photonic graphene*. Preliminary report.

Mathematical analysis on electromagnetic waves in photonic graphene, a photonic topological material which has a honeycomb structure, is one of the most important current research topics. By modulating the honeycomb structure, numerous topological phenomena have been observed recently. The electromagnetic waves in such a media are generally described by the 2-dimensional wave equation. It has been shown that the corresponding elliptic operator with a honeycomb material weight has Dirac points in its dispersion surfaces. In this article, we study the time evolution of the wave-packets spectrally concentrated at such Dirac points in a modulated honeycomb material weight. We prove that such wave-packet dynamics is governed by the Dirac equations with a varying mass in a large but finite time. Our analysis provides mathematical insights to those topological phenomena in photonic graphene. (Received September 20, 2018)