Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Imaginary geometric phases of quantum trajectories in high-order terahertz sideband generation[1] FAN YANG, REN-BAO LIU, Chinese Univ of Hong Kong — Quantum evolution of particles under strong fields can be described by a small number of quantum trajectories that satisfy the stationary phase condition in the Dirac-Feynmann path integral. The quantum trajectories are the key concept to understand the high-order terahertz siedeband generation (HSG) in semiconductors [1]. Due to the nontrivial "vacuum" states of band materials, the quantum trajectories of optically excited electron-hole pairs in semiconductors can accumulate geometric phases under the driving of an elliptically polarized THz field [2]. We find that the geometric phase of the stationary trajectory is generally complex with both real and imaginary parts. In monolayer MoS2, the imaginary parts of the geometric phase leads to a changing of the polarization ellipticity of the sideband. We further show that the imaginary part originates from the quantum interference of many trajectories with different phases. Thus the observation of the polarization ellipticity of the sideband shall be a good indication of the quantum nature of the stationary trajectory.

[1] B. Zaks, R. B. Liu, and M. S. Sherwin, Nature 483, 580 (2012).
[2] F. Yang and R.-B. Liu, arXiv:1211.3021.

[1]This work is supported by Hong Kong RGC/GRF 401512 and the CUHK Focused Investments Scheme.

Fan Yang
Chinese Univ of Hong Kong

Date submitted: 12 Nov 2013 Electronic form version 1.4