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**Topological effects in an electric-field-driven hexagonal lattice**

WOO-RAM LEE, KWON PARK, Korea Inst for Advanced Study — In this work, using the Floquet theory, we investigate the topological effects in a hexagonal lattice under the influence of in-plane electric field. It is found that the Bloch oscillation of an electron in a hexagonal lattice causes topologically nontrivial energy shift in Wannier-Stark energy ladders, depending on the strength and relative angle of the electric field. Importantly, the energy shift is connected to the Berry curvature effect, which induces Hall current. In the presence of spin-orbit coupling, the competition between the electric field and the spin-orbit coupling is also studied.

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