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Probing of Berry phase by Bloch Oscillation in 2D polariton lattices

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We demonstrate robust Bloch oscillations in two-dimensional polariton lattices formed by a micro-structured planar semiconductor resonator operating in a strong-coupling regime. This self-accelerating dynamic of polaritons allows for understanding of topological effects within respective Bloch bands. In particular, considering an interference between two wave-packets moving in the vicinity of Dirac cones, we developed a method for visualization of Berry curvature and topological invariants, like valley Chern number. Furthermore, we detected an anomalous spatial shift directly associated with the Berry curvature of the photonic band.