

Dirac electrons in a graphene quasicrystal

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Quantum states of quasiparticles in solids are dictated by symmetry. We experimentally demonstrate Dirac electrons in a two-dimensional quasicrystal without translational symmetry. A dodecagonal quasicrystalline order was realized by epitaxial growth of twisted bilayer graphene rotated exactly 30° . The graphene quasicrystal was grown up to a millimeter scale on an SiC (0001) surface while maintaining the single rotation angle over an entire sample and was successfully isolated from a substrate, demonstrating its structural and chemical stability under ambient conditions. Multiple Dirac cones replicated with the 12-fold rotational symmetry were observed in angle-resolved photoemission spectra, which revealed anomalous strong interlayer coupling with quasi-periodicity. Our study provides a way to explore physical properties of relativistic fermions with controllable quasicrystalline orders.