Graphene-Based Josephson-Junction Single-Photon Detector

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Single photon detector is a key enabling technology in quantum information processing, cryotography, deep space communication, and radio astronomy. However, detecting low frequency photons is challenging because of their vanishingly small energy. Here we present a concept to detect a single photon from a wide electromagnetic spectrum by sensing its thermal energy using the superconductor-graphene-superconductor junction. This is possible because the Dirac fermions are in extreme thermal isolation with a minute specific heat that can be exploited for ultra-sensitive calorimetry. Modeling of its performance and the latest experimental progresses in infrared and microwave single photon detection will be discussed.

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