

Abstract Submitted  
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**Observation of short ballistic Josephson effect in vertical graphene junctions** GIL-HO LEE, HU-JONG LEE, POSTECH — The current-phase relation (CPR) of vertical graphene Josephson junctions (vGJJs) was measured using phase-sensitive dc-SQUID interferometry. A vGJJ, realized by vertically sandwiching a monolayer graphene between two Al electrodes, had an atomically short channel with transparent contacts for the highly coherent junction nature. The measured CPR was almost perfectly skewed, which rigorously confirmed the short ballistic character of the vGJJs. The short ballistic character of a Josephson junction has been predicted since 1970's but has never been realized in scalable hybrid systems. The CPR also provided energy spectrum of Andreev levels formed inside the junction, which offered a promising prospect for scalable quantum information devices such as Andreev-level qubits. This vertical-junction scheme is also readily applicable to the other cleavable materials such as three-dimensional topological insulators or transition metal dichalcogenides, opening a new pathway for uncovering exotic coherence phenomena arising in an atomic scale.

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