# Induced superconducting proximity effect in the flatbands of Magic Angle Twisted Bilayer Graphene

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The distinct electronic structure of magic angle twisted bilayer graphene (MATBG), marked by flat bands at specific twist angles, presents a unique platform for investigating the interplay between the Josephson effect and strong correlated states. Here we report on the creation of Josephson junctions (JJs) where the weak link is made of a MATBG sheet that is contacted on the edges by superconducting leads. This geometry, compared to previous works on gate-defined JJs [1-3], enables us to study all the phase diagram of MATBG under an induced superconducting proximity effect. First, we show how the Josephson effect behaves differently in the high dispersive bands as compared to the flat bands. Finally, we will report on a reversible superconducting diode effect, which is only observed in samples near the magic-angle and at certain fillings of the flat band.

## References

[1] Rodan-Legrain, D. *et al.,* Nature Nanotechnology 16, 769–775 (2021).
[2] de Vries, F. K. *et al.*, Nature Nanotechnology 16, 760–763 (2021).
[3] Díez-Mérida, J. et al. Nat. Commun. 14, 2396 (2023).

## Figures

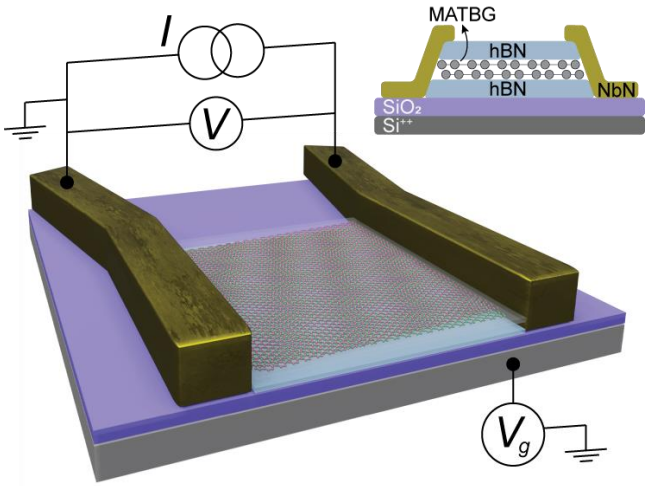


**Figure 1:** Schematic of our experiment, consisting of a MATBG sheet acting as the weak link of a Josephson junction.