

## Half-integer Shapiro steps in highly transmissive InSb nanoflag Josephson junctions

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We study a hybrid semi-super Josephson junction out of a InSb nanoflag with Nb contacts [1].

The high transparency of the superconductor-semiconductor interfaces enables ballistic transport by parallel short and long conduction channels.

Under microwave irradiation, half-integer Shapiro steps appear, as reported for other types of hybrid junctions [2, 3]; yet, our steps are remarkably robust to temperature and rf power, thus suggesting a non-equilibrium origin. The observed phenomenology is only partially captured by the adiabatic approximation in terms of a non-equilibrium current-phase relation.

On the one hand, we expect further theoretical developments to address such strong second harmonic supercurrents in ballistic, highly transparent hybrid junctions; on the other hand, future experiments could employ InSb nanoflag Josephson junctions for coherent manipulation of Andreev states.

### References:

1. Iorio et al., arXiv:2303.05951 (2023)
2. Zhang et al., arXiv:2211.07119 (2022)
3. Ueda et al., Phys. Rev. Res. 2, 033435 (2020)

