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Effect of Microwaves on the Current-Phase-Relation of diffusive SNS Junctions M. FUCHSLE, J. BENTNER, P. TRANITZ, W. WEGSCHEIDER, C. STRUNK[1] — We investigate the current-phase-relation (CPR) of long diffusive superconductor - normal metal - superconductor (SNS) Josephson junctions under microwave irradiation. The samples consist of narrow Ag bridges with a length between 300 and 500 nm inserted into a Nb loop by shadow evaporation on top of a mesoscopic Hall cross. Our Hall-sensors are based on high mobility GaAs/AlGaAs- heterostructures. They directly detect the magnetic response of the loop to an external magnetic field, from which the full CPR can be reconstructed. The measurements are done in the high-temperature regime $E_{Th} < k_B T$, where E_{Th} is the Thouless energy of the junctions and $\hbar\omega \approx E_{Th}$.
We find that the CPR can be strongly affected by microwave radiation. A strong deviation of the CPR from the well-known sinusoidal $I(\Phi)$ relation is observed: depending on the applied frequency and amplitude, the supercurrent can be strongly suppressed for phase differences in the vicinity of $\phi = \pi$. At some frequencies, the $\sin(\Phi)$ term in the CPR can be completely suppressed, resulting in a dominant second harmonic.

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