

## **Dc-SQUID Readout with High Dynamic Range and Intrinsic MHz Frequency-Division Multiplexing Capability**

D. Richter, A. Fleischmann, C. Enss, S. Kempf

Kirchhoff-Institute for Physics, Heidelberg University, Heidelberg, Germany

**Abstract—** We present a novel dc-SQUID readout scheme that provides linearization of the relation between the input and output signal without using a conventional flux-locked loop circuit. It relies on applying a periodic, sawtooth-shaped magnetic flux signal to the modulation coil of the SQUID to continuously measure the flux-to-voltage SQUID characteristic within each period of the flux ramp. In case that the amplitude and repetition rate of the ramp are chosen such that multiple flux quanta are induced in the SQUID and that the input signal is quasistatic within one period of the flux ramp, the input signal adds a constant magnetic flux offset to the SQUID that leads to a phase shift of the SQUID characteristic being proportional to the input signal. We show that this scheme allows for significantly increasing the dynamic range and that it intrinsically allows for MHz frequency-division SQUID multiplexing.

**Keywords (Index Terms) —** SQUIDs, linearization techniques, dynamic range, frequency division multiplexing.

IEEE-CSC & ESAS SUPERCONDUCTIVITY NEWS FORUM (global edition), September 2019.

Selected August 5, 2019. Reference STP642; contributed presentation 4-SQ-C-4 given at ISEC, 28 July-1 August 2019, Riverside, USA.