

## **SQUIDS - From Ideas to Instruments and Applications**

R. Stolz

Dept. of Quantum Detection, Leibniz Institute of Photonic Technology, Jena, Germany

***Abstract***— More than 5 decades after the invention of Superconducting Quantum Interference Devices (SQUIDs), they are still driving research as an enabling technology and lead to emerging applications due to their unique properties. This presentation will not provide an exhaustive review on the background, theory and working principles of SQUID sensors and the Josephson effects, but will review the key facets of SQUID design, fabrication, readout circuitry and operation. In terms of fabrication technology, a short excursion will be provided on the differences between low and high temperature SQUIDs, new developments, and specific aspects in their readout circuitry. There are a variety of SQUID readout electronics which enable use of SQUIDs in a number of applications with demanding properties such as bandwidths of more than 100 MHz, exceptional slew rate and dynamic range without compromises on the usable resolution even at very low frequencies. Some examples will be introduced and discussed in view of specific applications. Of course, there is no review article without fascinating insights into applications of SQUIDs. We will shortly review a number of areas such as non-destructive evaluation, biomagnetic, NMR and geophysical measurements as well as emerging applications in detector physics as high frequency amplifiers and multiplexing circuits.

***Keywords (Index Terms)*** — SQUID devices, SQUID applications, superconducting electronics.

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