



## Walther-Meißner-Seminar

Walther-Meißner-Institute, Seminar Room 143

**Date:** Friday, 26 November 2021, 11:15 h (hybrid seminar)

**Speaker:** Wilhelm Wittl

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**Title:** Investigation of proximity induced superconductivity in Al-based topological Josephson junctions

### Abstract:

On the one hand, the talk reports about an in-situ fabrication process for single BST Josephson junctions with Al electrodes and, on the other hand, about transport measurements regarding Josephson junctions at temperatures in the millikelvin regime. The in-situ process by means of molecular beam epitaxy is a specialty of the Research Center Juelich. It bases on Si-compatible technology, uses a stencil mask technique for selective area growth and takes place fully in a UHV-environment (inclusively the passivation of components prone to oxidation). The direct deposition of Al on top of BST leads to strong interdiffusion at the interface and, hence, suppresses the proximity-induced superconductivity. In consequence, my master's project investigates various interdiffusion barriers between Al and BST to hinder the Al from diffusion into BST. Therefore, the materials Ti, Nb, Pt as well as Pd are inserted in-between, after first TEM images of my colleague Abdur Jalil showed promising results. Under this positive sign, the transport measurements on Josephson junctions with the different interdiffusion layers between Al and BST are highlighted in this talk. The DC measurements show subharmonic structures with multiple Andreev reflections. In addition, RF measurements showing both integer and fractional Shapiro stages are presented. Moreover, characteristic parameters for the Josephson junctions determined from the measurements are presented. First values of the transparency according to the OTBK model are also included.