*TITLE:*

# Quantum sensing in space with superconducting devices


## *ABSTRACT*:

A Josephson junction is a superconducting wire interrupted by a thin insulating layer. Among the different techniques used to fabricate these junctions the most common one is shadow evaporation, which allows to deposit the electrode and grow the insulating layer without breaking the vacuum [1], but limits the design possibilities. Overlap junctions [2], on the other hand, require to break the vacuum between the patterning of the two electrodes, but result in more flexibility in terms of design. We developed a fabrication recipe for Al/AlOx/Al overlap junctions in the FBK cleanroom based on optical lithography and sputtering, which returns μm sized junctions with a reliable and close to industry-compatible process. This process is readily extendable to NbTiN junctions, whose higher critical temperature makes them more resilient to the environment and simpler to operate. We use these junctions as building blocks of quantum devices such as parametric amplifiers, transmon qubits and Josephson arrays, showing performances comparable to shadow evaporated junctions. We discuss the feasibility of using this quantum devices for space-based applications.