

V142a **Next-generation multibeam SIS receiver development in NAOJ: strategy, roadmap, and proof-of-concept**

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Arrayed SIS receivers are unique equipments in millimeter and submillimeter astronomical observation, which allow wide field-of-view (FoV) observation with high spectral resolution and high sensitivity inherently contributed by SIS mixers. Since a broad FoV is the fundamental requirement of various science demands, arrayed receivers are generally recognized to be essential for future development. However, despite the efforts from many instrumental teams in constructing multi-beam receivers by densely packing single-pixel modules, the construction of a large array is highly risky and the pixel count remains small.

This report is concerning the plan and the on-going activities of the multibeam receiver development in NAOJ. We have framed a concept of planar integration of SIS mixer array, which has the basic idea that the metal waveguide components, which are difficultly machined, are replaced by their planar circuit counterparts that are integrated with SIS mixers in the same integrated circuit (IC). As a result, the metal waveguides network for LO distribution is much simplified and can be embedded into the mixer mount. We have been carrying out proof-of-concept studies with prototyping a single-pixel integrated receiver, assuming to be able to readily extend it to many pixels. Our measurement results provide unambiguous evidences that a large-format SIS mixer arrayed receiver can be constructed based on the concept that we proposed. Also, relevant plan will also be presented in order to develop large-format and terahertz-frequency arrays.