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Development of Kinetic Inductance Detectors for a 3 mm camera

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Millimetre-wave astronomical observations have an enormous discovery potential in the study of the earliest stages of the evolution of the universe, clusters of galaxies, high redshift objects, and star formation regions. One of the challenges today is to perform observations with the finest angular resolution, in order to accurately investigate the nature of these astrophysical sources. While for spectroscopic investigations of point-like sources ALMA is the obvious solution, for continuum measurements of diffuse sources large single-dish telescopes (e.g. GBT, TML, IRAM, SRT, etc.) equipped with large-format bolometeric cameras provide a much higher mapping speed.
Kinetic Inductance Detectors represent an interesting option for the detector array, due to their easiness to multiplex and their capability to efficiently tackle with atmospheric issues.
We are developing Aluminum Lumped Element KIDs for the 3 mm atmospheric window (W-band). While interesting performance of KIDs has already been demonstrated for the1 and 2 mm windows, further technological development is needed for their use at longer wavelengths. In this contribution we analyze the main issues of such a R&D (like minimum operation frequency, operation in high background conditions, size of the array etc.) and present the results of optical tests of the first devices. We also discuss their possible application in an imaging differential spectrometer for the Sardinia Radio Telescope, the largest Italian radio astronomy facility.

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