DIPARTIMENTO DI FISICA "GIUSEPPE OCCHIALINI"
WPASM5
5th Workshop on the Physics and Applications of Superconducting Microresonators

Contribution ID: **7** Type: **Oral Contribution**

GroundBIRD - KIDs meet the cosmic inflation

Wednesday, 22 June 2016 10:20 (25 minutes)

The cosmic inflation is a promising scenario to describe the origin of the Big Bang universe. Precise measurements of the cosmic microwave background (CMB) radiation, in particular its polarization patterns larger than one degree-scale, are the best experimental approach to prove it. The GroundBIRD is one of the CMB polarization experiments, we plan to start observation at Canary Island from 2017. To measure such large angular scale patterns, we implement some own features, e.g. high-speed scan modulation and kinetic inductance detectors (KIDs). The high-speed scan modulation mitigates effects of 1/f noise due to instruments, atmospheric fluctuation and so on. The scan speed is roughly two orders of magnitude faster than the speed of conventional telescopes. A patent pending technology, continuous rotation of the telescope along the azimuth with the maintenance of the cold temperature, realizes this scan strategy. Because the scan speed is fast, it is natural to use fast time response detector, KID. We have horn antenna coupled KID arrays in 145 and 220 GHz bands. The signal via each horn is picked up by planar OMT, and it is transmitted to KIDs. A combined simulation using three types of simulators, named hybrid simulation," allows us to optimize millimeter-wave circuits: components from the OMT to the resonator. In the KID fabrication stage, we also performhybrid processing": a combination of an aligner and stepper for exposure of the photo-resist. Single KID-array wafer consists of one feed-line, 110 (224) resonators, and 55 (112) millimeter-wave circuits for 145 GHz (220 GHz) band. Since each resonator has a different design, the aligner is the natural solution to fabricate the feed-line and resonators. On the other hand, the millimeter-wave circuits require finer resolution than specifications of the aligner, and we use the stepper for their fabrication. We will present development status of the detector and other instruments.

Primary author: Prof. TAJIMA, Osamu (KEK)

Presenter: Prof. TAJIMA, Osamu (KEK)

Session Classification: Session 1: MKIDs for optical, infrared, and millimeter wave telescopes - Part 1

Track Classification: MKIDs for optical, infrared, and millimeter wave telescopes