Contribution ID: **52** Type: **5 min talk**

Status of DOSUE-RR Experiment for Dark Photon Dark Matter Search at $m_{\mathrm{DP}} \sim 1$ meV

Monday, 16 September 2024 16:55 (5 minutes)

Dark photon is one of the candidates for cold dark matter, predicted by a part of string theories and high-scale inflation models. Dark photons interact with ordinary photons via tiny kinetic mixing with them. Owing to this interaction, the dark photons convert into millimeter-wave light at the electromagnetic boundaries, such as the surface of a metal plate. The frequency of the conversion photon corresponds to the mass of dark photon because of the energy conservation ($h\nu \simeq mc^2$); for example, a signal at 240 GHz corresponds to the mass of 1 meV. To detect the conversion photon from the dark photon in various frequency bands, we, the DOSUE-RR collaboration, have developed cryogenic millimeter-wave receivers. We have already performed the searches for conversion photons in the frequency range of 10–26.5 GHz. Since there is still an unexplored range up to O(100 GHz), we are focusing on the frequency range of 170–260 GHz as the next target. However, in this frequency range, there is no good low-noise amplifier to detect the tiny signal from the dark photons. To keep low noise, we installed a Superconductor-Insulator-Superconductor (SIS) mixer, which is commonly used in cutting-edge radio telescopes. This device allows us to down-convert the signal frequency from around 200 GHz to ~10 GHz, and to detect the signal with a low noise level of $< O$(100 K). In this presentation, I will discuss the current status including receiver evaluation and future plans of the DOSUE-RR.

Primary author: HANIMURA, Keigo (Kyoto University)

Co-authors: ADACHI, Shunsuke (Kyoto University); TAKEUCHI, Hiroki (Kyoto University); SUZUKI, Junya (Kyoto University); TAJIMA, Osamu (Kyoto University); HONDA, Shunsuke (University of Tsukuba); NAKAJIMA, Tac (Nagoya University); OGAWA, Hideo (Osaka Metropolitan University); HASEGAWA, Yutaka (National Institute of Information and Communications Technology)

Presenter: HANIMURA, Keigo (Kyoto University)

Session Classification: Afternoon