Contribution ID: **30** Type: **not specified**

First Scan Search for Dark Photon Dark Matter with a Tunable Superconducting Radio-Frequency Cavity

Tuesday, 20 August 2024 10:00 (30 minutes)

Dark photons have emerged as promising candidates for dark matter, and their search is a top priority in particle physics, astrophysics, and cosmology. We report the first use of a tunable niobium superconducting radio-frequency cavity for a scan search of dark photon dark matter with innovative data analysis techniques. We mechanically adjusted the resonant frequency of a cavity submerged in liquid helium at a temperature of 2 K, and scanned the dark photon mass over a frequency range of 1.37 MHz centered at 1.3 GHz. Our study leveraged the superconducting radio-frequency cavity' s remarkably high quality factors of approximately 1010, resulting in the most stringent constraints to date on a substantial portion of the exclusion parameter space on the kinetic mixing coefficient ϵ between dark photons and electromagnetic photons, yielding a value of $\epsilon < 2.2 \times 10{-}16$

.

Primary author: Prof. SHU, JING (PKU)

Presenter: Prof. SHU, JING (PKU)

Session Classification: Plenary talks (1)