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First results from a cavity haloscope experiment with a novel frequency tuning system using a qubit

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We propose and experimentally demonstrate a novel method for cavity frequency tuning in cavity haloscope experiments by coupling with a superconducting qubit. Compared to the existing tuning-rod approach, this alternative method addresses a few advantages: (a) easy implementation, (b) reduction of electromagnetic wave leakage, and (c) fast scanning because there is no thermal noise derived from the friction while tuning. In this presentation, I will summarize our detection setup, data analysis method, and the first results of our search for the dark photon around 36.1 μeV.

Primary authors: NAKAZONO, Kan (The University of Tokyo); WATANABE, Karin (Tokyo University); TERASHI, Koji (Tokyo University); SAWADA, Ryu (University of Tokyo, Project assistant professor); CHEN, Shion; NITTA, Tatsumi (The University of Tokyo); INADA, Toshiaki (Tokyo University)

Presenter: NAKAZONO, Kan (The University of Tokyo)

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