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(I) Recent progresses of the LAMPOST Experiment

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Uncovering the nature of dark matter is one of the most important goals of particle physics. Light bosonic particles, such as the dark photon, are well-motivated candidates: they are generally long lived, weakly-interacting, and naturally produced in the early universe. LAMPOST (Light A' Multilayer Periodic Optical SNSPD Target) experiment searches for dark photon dark matter in the eV mass range, via coherent conversion of dark photon to photon in a multilayer dielectric haloscope, which are subsequently collected with superconducting nanowire single-photon detector (SNSPD).

In this talk, I will report on the recent progress of the LAMPOST experiment. In a prototype experiment, we achieve efficient photon detection with a dark count rate (DCR) of $\sim 6 \times 10^{-6}$ counts/s. We find no evidence for dark photon dark matter in the mass range of ~ 0.7 - 0.8 eV with kinetic mixing $\epsilon \geq 10^{-12}$, improving existing limits in the mass range. I will also show some recent progress in experimental design and performances of SNSPDs, and how these could allow us to probe significant new parameter space for dark photon and axion dark matter in the meV to 10 eV mass range.

Keyword-1

dark matter

Keyword-2

Single photon detector

Keyword-3

dark photon

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