Contribution ID: **92**   Type: **Poster**

Dark matter Axion search with riNg Cavity Experiment DANCE: Latest optical system and sensitivity

Tuesday, 23 May 2023 18:46 (1 minute)

Researches on cosmology and astrophysics have revealed that more than 80% of the matter in the universe consists of an unknown substance, or dark matter. The nature of dark matter is still unknown and many searches have been conducted for various dark matter candidates. Axion-like particles (ALPs) are undiscovered particles that are well-motivated candidates for ultralight dark matter. The interaction between ALPs and photons slightly causes the rotational oscillation of linearly polarized light, and therefore ALP dark matter can be detected by the measurement of the polarization rotation of a laser beam.

Recently, some ALP dark matter search experiments using the laser interferometer have been proposed. The basic idea is to use an optical cavity, which can enhance the effective light path and also the duration of the interaction with the ALP dark matter. With this technique, the polarization rotation can be amplified and high-sensitive ALP dark matter search can be conducted.

In this workshop, I will introduce our interferometric ALP dark matter search experiment: DANCE and will report its latest sensitivity.

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Session Classification: Tuesday Poster session

Track Classification: Other