Contribution ID: **54** Type: **not specified**

Searching for ultralight dark matter using radio telescopes

Tuesday 9 May 2023 16:30 (15 minutes)

Ultralight axions and dark photons are compelling candidates for dark matter. In this talk, I will provide an overview of my recent work (arXiv:2207.05767, 2301.03622) on detecting radio-frequency axions and dark photons using radio telescopes. The detectability relies on two distinct underlying mechanisms. One mechanism involves local dark photon dark matter inducing harmonic oscillations of electrons within the antenna of radio telescopes. This process results in a local radio electromagnetic (EM) signal that can be captured by telescope receivers. The other mechanism is the resonant conversion of dark photons into EM waves in the solar corona when their mass matches the solar plasma frequency. This mechanism is also applicable to axions due to the presence of the solar magnetic field. The resulting radio EM waves can be detected by radio telescopes designed for solar observations, although the detectability for axions is suppressed due to the relatively weak solar magnetic field. By analyzing data from radio telescopes such as FAST and LOFAR, we have obtained constraints on the kinetic mixing constant between dark photons and photons, surpassing existing bounds in multiple radio-frequency ranges.

Author: GE, Shuailiang (Peking University)

Presenter: GE, Shuailiang (Peking University)

Session Classification: DM III

Track Classification: Dark Matter