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Flavor Physics at CEPC - A General Perspective

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Pulsar timing arrays (PTAs) consisting of widely distributed and well-timed millisecond pulsars can serve as a galactic interferometer to detect gravitational waves. With the same data acquired for PTAs, we propose (https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.130.121401) to develop pulsar polarization arrays (PPAs), to explore astrophysics and fundamental physics. As in the case of PTAs, PPAs are best suited to reveal temporal and spatial correlations at large scales that are hard to mimic by local noises.

As one scientific case for the PPAs, we consider the detection of axion-like wave dark matter (WDM). Because of its tiny mass, the axion-like WDM can be generated as a Bose-Einstein condensate, characterized by a strong wave nature. It can also affect the polarization of pulsar light via its Chern-Simons coupling, yielding an effect of "birefringence", while the light travels across the halo. In this talk, the speaker will demonstrate the excellent capability of PPAs; and their complementarity with the PTAs in such a scientifically important task.

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