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Hunting Axion Dark Matter with New Techniques

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Identification of dark matter has been an outstanding problem in physics for decades, and axion (or axion like partciles) is its candidate with great motivations. A number of observations and experiments have tried to detect axion by using the axion-photon conversion by assuming the axion is coupled to photon, while no signal yet to be found. In this talk, I will discuss new techniques to search for axion dark matter (ADM) by focusing on another phenomena, birefringence, which is caused by the same coupling. The polarimetry observation of protoplanetary disks puts the best constraint on ADM for fuzzy dark matter mass (m = 10ˆ{-22}eV). I also propose to use gravitational wave interferometer like LIGO for ADM search by installing a new detector which does not affect the detection of gravitational waves.

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