15th Patras Workshop on Axions, WIMPs and WISPs

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## Axion-like Dark Matter Constraints from Cosmic Birefringence

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Axion-like particles (ALPs) are leading dark matter candidates originally motivated by the strong CP problem and also arise in theories of string compactifications. I will present a sensitive probe for ALPs or ultra-light dark matter - the birefringence in the cosmic microwave background (CMB). Birefringence arises from the oscillating ALPs' effective refractive index and is also relevant for laboratory axion searches. Constraints on the axion-photon coupling derived from birefringence of CMB polarization lead to orders of magnitude improvement over prior constraints, with further prospects for upcoming cosmological birefringence observations. These limits, in hitherto unconstrained regions of the coupling vs. ALP mass parameter-space, are independent of assumed magnetic fields and relatively robust to ALP dark matter fraction.

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