

Whispers from the Dark Universe - Particles & Fields in the Gravitational Wave Era

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WHISPERS FROM THE DARK UNIVERSE – PARTICLES & FIELDS IN THE GRAVITATIONAL WAVE ERA

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Searching for Ultralight ALPs using JVLA and VLBA Observations

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Axionlike particles (ALPs) are promising candidates for dark matter. A tiny interaction between photons and ALPs gives rise to achromatic birefringence. The birefringence angle oscillates with a time period determined by ALP mass. We exploit this property of ALPs to find stringent constraints on its coupling constant as well as mass by means of radio polarimetric observations of strong gravitationally lensed quasars.

The differential polarization angle measured between the images of strong gravitationally lensed quasars is expected to exhibit a clean ALP-induced birefringence signal which is free of observational and astrophysical systematics. This allows us to probe ALPs at sensitivity comparable to, or better than, lab experiments. We demonstrate this new technique with the help of existing observations. We also report about the ongoing analysis of ~100 hours of dedicated multi-epoch spectropolarimetric observations of 5 gravitational lens systems using the JVLA and the VLBA.

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