## TeV Particle Astrophysics 2017 (TeVPA 2017)



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## CMB Polarization B-mode Delensing with SPTpol and Herschel

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Inflation generically predicts a background of primordial gravitational waves, which generate a primordial B-mode component in the polarization of the cosmic microwave background (CMB). The measurement of such a B-mode signature would lend significant support to the paradigm of inflation and be important for development of quantum gravity theories. Observed B modes also contain a component from the gravitational lensing of primordial E modes, which can obscure the measurement of the primordial B modes. If the amplitude of primordial B modes is sufficiently small, the lensing component will need to be cleaned using a process called 'delensing.'Delensing has been studied theoretically and with simulations but has not been demonstrated with data until recently. I will present delensing of a measurement of the CMB B-mode power spectrum from SPTpol using data from Herschel as a tracer of the lensing potential. The measured B-mode power is reduced by 28 percent on sub-degree scales, in agreement with predictions from simulations, and the null hypothesis of no delensing is ruled out at 6.9 sigma. Furthermore, we develop and use a suite of realistic simulations to investigate and validate the delensing process. This work represents a crucial step on the road to detecting primordial gravitational waves.

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