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Cosmology with the largest cosmic structures: new ISW and lensing results from the Dark Energy Survey and the eBOSS quasar data set

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Dark energy leaves a weak yet characteristic integrated Sachs-Wolfe (ISW) imprint in the cosmic microwave background on the largest scales. Formally, these additional hot and cold spots serve as a consistency test for the standard model that has a definite prediction for the ISW signal relying on precise constraints from other probes. An interesting aspect is that stronger-than-expected imprints aligned with superclusters and supervoids have been observed from the SDSS/BOSS and the DES Year-3 data sets at 0.2<z<0.9, which are hard to explain in the LCDM model and its typical alternatives. Here I present the first detection of additional high-z ISW anomalies from hundreds of supervoids in the eBOSS DR16 quasar catalog which yet again provides corroborating evidence against the LCDM model's ISW expectation. I will also describe our efforts to use the Planck CMB lensing map to study the origin of these puzzling signals from super-structures, and how the problem of the CMB Cold Spot and its new mapping by the Dark Energy Survey's state-of-the-art dark matter mass maps is related to the ISW anomalies. Taken the recalcitrant evidence at face value, I outline how the low-z and high-z ISW anomalies are related to the H0 and S8 tensions.

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