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Interacting dark energy in light of CMB, lensing, and BAO data

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This presentation will introduce the research [1] in which we employed the Planck CMB temperature anisotropy and lensing data, and baryon acoustic oscillation (BAO) data to constrain a phenomenological wCDM model, where dark matter and dark energy interact. We assumed time-dependent equation of state parameter for dark energy, and treated dark matter and dark energy as fluids whose energy-exchange rate is proportional to the dark-matter density. The CMB data alone leave a strong degeneracy between the interaction rate and the physical CDM density parameter today, ω_c, allowing a large interaction rate $|\Gamma| \sim H_0$. However, the BAO data break this degeneracy. As a novelty we exploit the CMB lensing potential likelihood, which probes the matter perturbations at redshift $z \sim 2$ and is very sensitive to the growth of structure, and hence one of the tools for discerning between the ΛCDM model and its alternatives. In models with $w < -1$ the CMB and BAO data favour energy transfer from dark energy to dark matter at the rate of about 35\% of today's Hubble rate while the non-interacting model is 3σ "disfavoured" by these data. Adding the CMB lensing data to the constraint budget, restores the non-interacting model to or near to the border of the 68\% CL region.

References

[1] J.Valiviita, E. Palmgren. arXiv:1504.02464. Accepted for publication in JCAP (2015).

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