

# Dhawan: "Narrowing down the possible explanations of cosmic acceleration with geometric probes"

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Recent re-calibration of the Type Ia supernova (SNe-Ia) magnitude-redshift relation combined with cosmic microwave background (CMB) and baryon acoustic oscillation (BAO) data have provided excellent constraints on the standard cosmological model. Here, we examine particular classes of alternative cosmologies, motivated by various physical mechanisms, e.g. scalar fields, modified gravity and phase transitions to test their consistency with observations of SNe-Ia and the ratio of the angular diameter distances from the CMB and BAO. Using a model selection criterion for a relative comparison of the models (the Bayes Factor), we find moderate to strong evidence that the data prefer flat  $\Lambda$  CDM over models invoking a thawing behaviour of the quintessence scalar field. However, some exotic models like the growing neutrino mass cosmology and vacuum metamorphosis still present acceptable evidence values. The bimetric gravity model with only the linear interaction term can be ruled out by the combination of SNe-Ia and CMB/BAO datasets whereas the model with linear and quadratic interaction terms has a comparable evidence value to standard  $\Lambda$  CDM. Thawing models are found to have significantly poorer evidence compared to flat  $\Lambda$  CDM cosmology under the assumption that the CMB compressed likelihood provides an adequate description for these non-standard cosmologies. We also present estimates for constraints from future data and find that geometric probes from oncoming surveys can put severe limits on non-standard cosmological models.