Power law cosmology model comparison with CMB scale information

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Models

$\Lambda\mathrm{CDM}$ $\quad \dfrac{H^2(z)}{H_0^2} = \Omega_r(1+z)^4 + \Omega_m(1+z)^3 + (1-\Omega_r-\Omega_m)$

Power law $\quad H(z) = H_0(1+z)^{1/n}$

$R_h = ct \quad H(z) = H_0(1+z)$

Method

Minimization of the χ^2 plus model comparison criteria (AIC and BIC).

Data

SNIa: JLA [Betoule *et al.* (2014)]

BAO: Characterized by the length of a standard ruler:

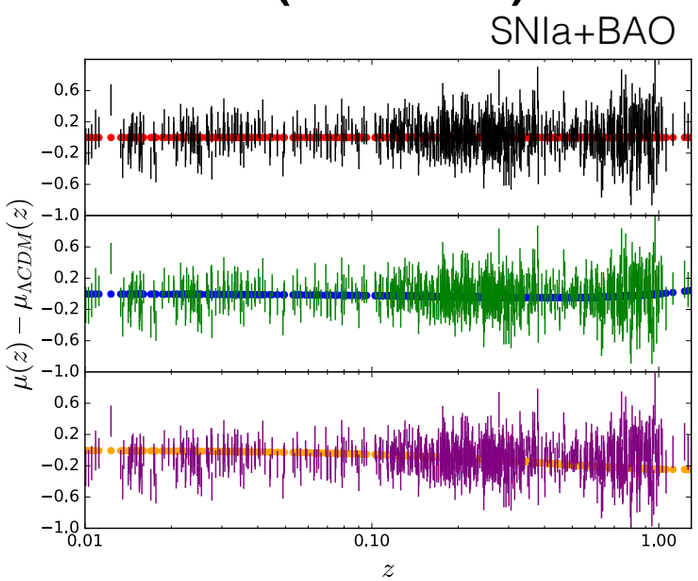
$$r_d(z_d) = \int_{z_d}^{\infty} \frac{c_s(z)\,\mathrm{d}z}{H(z)}$$

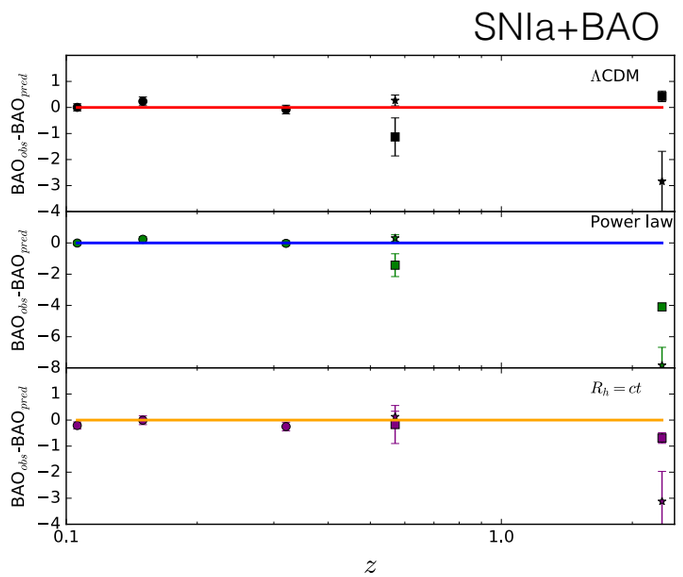
fitted from the data.

CMB ℓ_a : We assume that the correspondance between r_d and r_s is governed by the same physics as in the $\Lambda\mathrm{CDM}$ case (same baryon-photon plasma):

$$r_s(z_*) = \int_{z_*}^{\infty} \frac{c_s(z)\,\mathrm{d}z}{H(z)} = r_d - \int_{z_d}^{z_*} \frac{c_s(z)\,\mathrm{d}z}{H(z)}$$

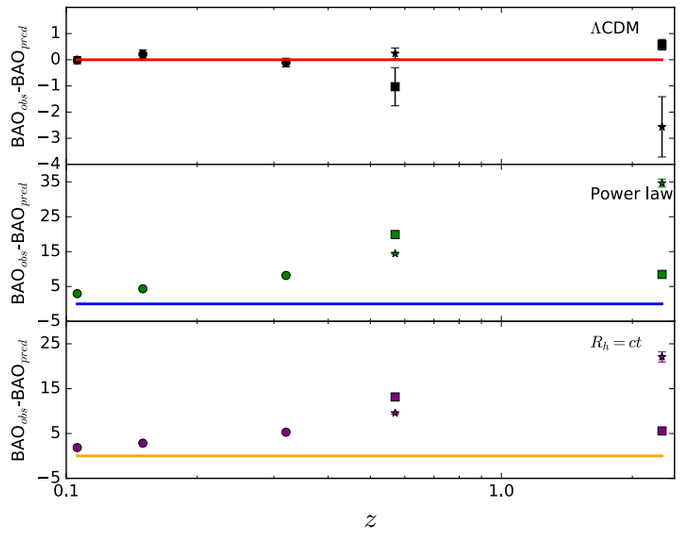
Results (residuals)





Conclusions

- With low-redshift data, power law and $R_h = ct$ cosmologies are disfavored with respect to $\Lambda\mathrm{CDM}$, but not completely excluded.
- Introduction of CMB scale information shows the tension between the BAO and the CMB scale in power law and $R_h = ct$ cosmologies.
- $\Lambda\mathrm{CDM}$ is statistically very strongly preferred over these models.



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