

Figure 1: Residuals from flat  $\Lambda$ CDM. Open circles are  $2.5\sigma$  deviates.

## Limits on Luminosity Evolution of the Standard Candle

An assumption which is rarely questioned in supernova cosmology is the constancy of the SNIa maximum light luminosity. However, if the parameters of a flat  $\Lambda$ CDM cosmology are assumed as a prior, our Hubble diagram of 1800 SNe from redshift 0 to 1.1 can be used to put an upper limit of  $|dM/d \log z|$ . To proceed with this we chose to assume the Planck  $\Lambda$ CDM cosmology and subtracted its luminosity distance moduli from the Hubble diagram data. We then did a linear regression on the m-M residuals versus  $\log z$  weighted by the magnitude errors. The code used was that of Akritas & Bershady (1996) . The result was  $|dM/d \log z| < 0.014 \pm 0.009 \text{ mag/dex}$ . This means that monotonic variation of the SNIa standardized maximum luminosity has been less than 3% in the last 8 Gyr at a 2–3 $\sigma$  confidence level.

## References

The Dark Energy Survey: Cosmology Results With 1500 New High-redshift Type Ia Supernovae Using The Full 5-year Dataset DES Collaboration; Abbott, T. M. C.; Acevedo, M. and 156 more 2024, arXiv 240102929 Alwitza & Barabady 1006 Ap I 470 706

Akritas & Bershady 1996, ApJ 470, 706