COSMIC PARAMETERS & COSMIC ACCELERATION

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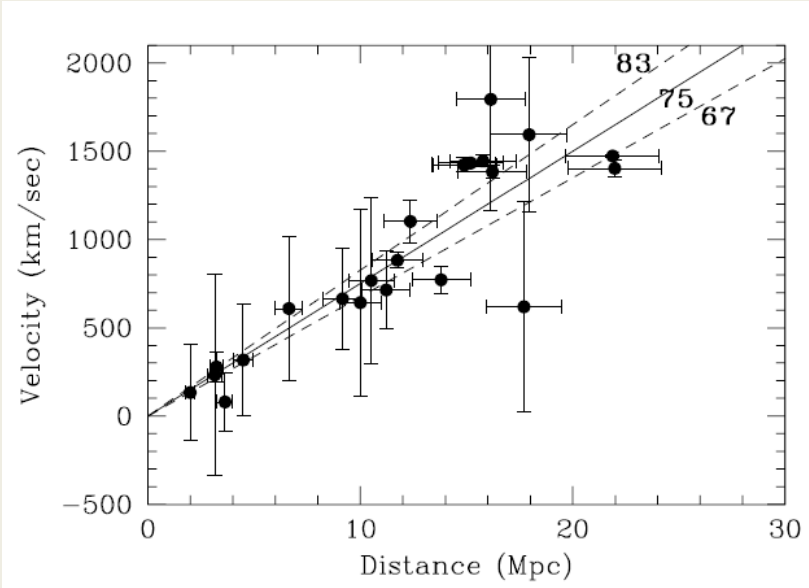
Outline

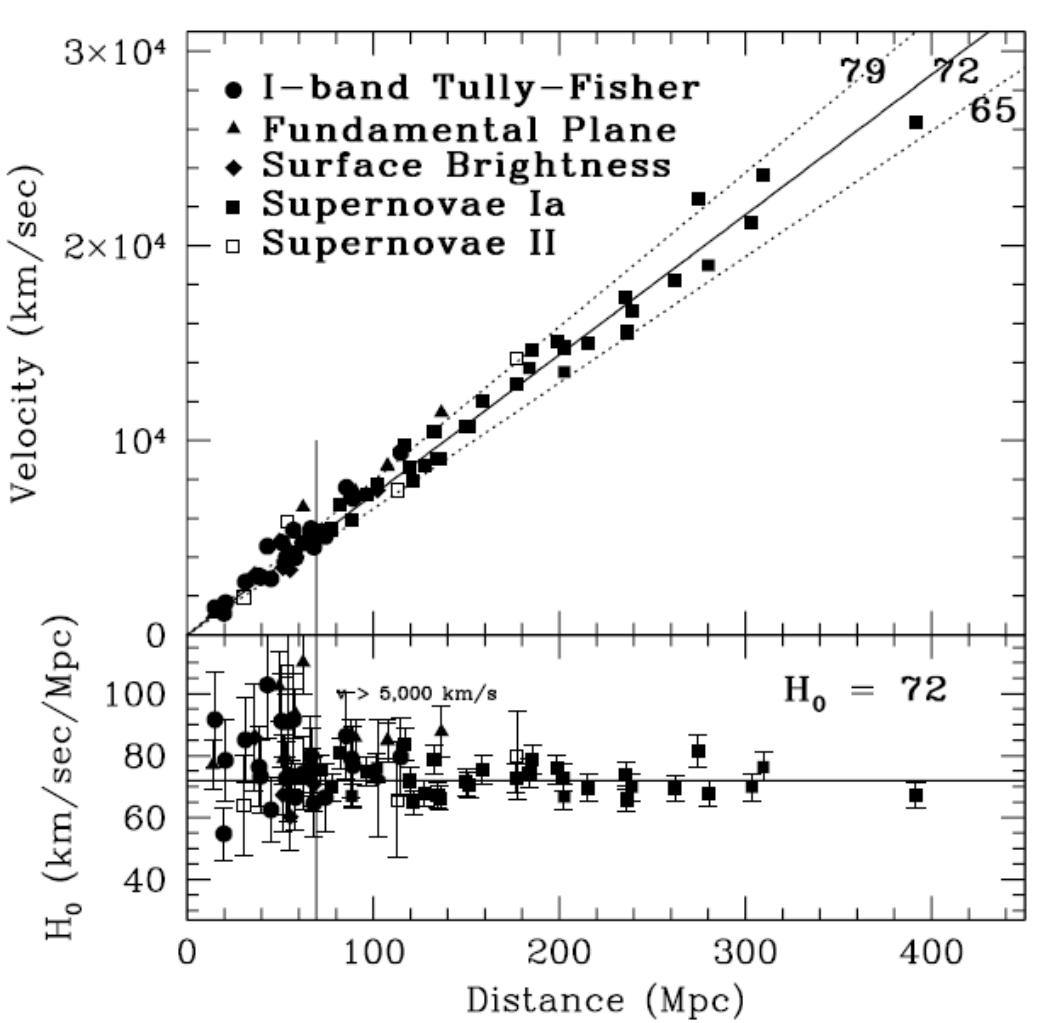
- Hubble's law & Hubble constant
- Measuring Ω_M and Ω_Λ
- The expansion history of the universe

V= HD



Freedman et al. 2001, ApJ

$$H_0 = 72 \pm 8\ km\ s^{-1} Mpc^{-1}$$



Measuring Ω_M andΩ_Λ

- Liminosity distance - redshift relation

$$d_l = cH_0^{-1}(1+z)|\Omega_k|^{-1/2} sinn\left\{|\Omega|_k{}^{1/2} \int_0^z dz'[(1+z')^2(1+z'\Omega_M) - z'(2+z')\Omega_\Lambda]^{-1/2}\right\}$$

$$\Omega_k = 1 - \Omega_M - \Omega_\Lambda \quad \Omega_k > 0, sinn(x) = \sinh(x), \Omega_k = 0, \sin(x) = x, \Omega_k < 0, \sin(x) = \sin(x)$$

$$D_l = H_0 d_l = D_l(z, \Omega_M, \Omega_\Lambda)$$

$$z = \frac{\Delta\lambda}{\lambda}$$

$$m = M + 5\log D_l(z, \Omega_M, \Omega_\Lambda) - 5log\, H_0 + 25$$

$$= \mathcal{M} + 5logDl$$

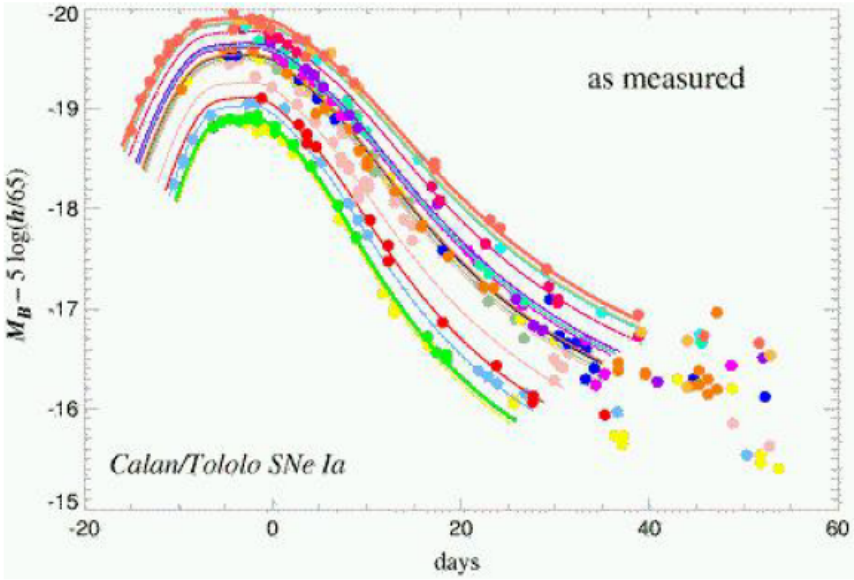
$$m = (M + Corr) + 5\log D_l(z, \Omega_M, \Omega_\Lambda) - 5log\ H_0 + 25$$

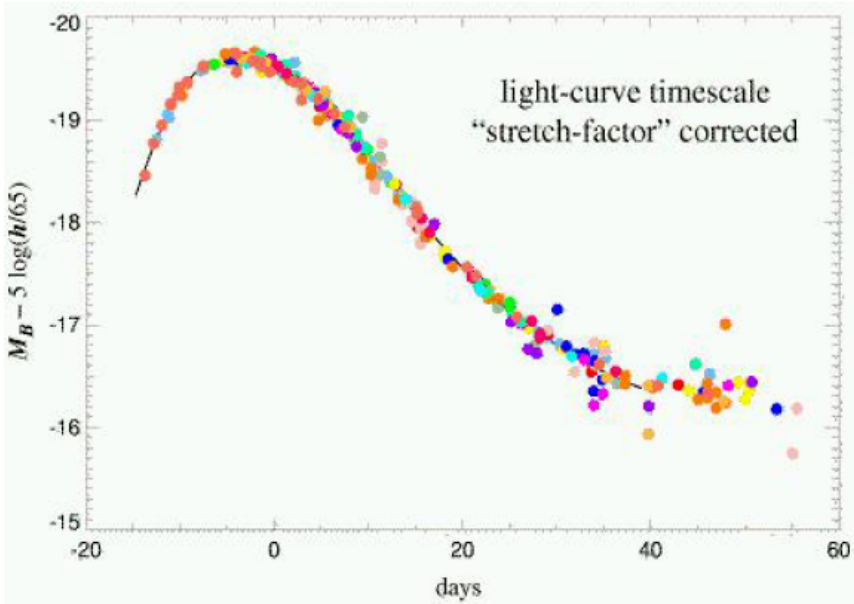
$$= \mathcal{M} + 5logD$$

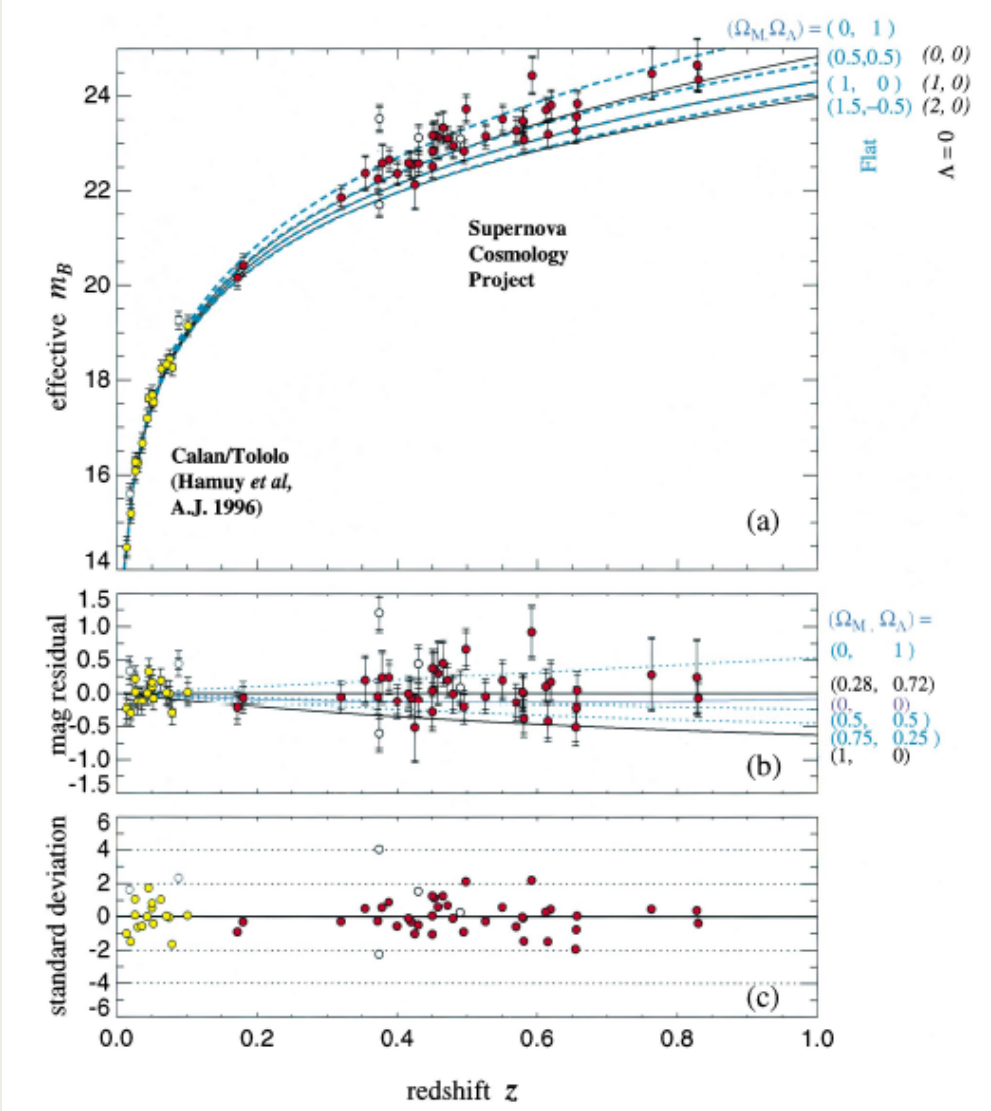
$$m_B^{eff} = m_R + Corr - K_{BR} - A_R$$

Galactic extinction

K-correction
Tranform the R band magnitude to the B band magnitude

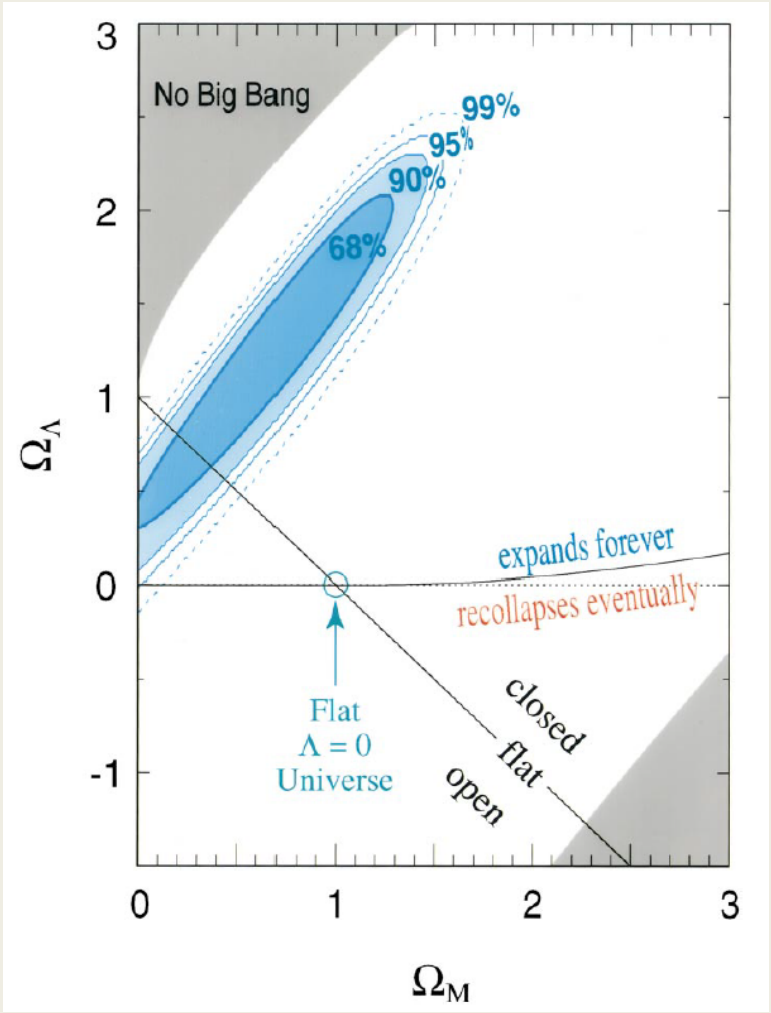


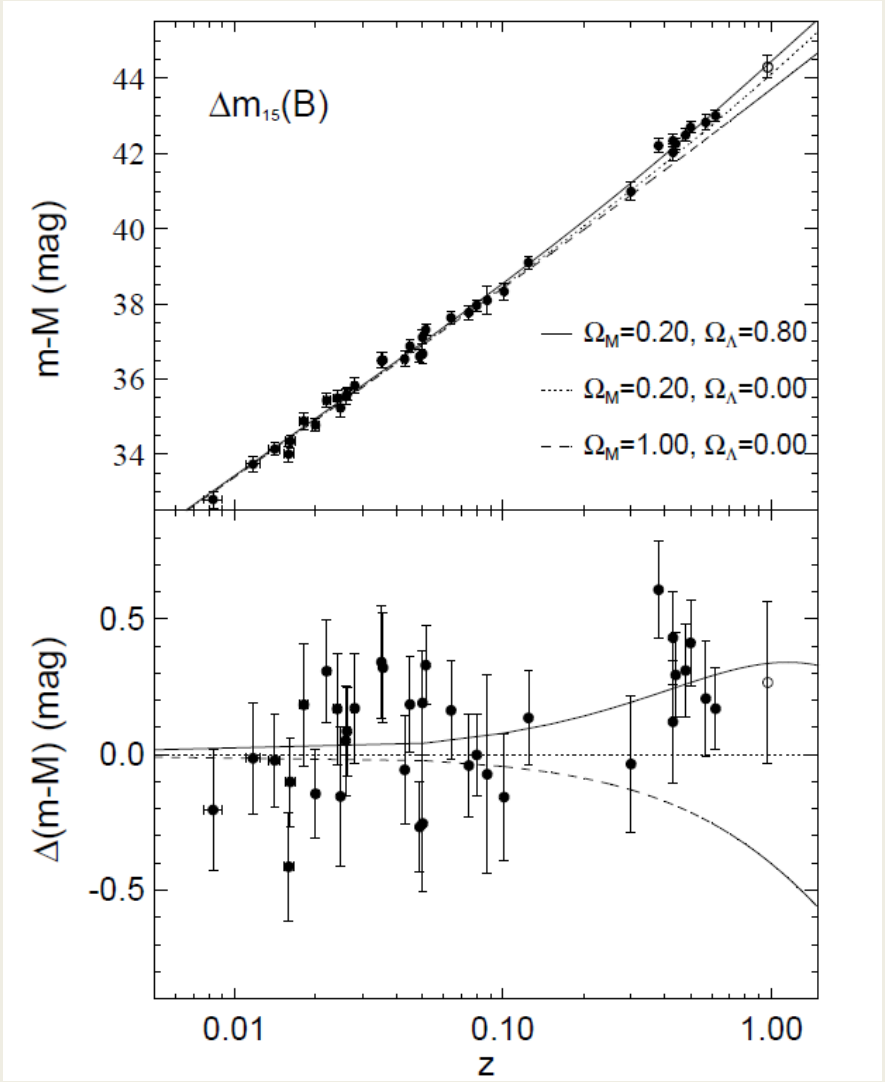




Perlmutter et al. 1999, ApJ

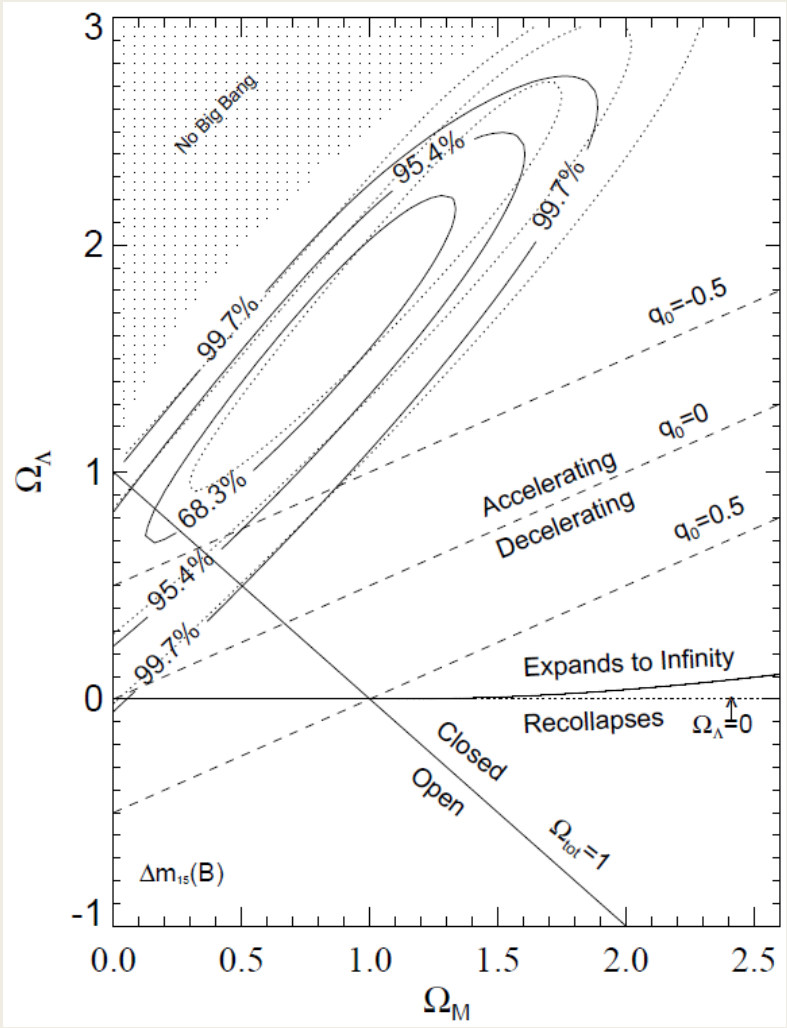
Supernova Cosmology Project
42 high redshift 0.18-0.83
18low redshift <0.1

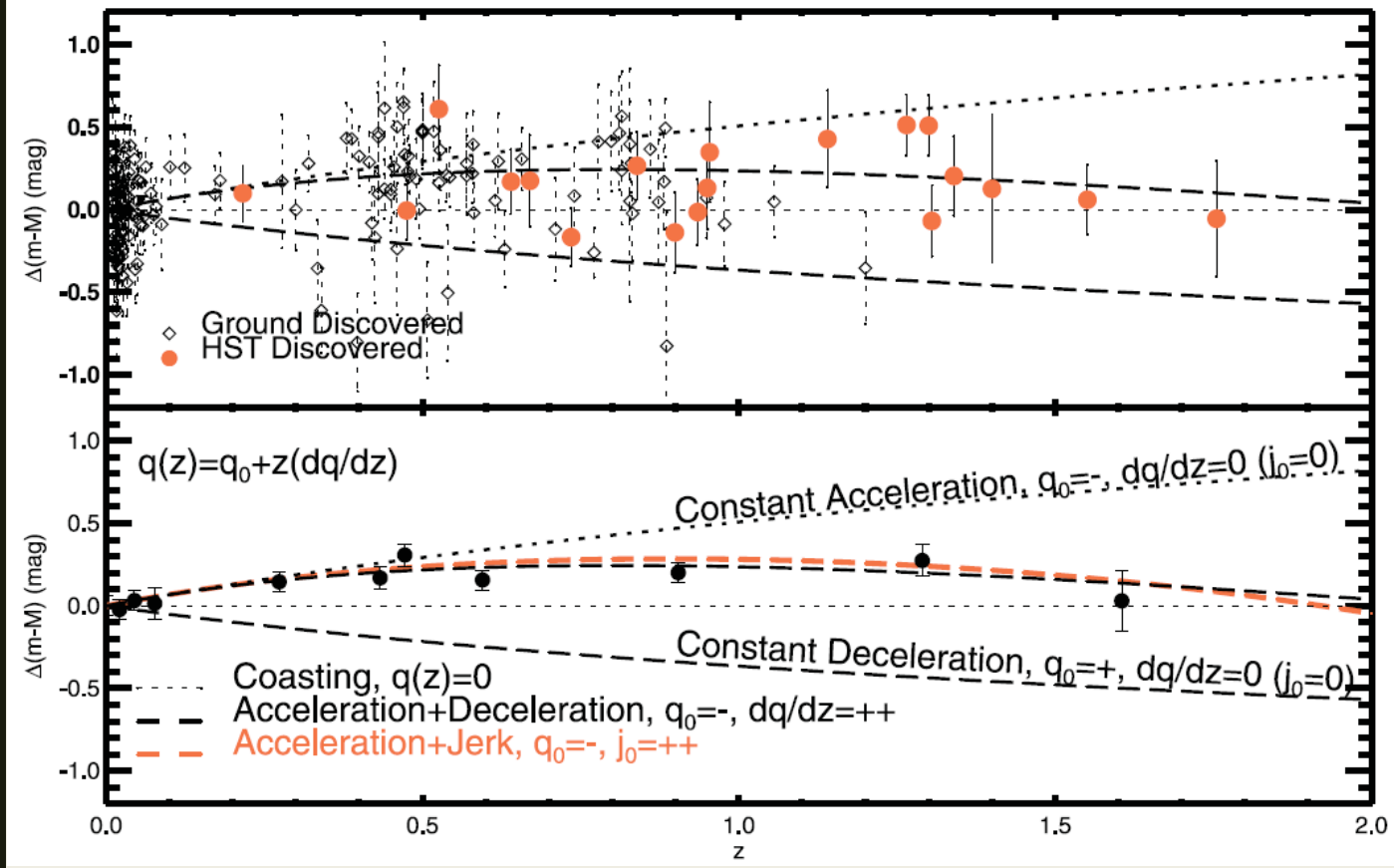




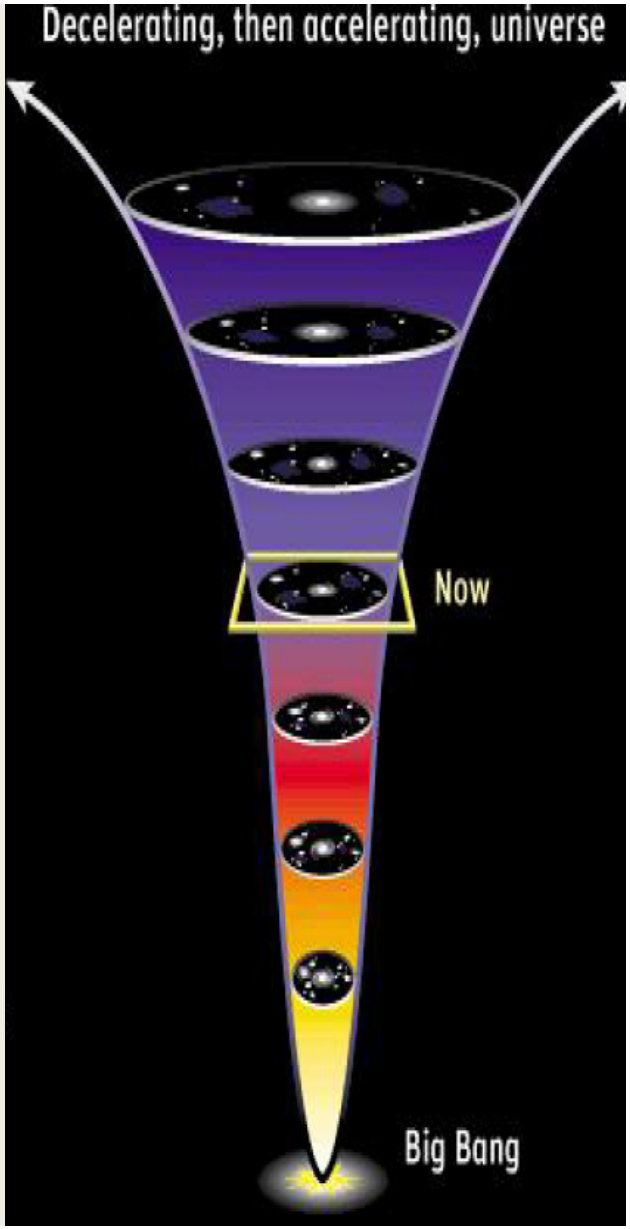
Reiss et al. 1998, ApJ

High-z Supernova Search Team
16 high redshift 34 low redshift





Riess et al. 2004, ApJ



Conclusion

- the value of Hubble constant
- The confidence region of Ω_M and Ω_Λ
- The expansion history of the universe

Thank You