Homogeneous

(averaged over $(100\,\mathrm{Mpc})^3$)

$\downarrow$

$(\mathrm{Gpc})^3$?

→ cosmological principle (?)

Occam's razor

Isotropic (averaged over $100\,\mathrm{Mpc}$ and large enough Ω

$$z = \sqrt{\frac{1+v_{\parallel}/c}{1-v_{\parallel}/c}} - 1$$

$$= \frac{\lambda_{obs}}{\lambda_{emit}} - 1$$

$$\approx \frac{v_{\parallel}}{c}$$

$$\frac{68\ \mathrm{km/s}}{73\ (2017)\ \pm 1.8\ \mathrm{km/s}/\mathrm{Mpc}} = H_0$$

Hubble "constant", $H(t)$, $H_0 = H(t=\text{today})$

$$\simeq 2\cdot 10^{-18}/\mathrm{s}$$

$$3.1\cdot 10^{19}\ \mathrm{km} \simeq 6.8\cdot 10^{-11}/\mathrm{yr}$$

$$\rightarrow \frac{1}{14.4\,\mathrm{Byr}}$$

Scale : $a(t)$

$$z \sim \frac{a(t_{today})}{a(t_{emit})} - 1$$

Temp(Universe) today

2.7 K

Planck radiation

→ CMB

$$\frac{T(t)}{K} = \frac{2.9\ \mathrm{mm}}{\lambda^{max}_{CMB}}$$

initial T (400 000 yrs ABB)

$\sim 3000\ K$

total energy density $\sim \sigma T^4$

$T \sim \frac{1}{z}$