

### Calculation of the Hubble Constant

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Temperature of the background radiation:

$$T = 2.725K$$

Energy:

$$E = k_B T = hf \quad \Leftrightarrow \quad f = 5.6753 \times 10^{10} \text{ Hz}$$

$k_B = \text{Boltzmann..constan } t$  ;  $h = \text{Planck constant}$ ;  $f = \text{frequency}$

Acceleration of the universe:

$$g_U = \frac{Sf^3}{c} = 1.1668 \times 10^{-10} ; \quad S = 1.9 \times 10^{-34} m^2$$

Two formulas of the universe:

$$g_U = \frac{GM_U}{R_U^2} ; \quad c^2 = \frac{GM_U}{R_U}$$

$G = \text{gravitational constant}$ ;  $M_U = \text{mass..of..the..universe}$  ;

$R_U = \text{radius..of..the..universe}$  ;  $c = \text{light..speed}$

$$R_U = \frac{c^2}{g_U} = 7.703 \times 10^{26} m$$

$$M_U = \frac{g_U R_U^2}{G} = 1.038 \times 10^{54} kg$$

Hubble constant:

$$H_0 = \frac{c}{R_U} = 3.9 \times 10^{-19} \text{ Hz}$$

