Captains' fight

Captains' fight n°1 : Question

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You have **3 minutes** to answer the following question :

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If the expansion of universe would take place in the solar system, how many years would be necessary for the Earth-Sun distance to be multiplied by a factor two ? The value of the Hubble constant is $H \simeq 70\ km/s/Mps$.

Captains' fight n°1 : Answer

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Denoting d_{T-S} the Earth-Sun distance, a parsec gives

$$ps = d_{T-S} \times \frac{360 \cdot 60 \cdot 60}{2\pi}.$$

The relative speed of the two objects is then

$$v_{\text{separation}} \simeq H \cdot d_{T-S} \simeq 70 \cdot \frac{2\pi}{10^6 \cdot 360 \cdot 60 \cdot 60} \; km/s.$$

For the distance to grow of $d_{T-S} = 150 \cdot 10^6 km$, it gives

$$T_{\text{separation}} \simeq d_{T-S}/v \simeq \frac{150 \cdot 10^6 \cdot 10^6 \cdot 360 \cdot 60 \cdot 60}{70 \cdot 2\pi \cdot \underbrace{365 \cdot 24 \cdot 60 \cdot 60}_{1 \text{ year}}} \; years,$$

giving finally $\boxed{T_{\text{separation}} \simeq 10^{10} \; years}$.

You want more ?

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Really ?

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Quick : 1min

Question : How many orders of magnitude are there between the highest and lowest artificially obtained temperatures ?

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Really ?

Quick : 1min

Question : How many orders of magnitude are there between the highest and lowest artificially obtained temperatures ? **Answer**

- Hottest temperature : quark and gluon plasma at LHC : 5×10^{12} K
- Lowest temperature : adiabatic demagnetization : 5×10^{-10} K
- Thus : $\boxed{\text{22 orders of magnitude}}$.