Answer on Question#55027 - Physics - Astronomy - Astrophysics

If the Milky Way were the size of a nickel (about $l_n = 2$ centimeters).

    a. How big would the Local Group be?
    b. How big would the Local Supercluster be?
    c. How big would the visible Universe be?

Solution:

The size of the Milky Way is $L_{MW} = 10^5 \text{ly}$.

    a. Since the size of the Local Group is $L_{LG} = 10^7 \text{ly}$, then the its new size L_{LG}^N will be

$$L_{LG}^N = \frac{L_{LG}}{L_{MW}} l_n = \frac{10^7 \text{ly}}{10^5 \text{ly}} 2\text{cm} = 200\text{cm} = 2\text{m}$$

    b. Since the size of the Local Supercluster is $L_{LS} = 52 \times 10^7 \text{ly}$, then the its new size L_{LS}^N will be

$$L_{LS}^N = \frac{L_{LS}}{L_{MW}} l_n = \frac{52 \times 10^7 \text{ly}}{10^5 \text{ly}} 2\text{cm} = 104\text{m}$$

    c. Since the size of the visible Universe is $L_U = 91 \times 10^9 \text{ly}$, then the its new size L_U^N will be

$$L_U^N = \frac{L_U}{L_{MW}} l_n = \frac{91 \times 10^9 \text{ly}}{10^5 \text{ly}} 2\text{cm} = 18.2\text{km}$$

Answer:

    a. 2m
    b. 104m
    c. 18.2km