2019 Ph H1 Q9

Section: Our Dynamic Universe

Topic: The Expanding Universe

The redshift of a distant galaxy is $z = 0.014$.

According to Hubble's Law, what is the distance of the galaxy from Earth?

Step-by-step solution:

🟥 **Step 1: Use redshift to find recessional velocity**

$$v = z \cdot c = 0.014 \cdot 3.00 \times 10^8 = 4.2 \times 10^6 \, \text{m/s}$$

🟦 **Step 2: Use Hubble's Law to find distance**

$$v = H_0 d \Rightarrow d = \frac{v}{H_0} = \frac{4.2 \times 10^6}{2.3 \times 10^{-18}} = 1.83 \times 10^{24} \, \text{m}$$

Final Answer:

B

Revision Tips:

- Use $v = zc$ for non-relativistic redshifts

- Then apply Hubble's Law: $v = H_0 d$

- Standard exam value: $H_0 = 2.3 \times 10^{-18} \, \text{s}^{-1}$

- Watch your powers of 10 — distances are **astronomically** large!

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