

How Many Protons Would it Take
To Stretch Across the (Observable) Universe
Like a String of Popbeads?

The radius of the observable universe is 15×10^9 light years (LY), or, since a light year is approximately 10^{16} meters,

$$15 \times 10^9 \text{ LY} \times \frac{10^{16} \text{ m}}{1 \text{ LY}} = 1.5 \times 10^{26} \text{ m}.$$

If there are 10^{26} m per universe radius, and 1.1×10^{-15} m per proton radius, then there must be:

$$\frac{1.5 \times 10^{26} \text{ m}}{1 \text{ universe radius}} \times \frac{1 \text{ proton radius}}{1.1 \times 10^{-15} \text{ m}} \cong \frac{1.36 \times 10^{41} \text{ proton radii}}{\text{universe radius}}.$$

It would take 1.36×10^{41} protons, laid end-to-end like beads on a string (assuming you could overcome their natural tendency to repel each other), to stretch across the observable universe. No wonder the answer to the ultimate question about life, the universe, and everything is 42! (Well, almost. What's a power of 10 between friends?)