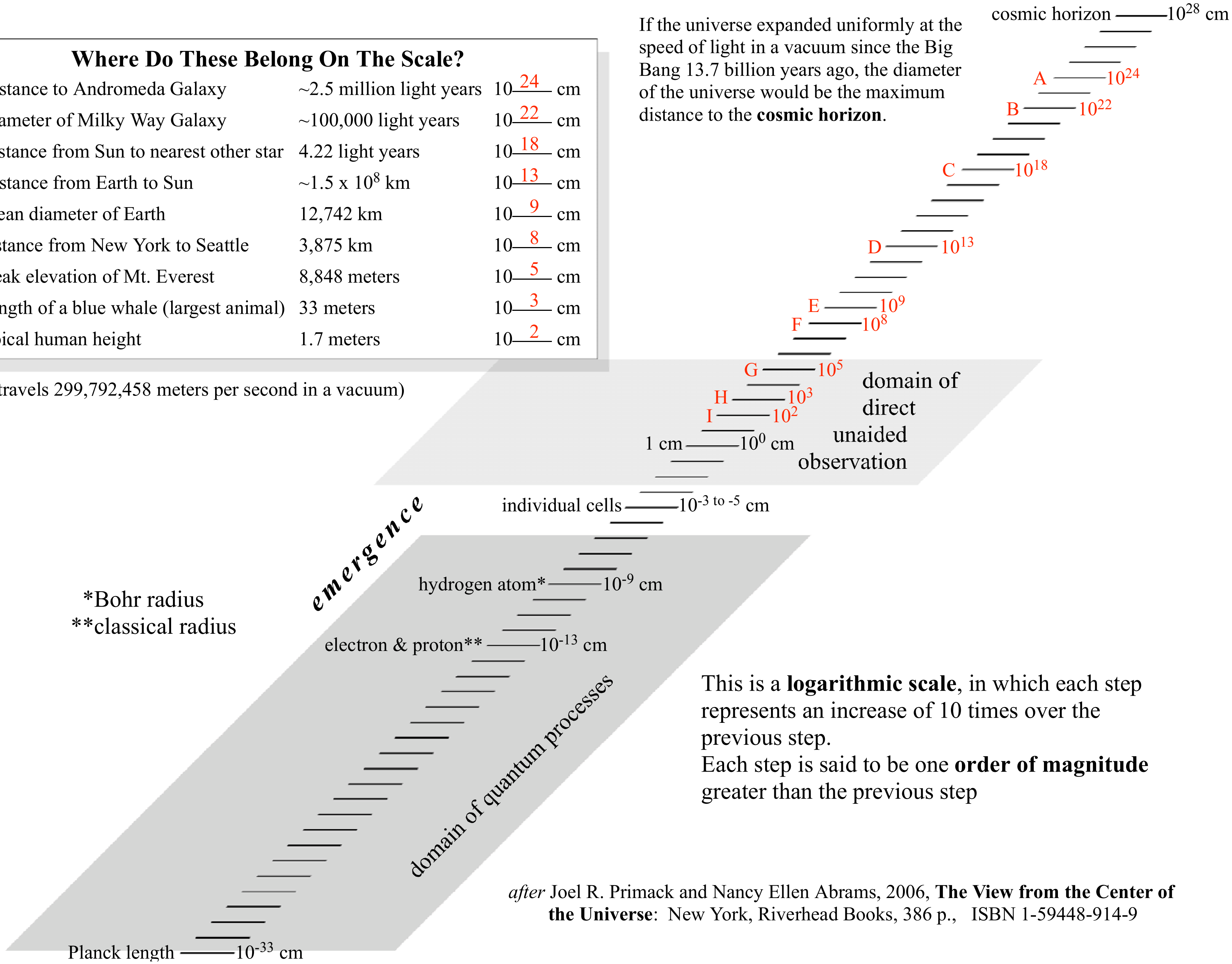
# Comparison of Lengths Relevant to Our Universe

### Where Do These Belong On The Scale?

| | | |
|---|---|---|
| A. distance to Andromeda Galaxy | ~2.5 million light years | $10^{24}$ cm |
| B. diameter of Milky Way Galaxy | ~100,000 light years | $10^{22}$ cm |
| C. distance from Sun to nearest other star | 4.22 light years | $10^{18}$ cm |
| D. distance from Earth to Sun | ~1.5 x $10^8$ km | $10^{13}$ cm |
| E. mean diameter of Earth | 12,742 km | $10^{9}$ cm |
| F. distance from New York to Seattle | 3,875 km | $10^{8}$ cm |
| G. peak elevation of Mt. Everest | 8,848 meters | $10^{5}$ cm |
| H. length of a blue whale (largest animal) | 33 meters | $10^{3}$ cm |
| I. typical human height | 1.7 meters | $10^{2}$ cm |

(light travels 299,792,458 meters per second in a vacuum)

If the universe expanded uniformly at the speed of light in a vacuum since the Big Bang 13.7 billion years ago, the diameter of the universe would be the maximum distance to the **cosmic horizon**.




*Bohr radius
**classical radius

This is a **logarithmic scale**, in which each step represents an increase of 10 times over the previous step.
Each step is said to be one **order of magnitude** greater than the previous step

*after* Joel R. Primack and Nancy Ellen Abrams, 2006, **The View from the Center of the Universe**: New York, Riverhead Books, 386 p., ISBN 1-59448-914-9

The **Planck length** is defined by three physical constants that are fundamental to the classical and quantum models of gravity and that combine in a dimensional analysis to yield a distance. The three constants are the Planck constant, the speed of light in a vacuum, and the gravitational constant. The Planck length is thought to be the smallest meaningful length in Nature, corresponding to the smallest distance over which quantum gravity operates.