

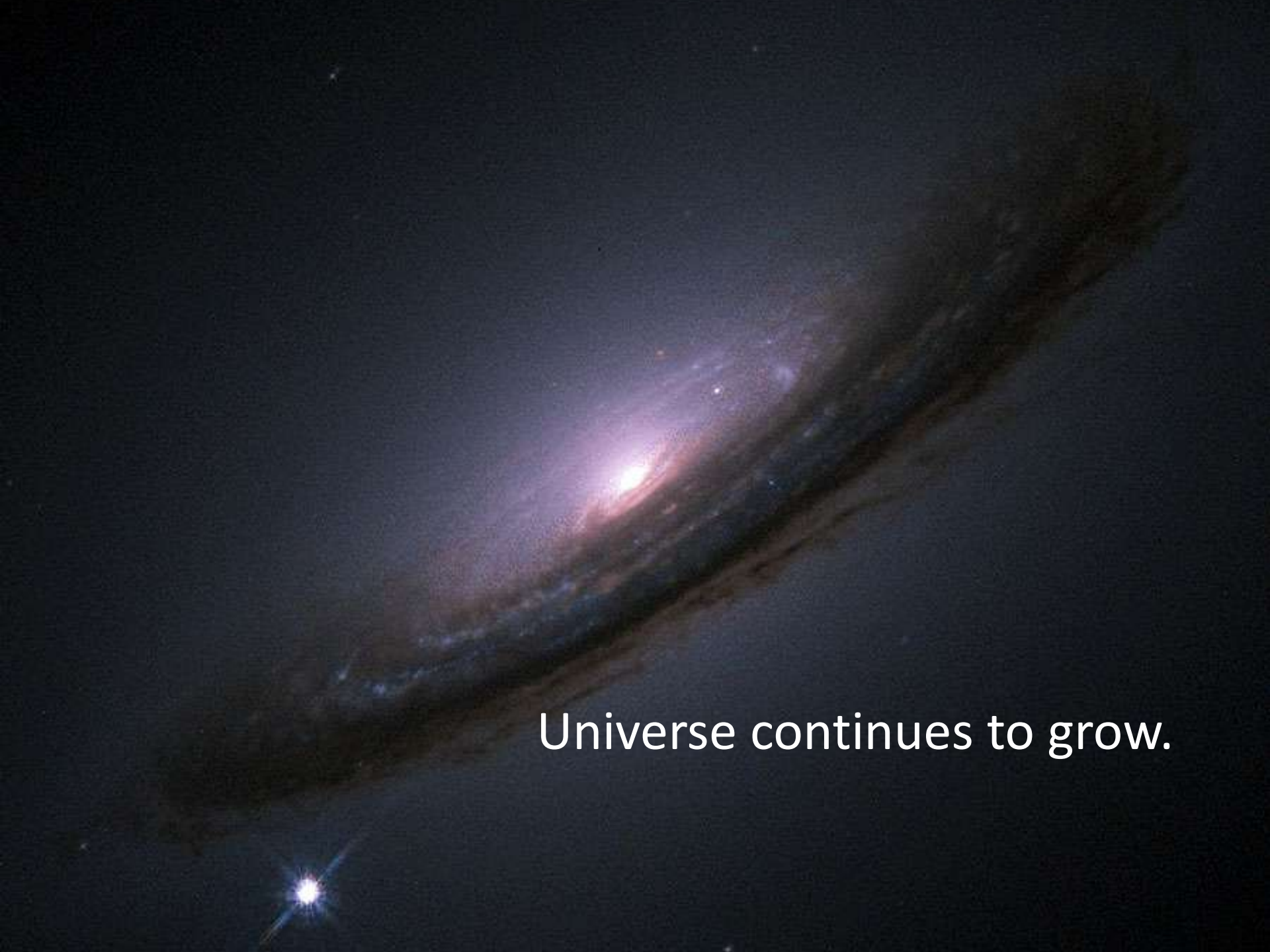


**Why is space dark ?**

# Why isn't the night sky bright ?

- If you add up all the photons spewing out of all, there is enough to light up the universe.
- But when we look up at the night sky, this is clearly not the case.
- So, why is the sky dark?





Universe continues to grow.

- The fact that the night sky is not as bright as the Sun is called **Olbers' paradox**.
- It can be traced as far back as Kepler in 1610, and was rediscussed by Halley and Cheseaux in the 18th century;
- but it was not popularized as a paradox until Olbers took up the issue in the 19th century.



- Even there can be more reasons, here we may take four possible explanations;

1.The Universe has only a finite number of stars

This explanation is just plain wrong.



## 2. There's too much dust to see the distant stars.

If it is then the dust heats up too. It acts like a radiation shield. It may technically be correct.

However the total amount of luminous matter in the Universe is too large to allow this escape.

And the number of stars is close enough to infinite for the purpose of lighting up the sky.

### 3. The Universe is young.

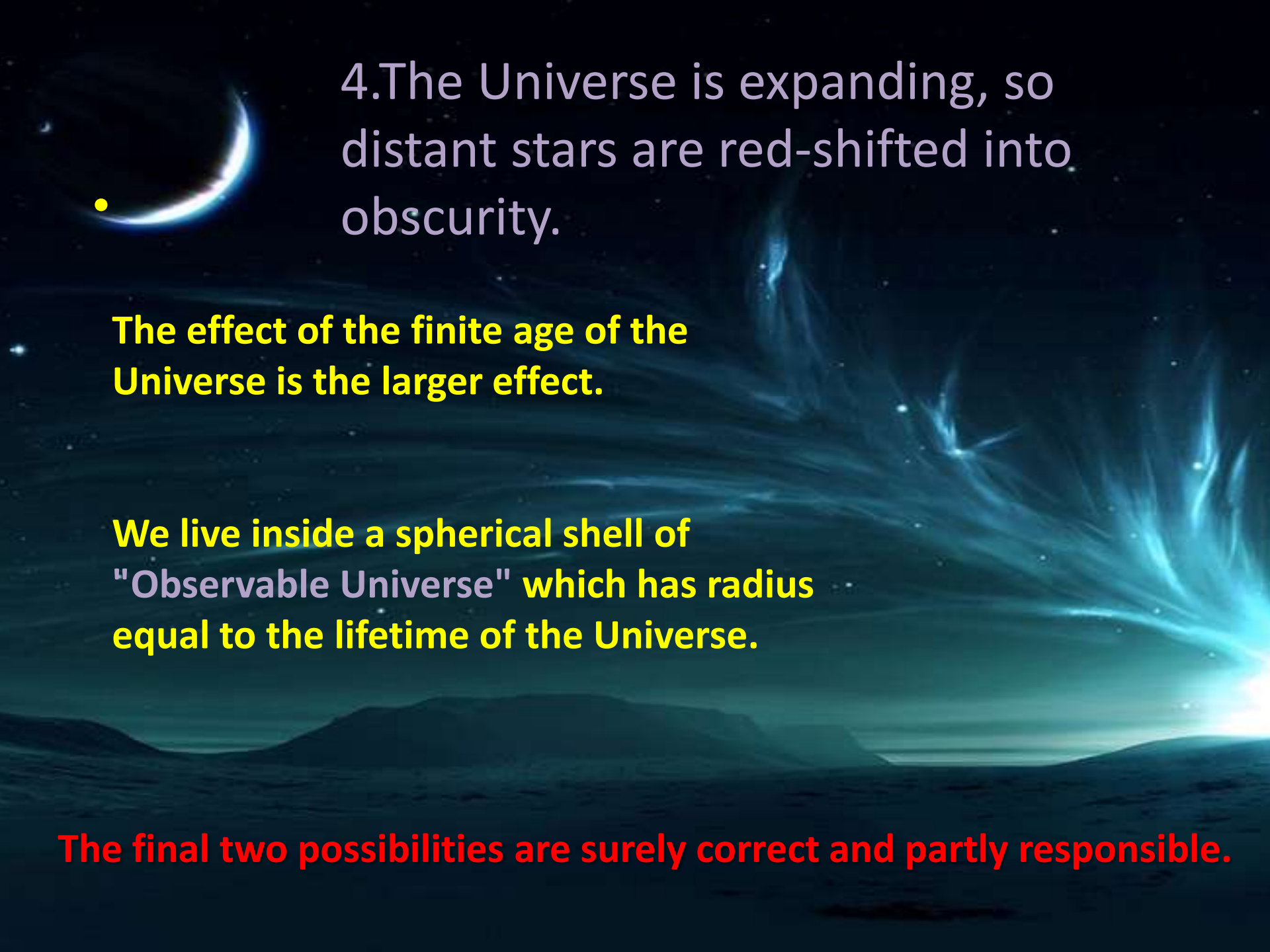
So distant light hasn't even reached us yet.

**The third explanation might be partially correct.**

**We just don't know, but;**

**If the stars are distributed fractally, then there could be large patches of empty space, and the sky could appear dark except in small areas.**

**Objects more than thousand million years old are too far away for their light ever to reach us.**



4. The Universe is expanding, so distant stars are red-shifted into obscurity.

**The effect of the finite age of the Universe is the larger effect.**

**We live inside a spherical shell of "Observable Universe" which has radius equal to the lifetime of the Universe.**

**The final two possibilities are surely correct and partly responsible.**



- Historically, after Hubble space telescope discovered that the Universe was expanding,

and before the Big Bang was firmly established by the discovery of the cosmic background radiation,

***Olbers' paradox*** was presented as a proof of special relativity.

**Hubble is a Space Telescope. It was launched by NASA in 1990.**

**Hubble is the length of a school bus. It weighs as much as two adult elephants.**

**Hubble can travels around Earth at about 5 miles per second.**

