COSMOLOGY

A tale of our Universe

Cosmology

The study of the origin, evolution and destiny of the Universe

A Universe in expansion

In 1929 ***E. Hubble*** observed that all galaxies are moving away from us…

A Universe in expansion

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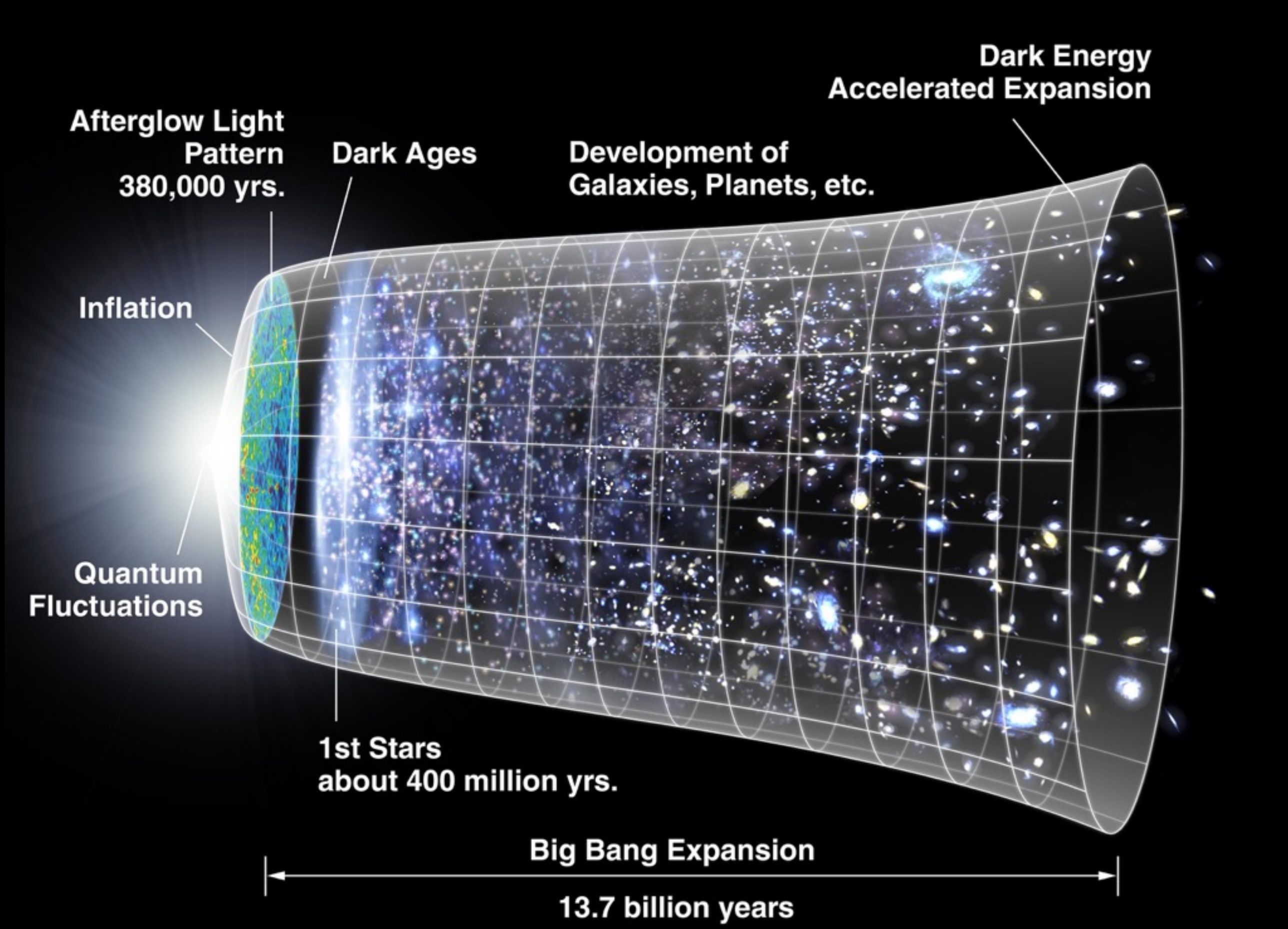
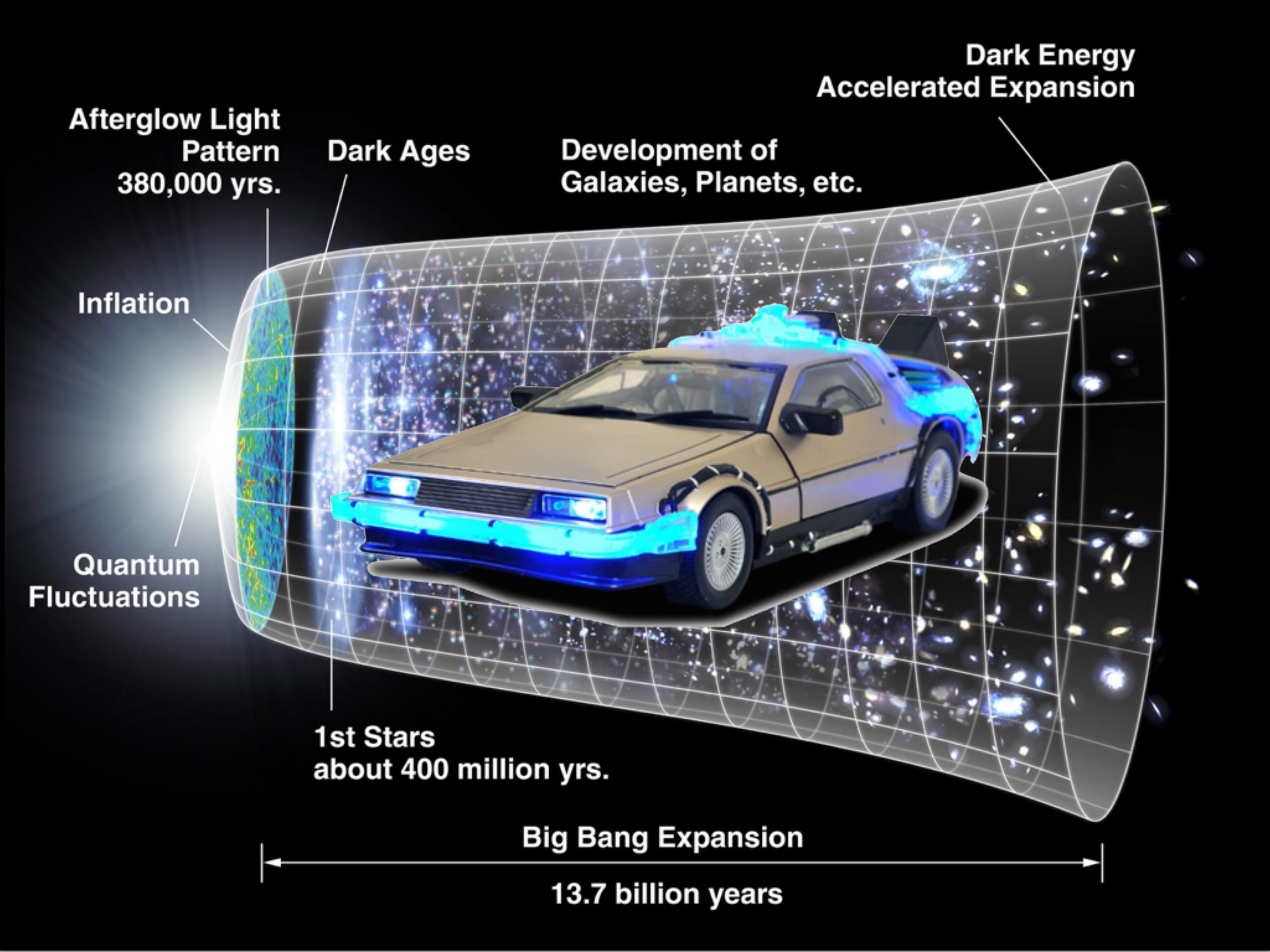
… In fact, the ***universe is expanding,*** meaning it was smaller in the past, and continues to grow

The ***big bang theory*** explains this


Dark Energy
Accelerated Expansion
Afterglow Light
Pattern
380,000 yrs.
Dark Ages
Development of
Galaxies, Planets, etc.
Inflation
Quantum
Fluctuations
1st Stars
about 400 million yrs.
Big Bang Expansion
13.7 billion years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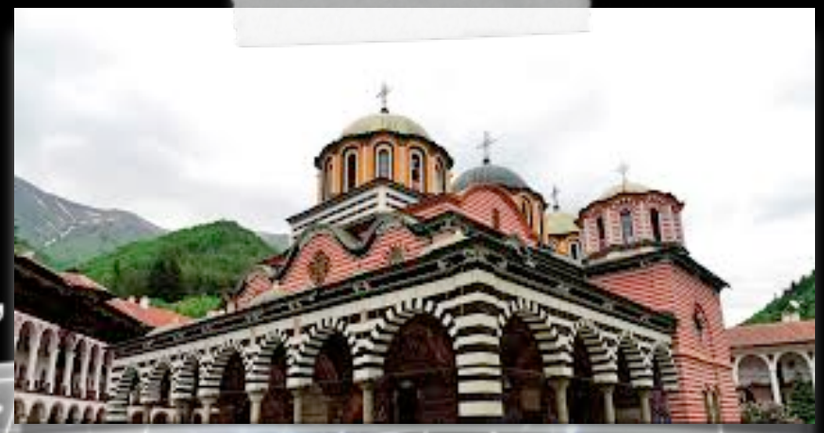

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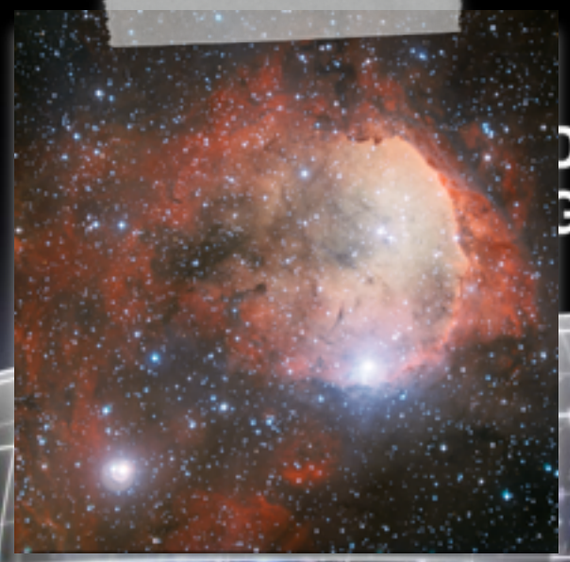

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How can we prove this?

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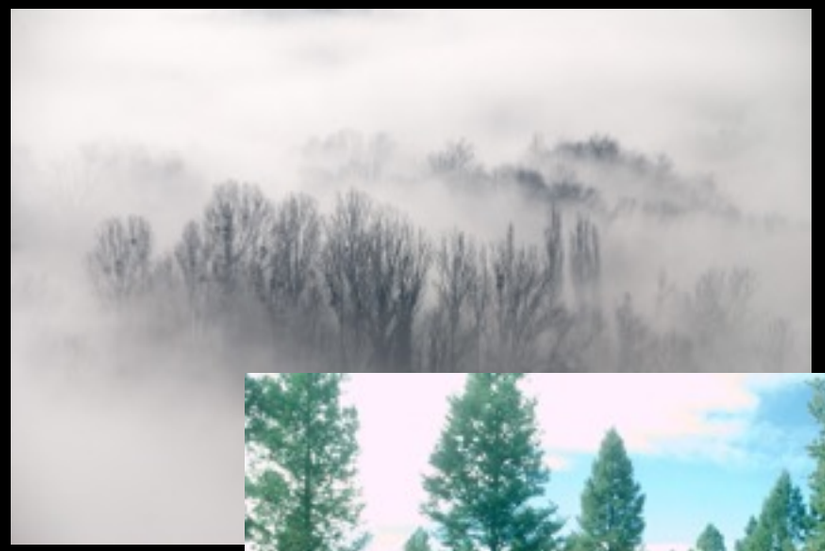


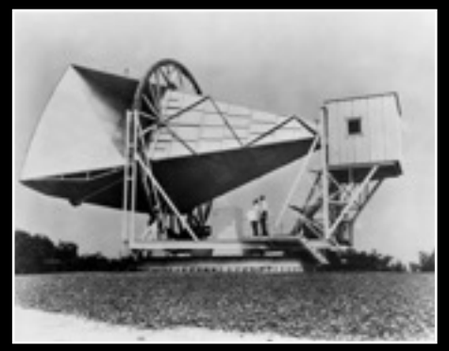
380.000 years after big bang, the fog dissolves and light can propagate freely

This relic of light was discovered accidentally in 1964 by Penzias and Wilson

Nobel-prize awarded in 1978

The Cosmic Microwave Background (CMB)

The CMB is a fingerprint of the early universe
→ *allows us to look back in time*



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Our precision has
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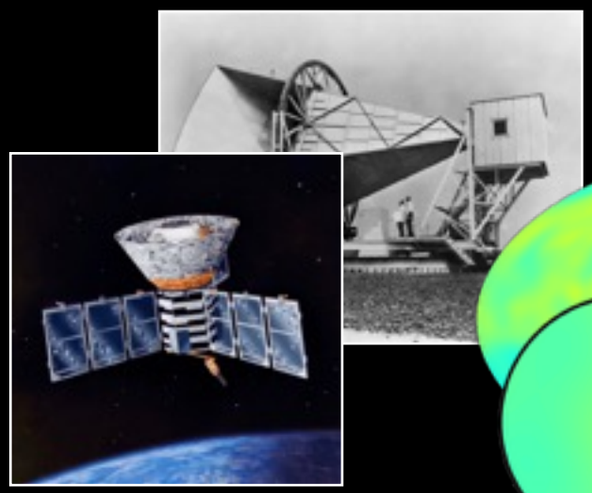

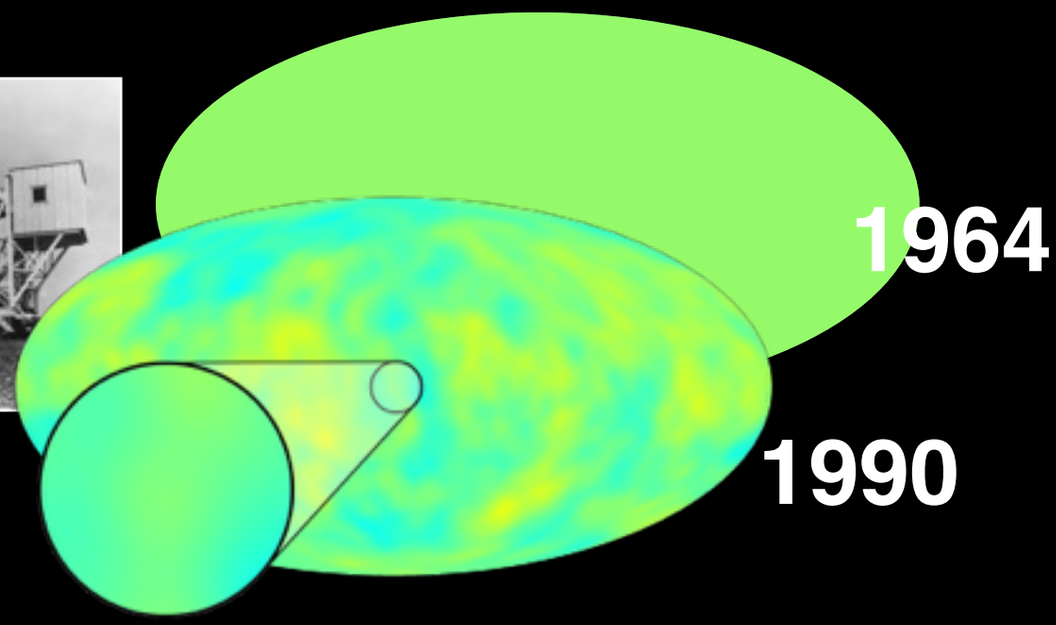

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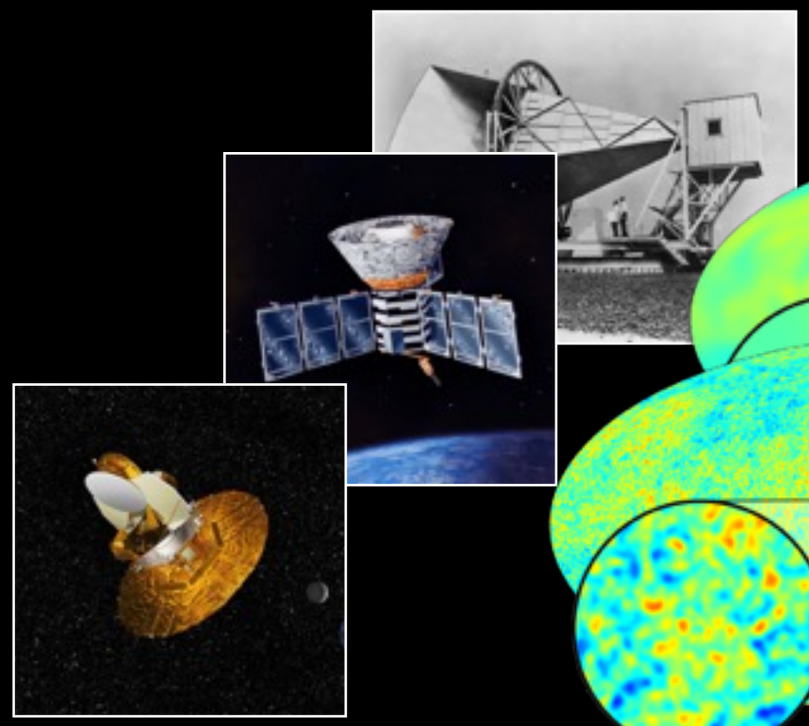

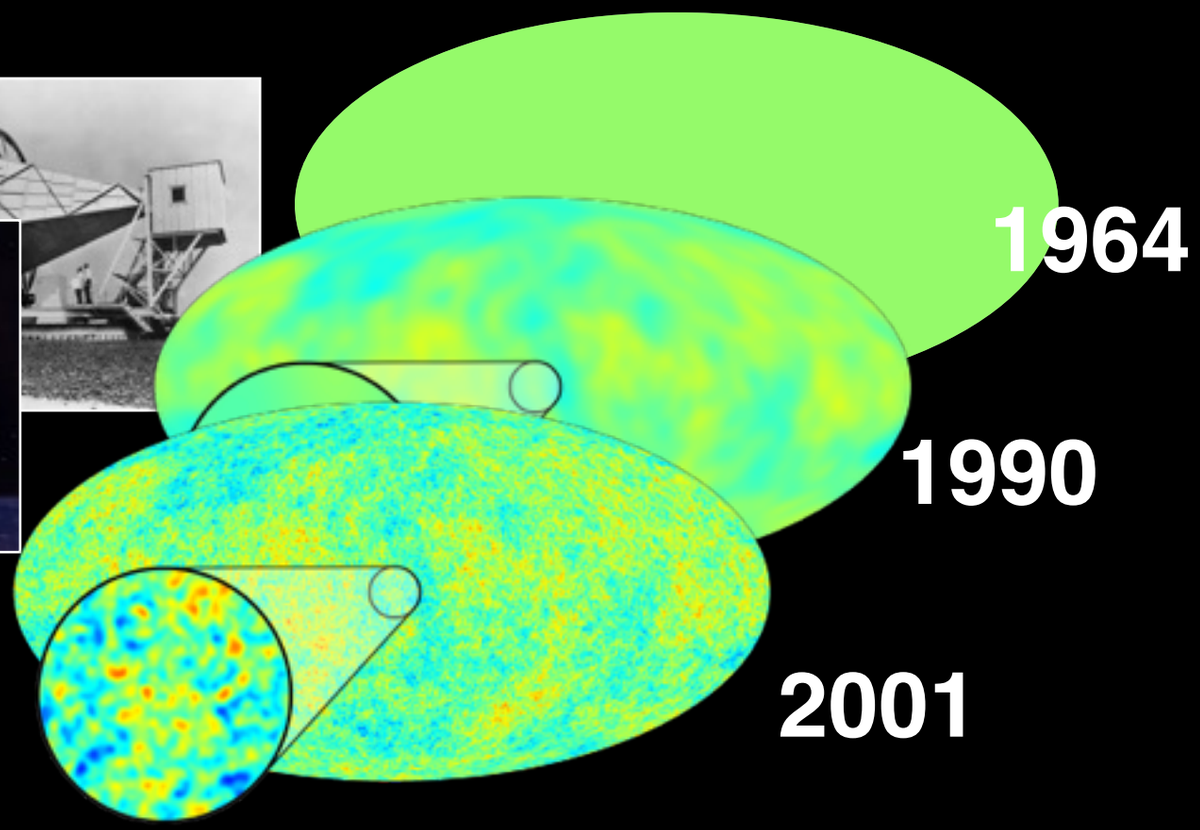

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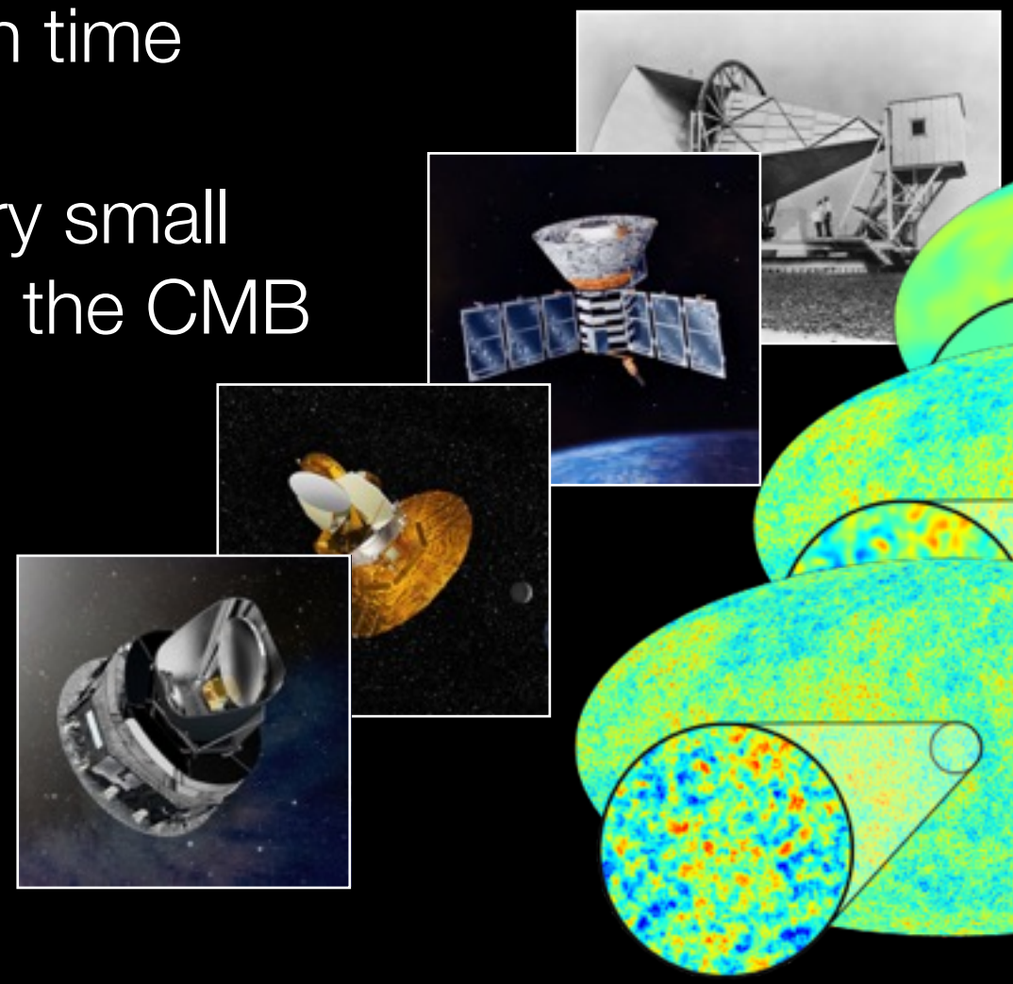
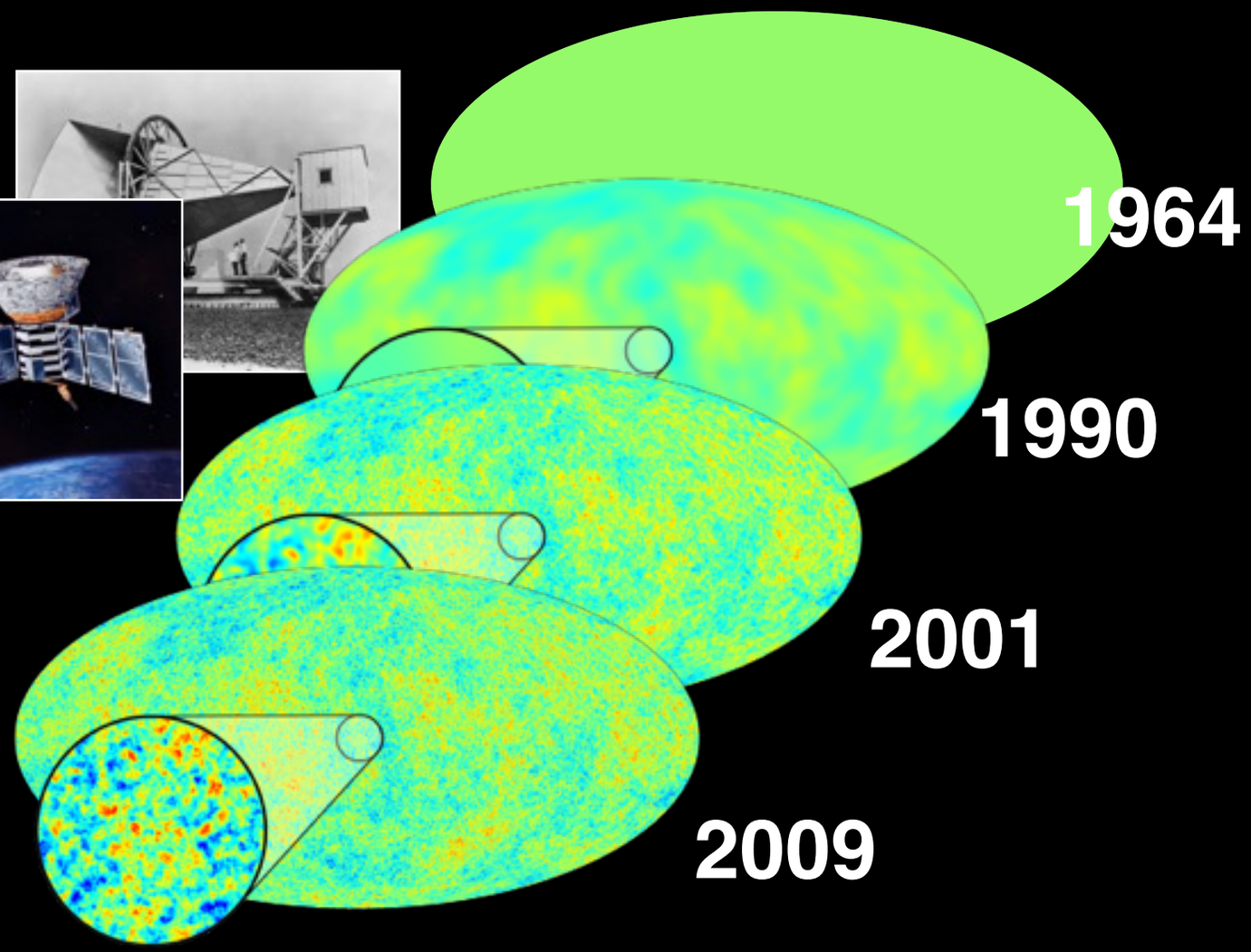
We detect very small
fluctuations in the CMB





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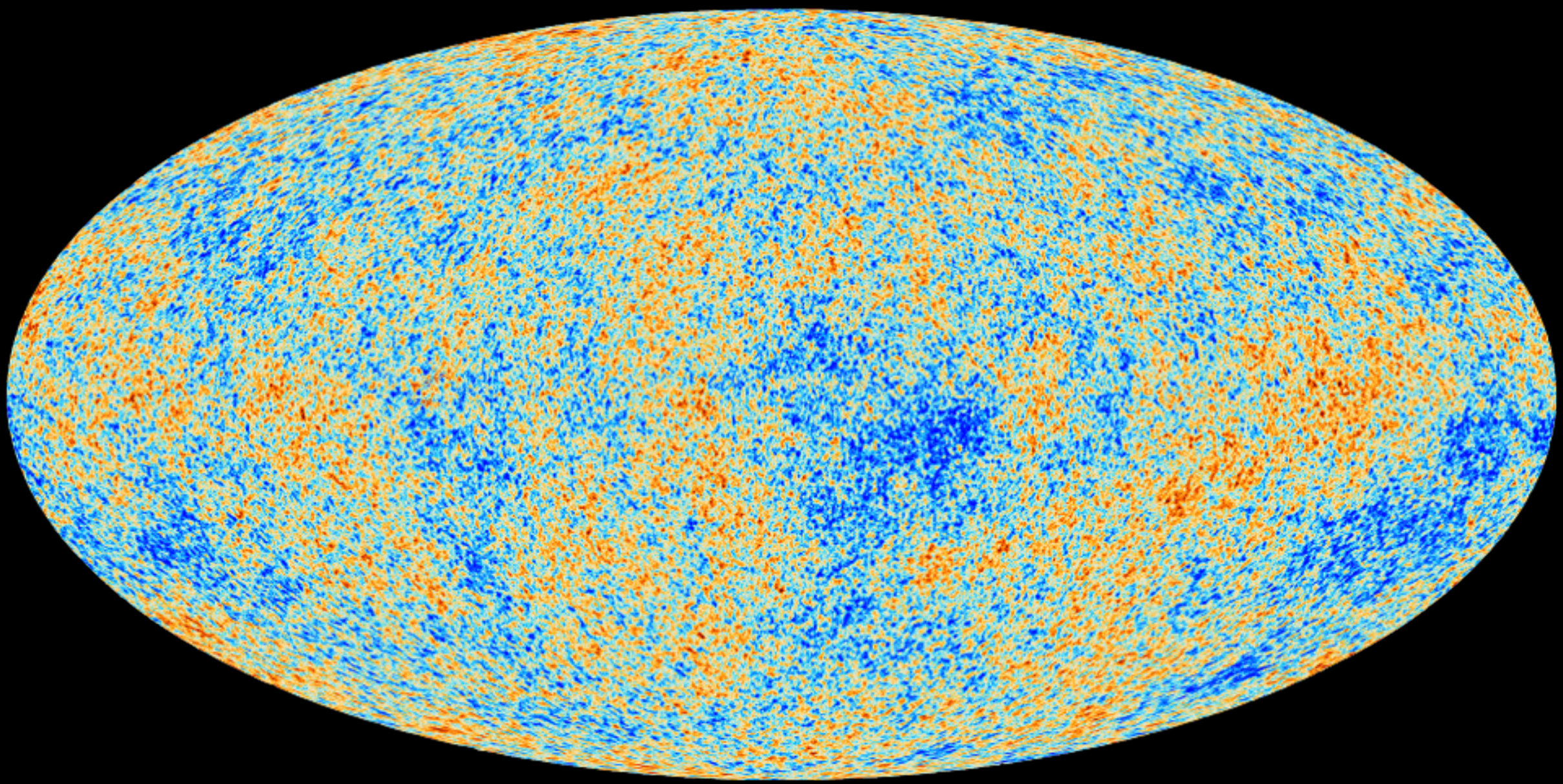


The most up-to-date map of the sky

Fluctuations tell us about the Universe structure…

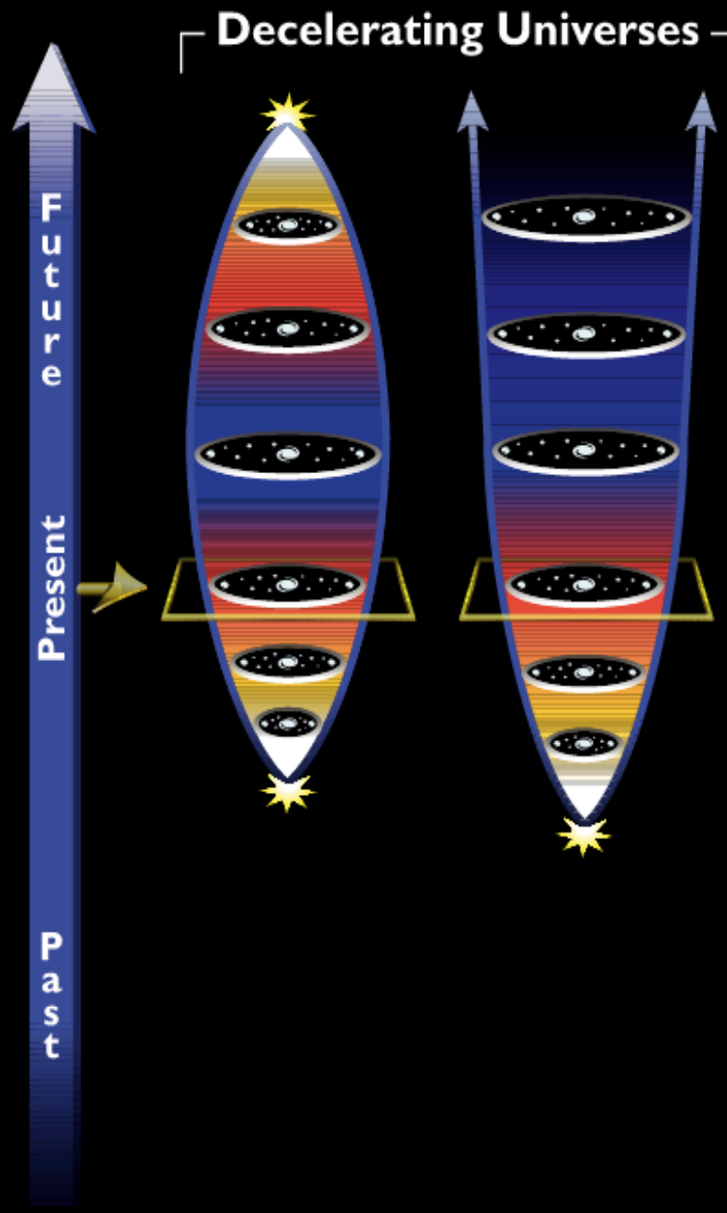
The future of the Universe

The destiny of our universe is determined by the struggle between the current expansion and the effect of gravity…

… we can predict how it will evolve!

The future of the Universe

Re-collapsing universe
"Slowing" universe



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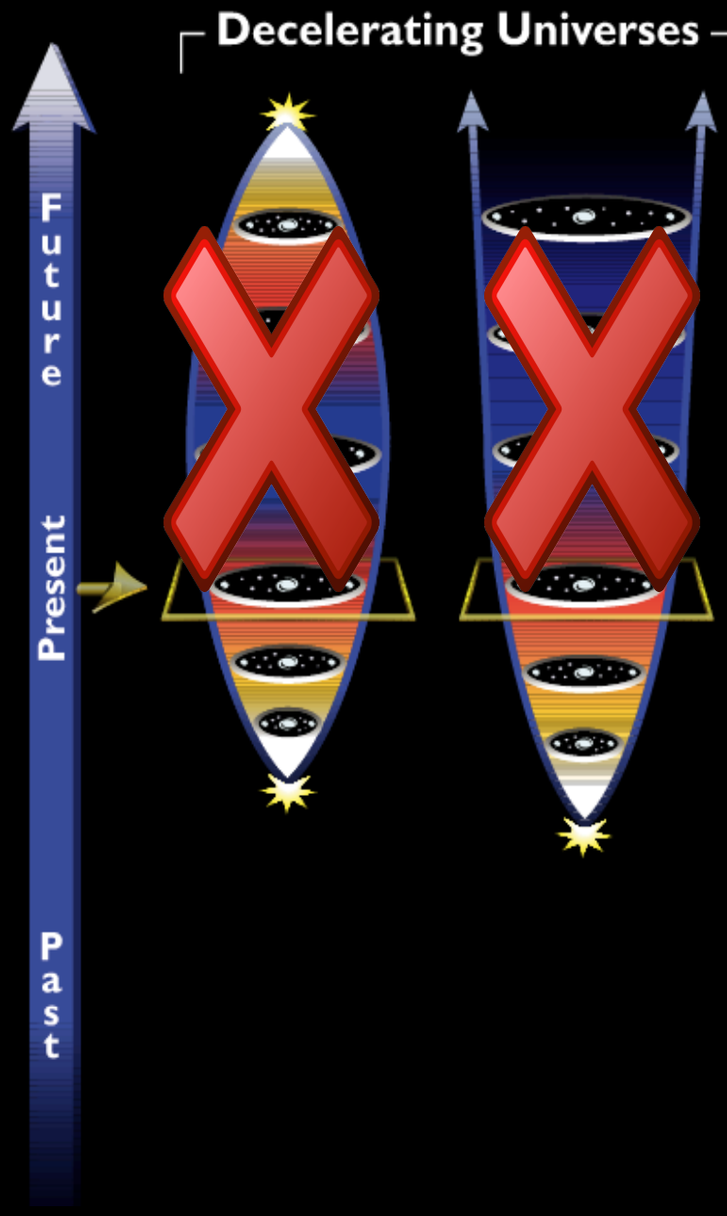

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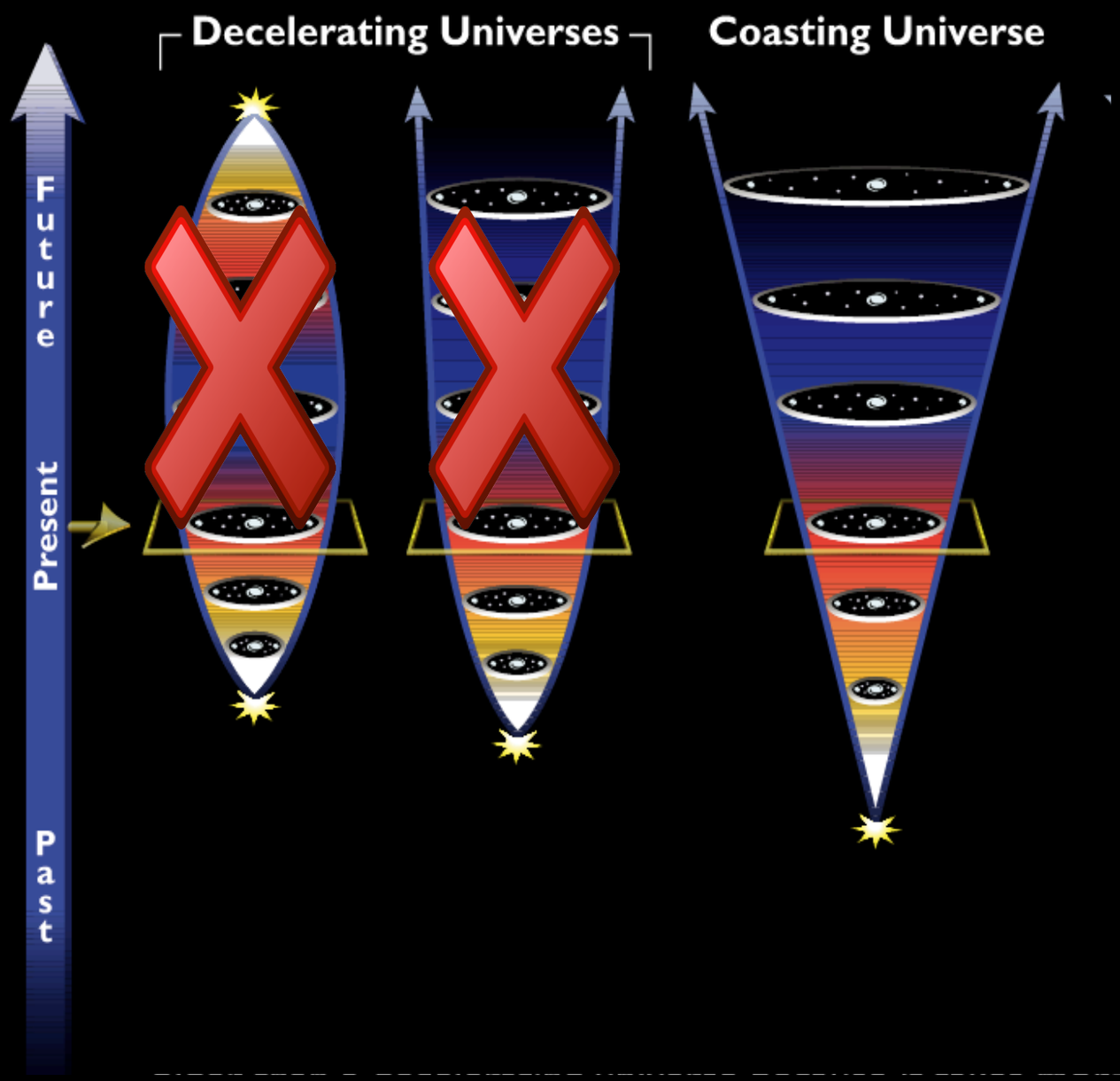

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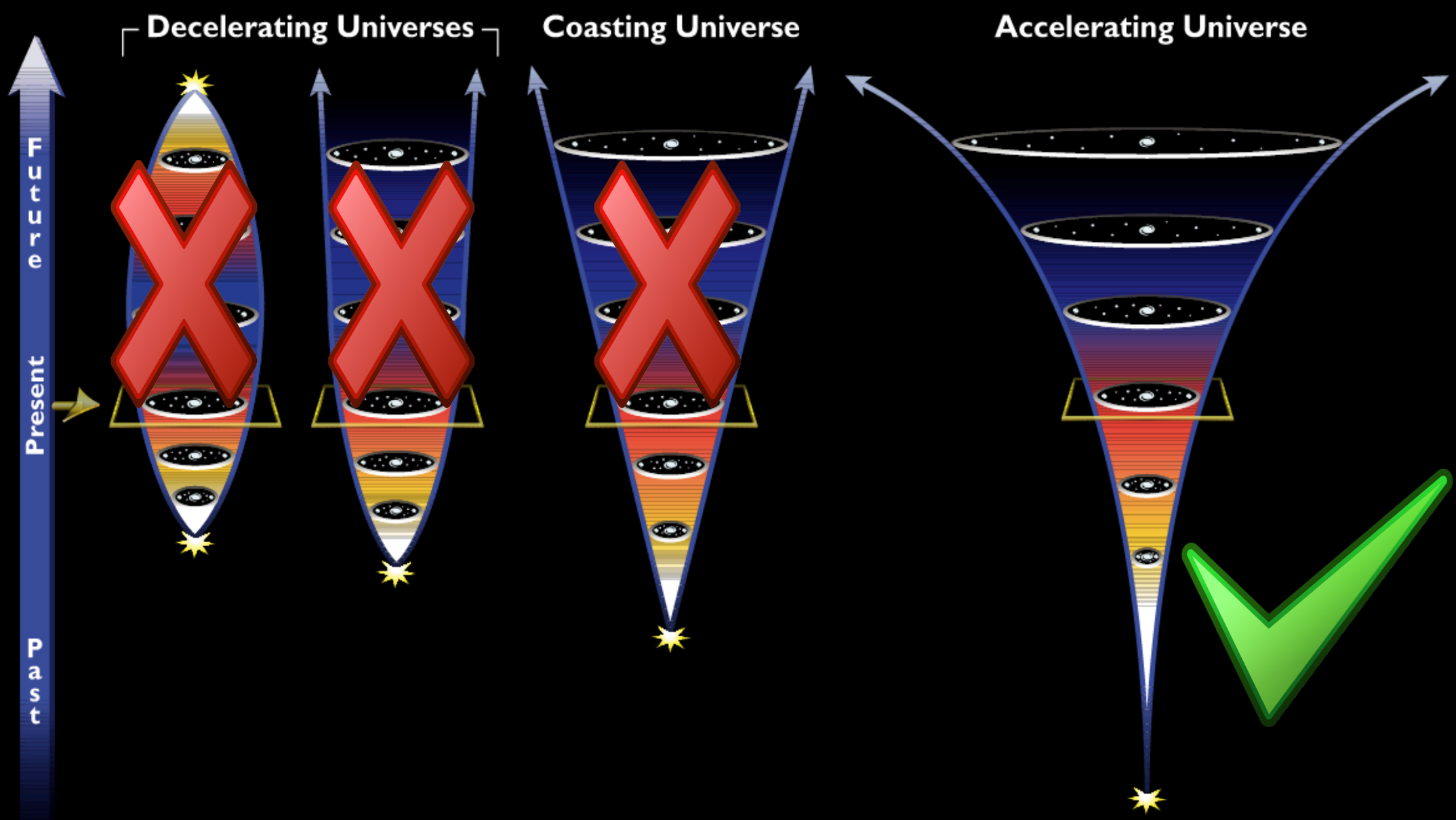

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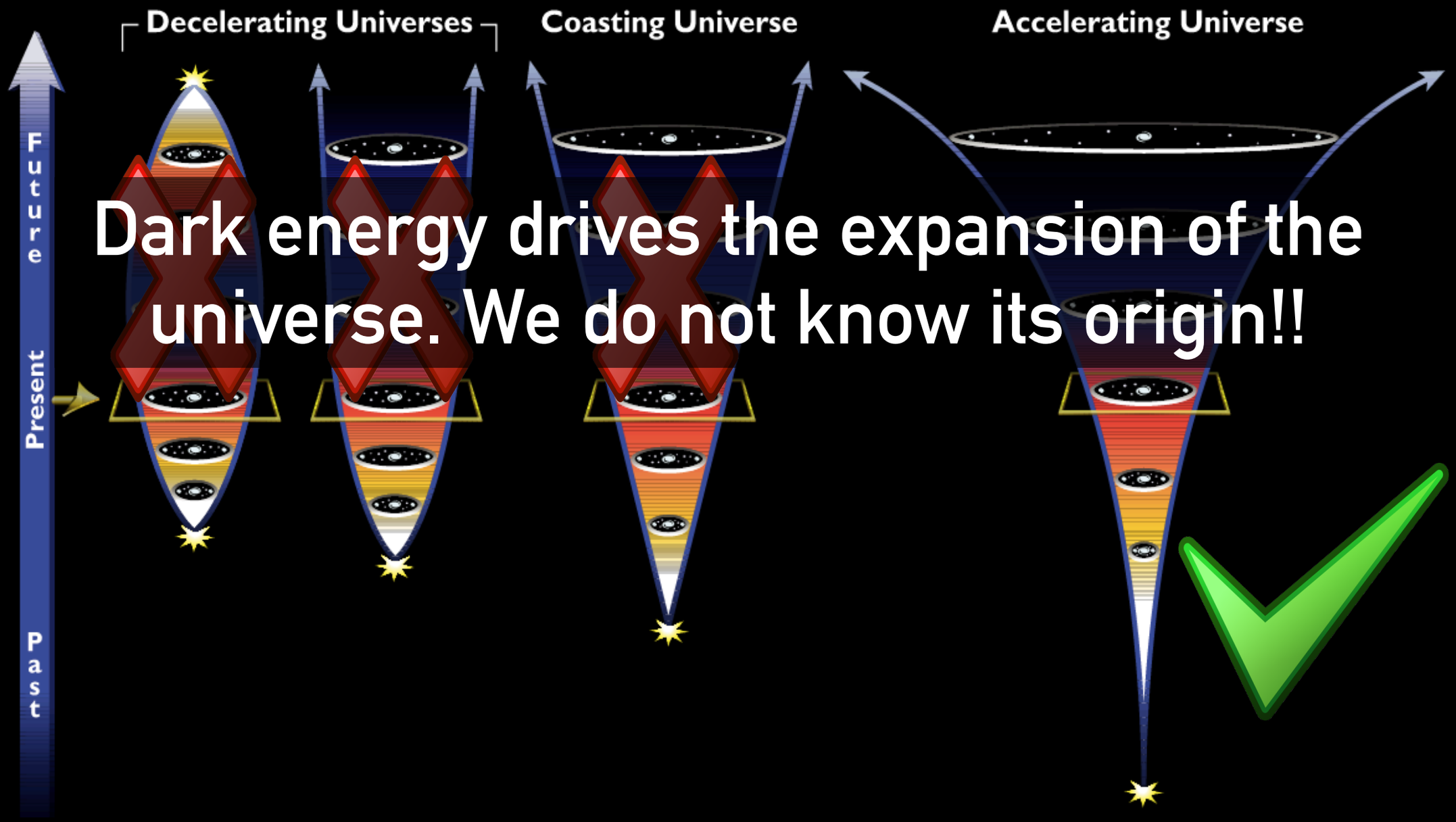

Dark energy drives the expansion of the universe. We do not know its origin!!

Conclusion

We hear the echo of the early Universe!

We learn about the present Universe from the study of the CMB

The Universe is destined to expand forever, but we don't know the nature of the driving force!

Thank you!