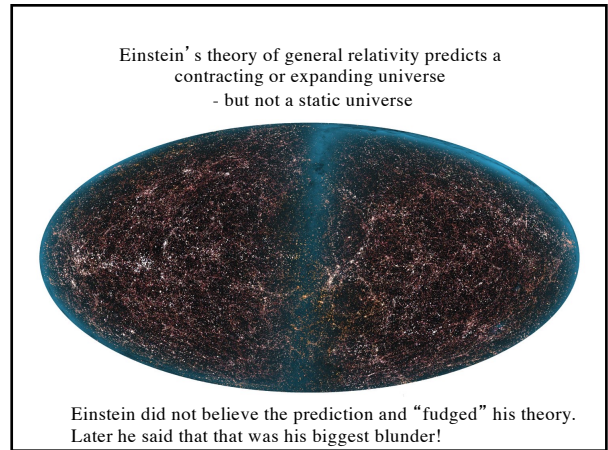
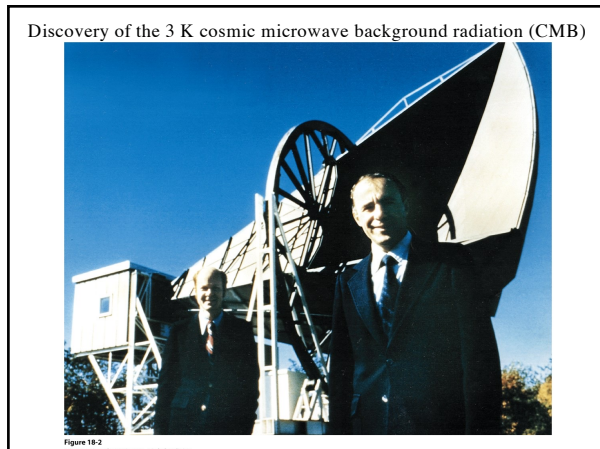


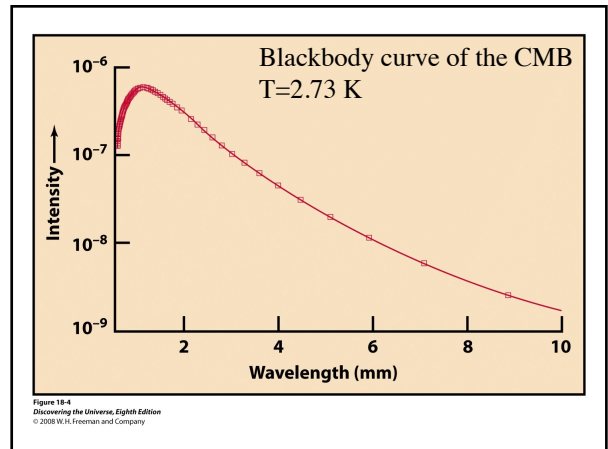
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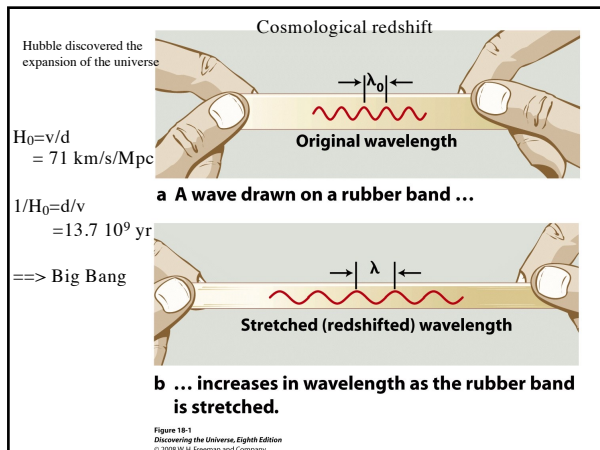
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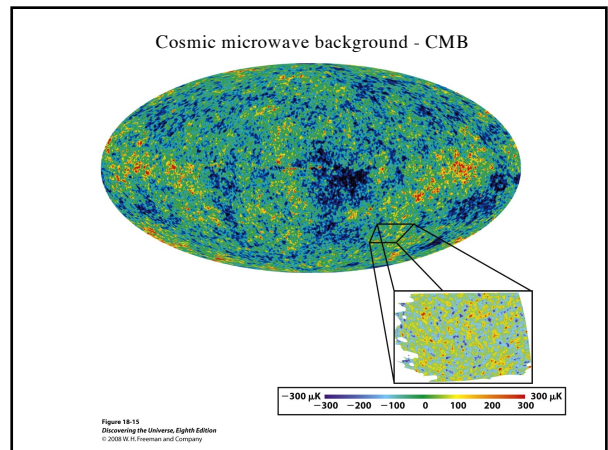
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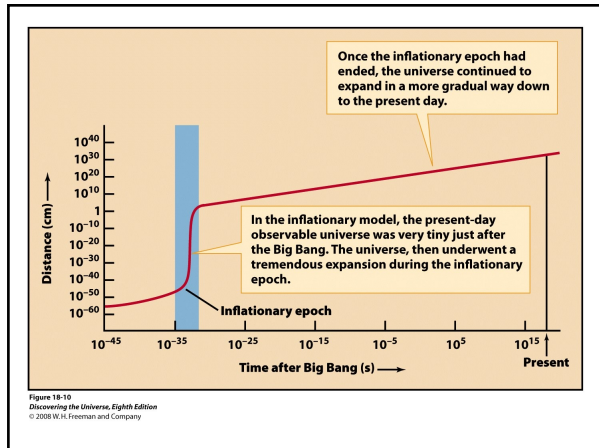
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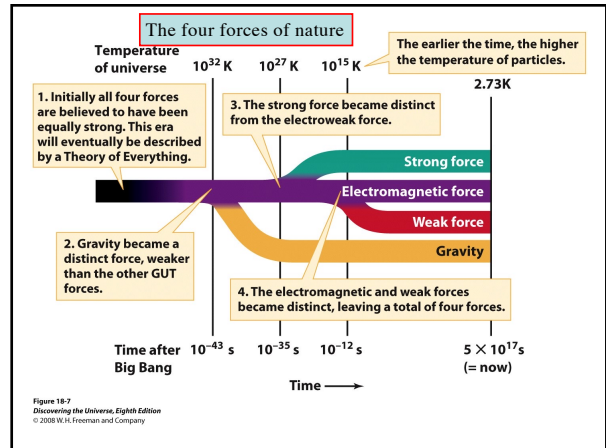
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8

Mysteries Needing Explanation

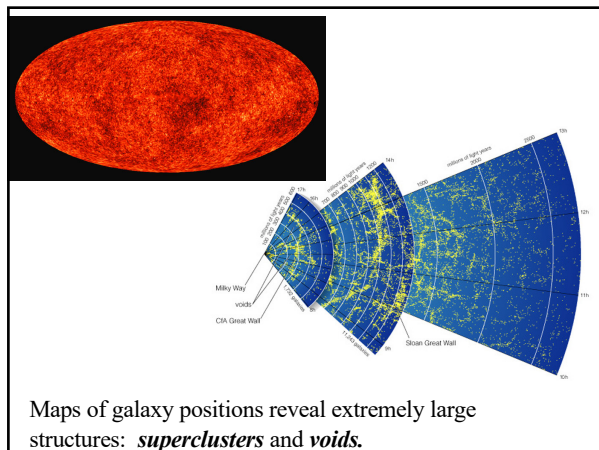
1. Where does structure come from?
2. Why is the overall distribution of matter so uniform?
3. Why is the density of the universe so close to the critical density?

9

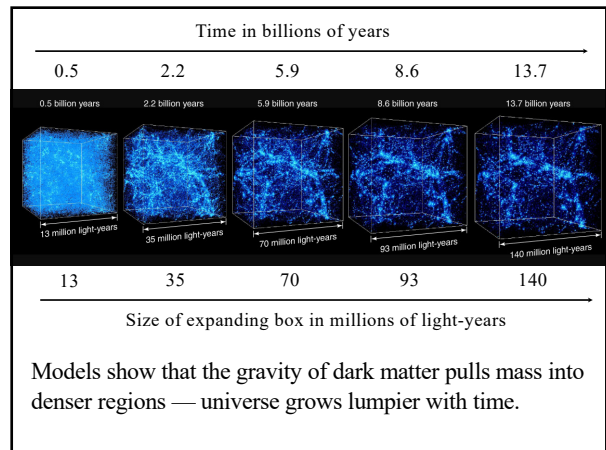
Inflation explains these features of the universe

- Structure: Giant quantum fluctuations
- Uniformity: equal temperatures and densities before inflation
- Density: with matter and dark energy  
=> density = critical density

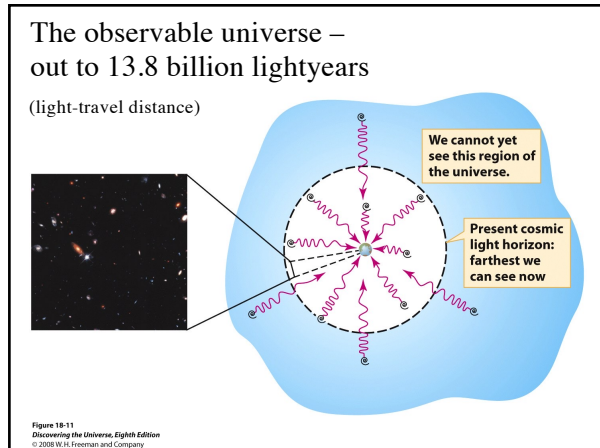
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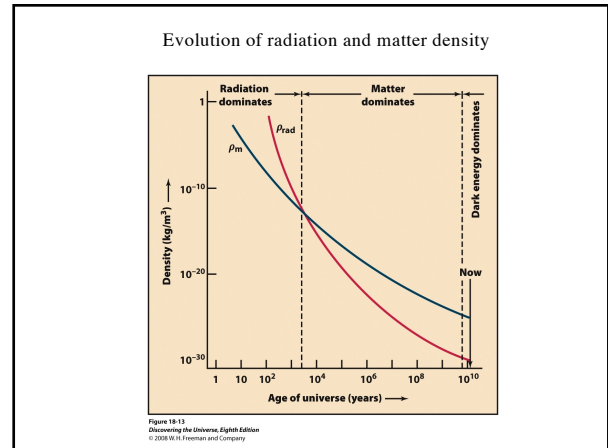
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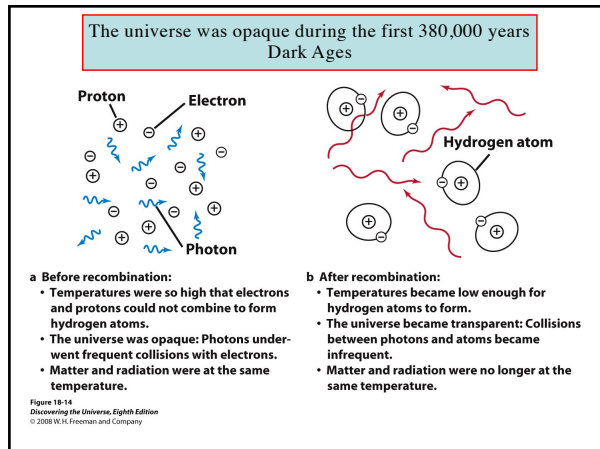
12



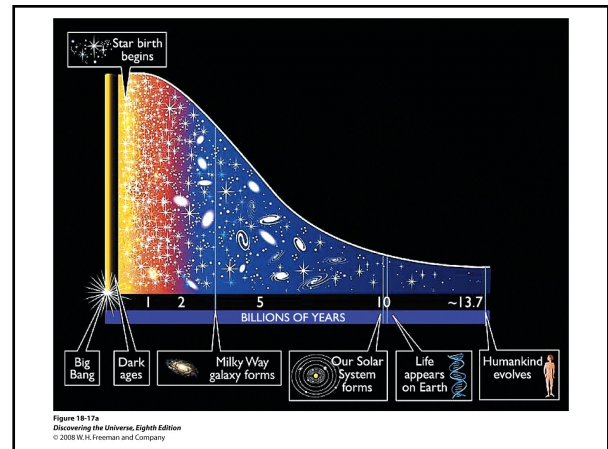
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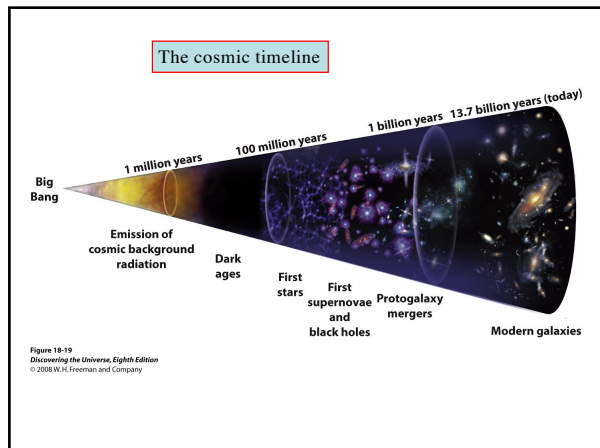
14



15



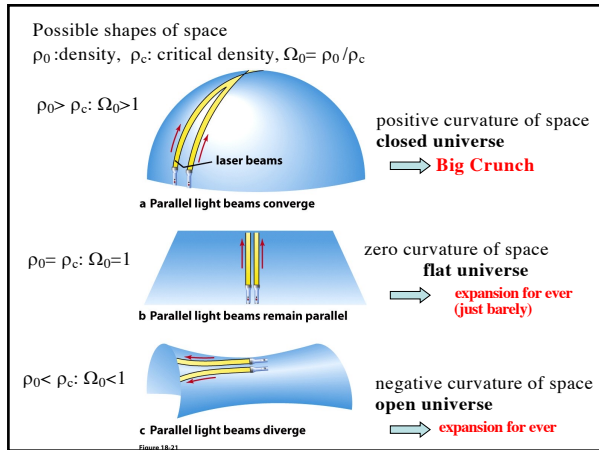
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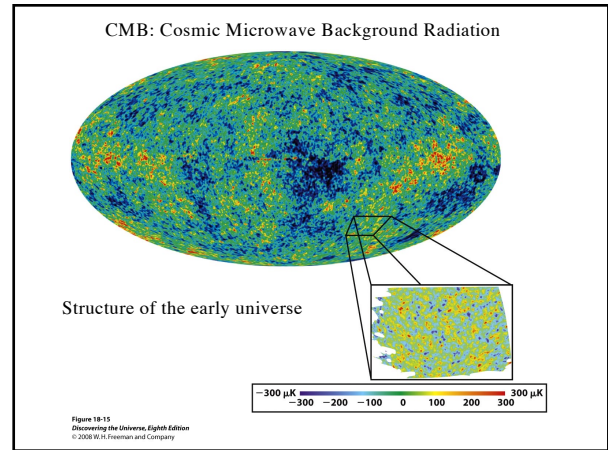
17



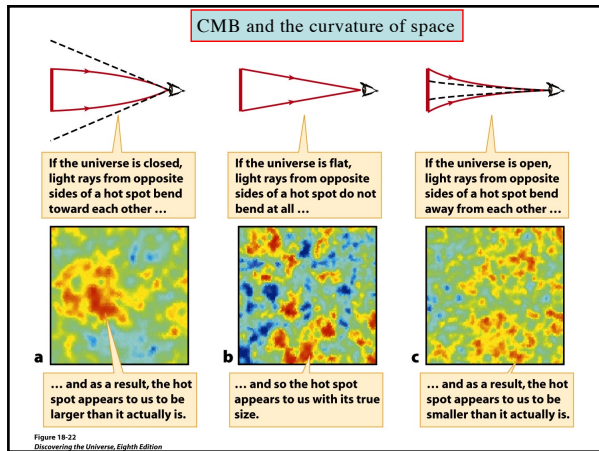
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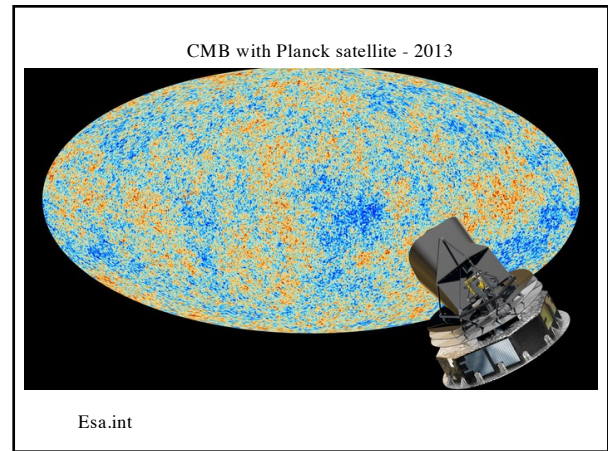
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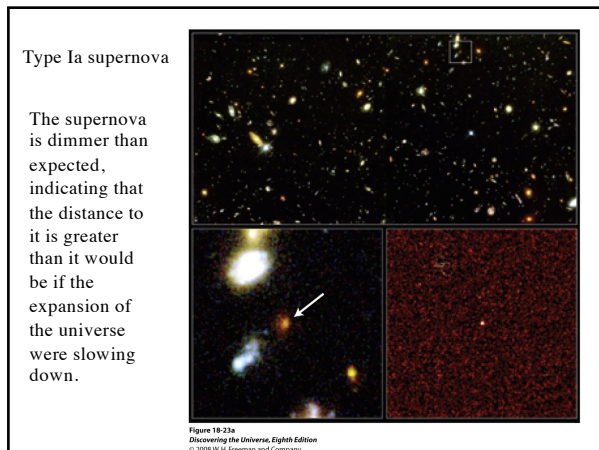
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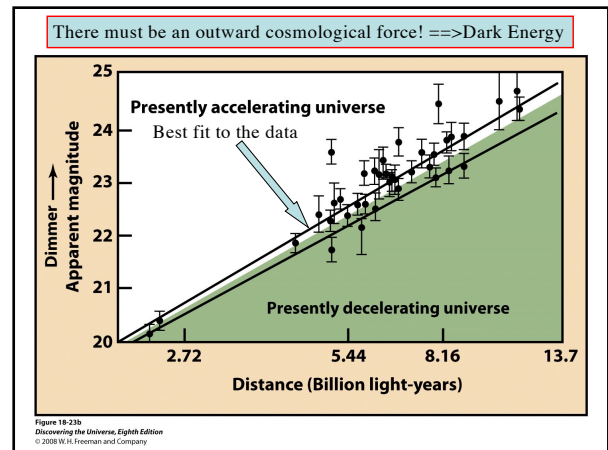
21



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24

### The major components of the Universe

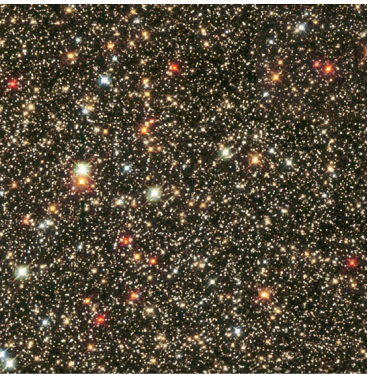
- 5% normal matter
- 27% dark matter
- 68% dark energy

$$\Omega_{0, M} + \Omega_{0, \Lambda} = \Omega_0 = 1$$

25

Why is it so dark in the night?

26



#### *Olbers' Paradox*

If the universe were

1. infinite
2. unchanging
3. everywhere the same

then stars would cover the night sky.

27



The night sky is dark because we see only the observable universe up to 13.8 billion light years distance.

28