



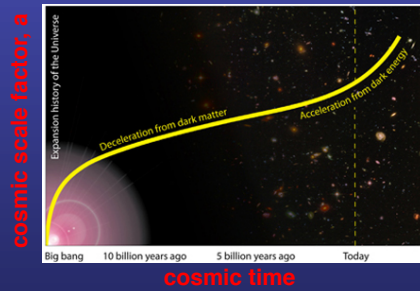
AST 376: Cosmology
(Spring 2014)



Problems with the Standard Model

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Great Success of the Cosmological Standard Model



→ But Standard Model has severe gaps!

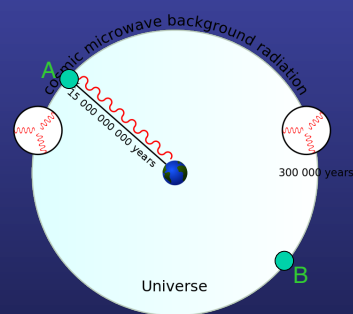
Big Problem: “Cosmic coincidences”!?!?

- Horizon problem
- Flatness problem
- ...
- Monopole problem

→ fine-tuning of initial conditions???

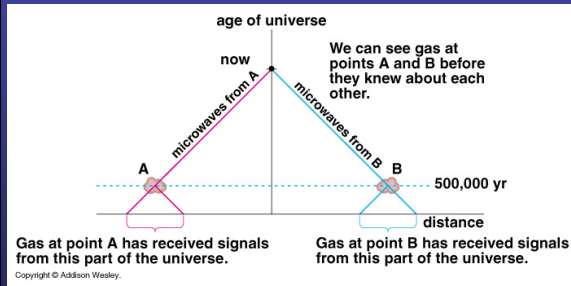
Horizon Problem

- Why is the universe so uniform?
- in particular: why is the CMB so isotropic?



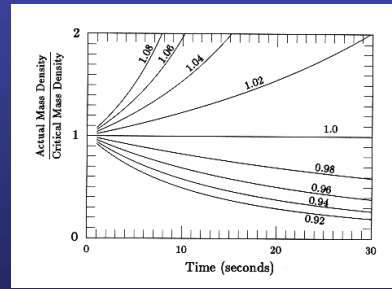
Horizon Problem

- "Causal contact was worse in the past!"



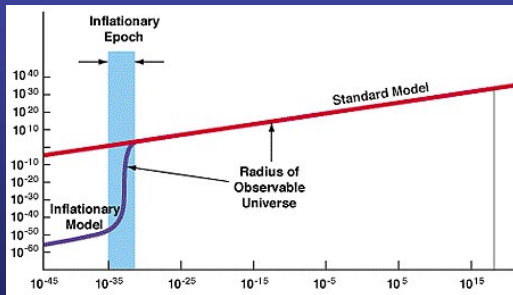
Flatness Problem

- Why is Ω_{total} so precisely tuned to 1?



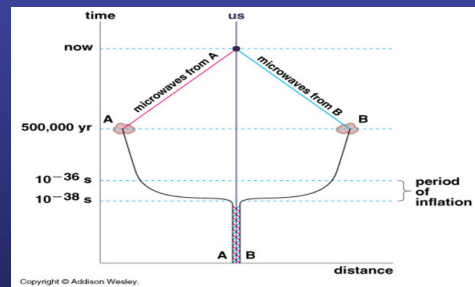
Solution: Inflation?

- Inflation: Phase of exponential growth in very early universe



Solution: Inflation?

- Way out of horizon problem:



Solution: Inflation?

- Way out of flatness problem:

