Remedial Inflation

Suggested Reading:
Ryden Chapter 11
Peacock Chapter 11

The Standard Big Bang Cosmological Model

- Based upon:
- General Relativity
- Cosmological Principle
- Known particle physics

- Successfully Explains:
- Dark night sky
- Hubble Expansion
- Age of universe
- CMB
- Light elements

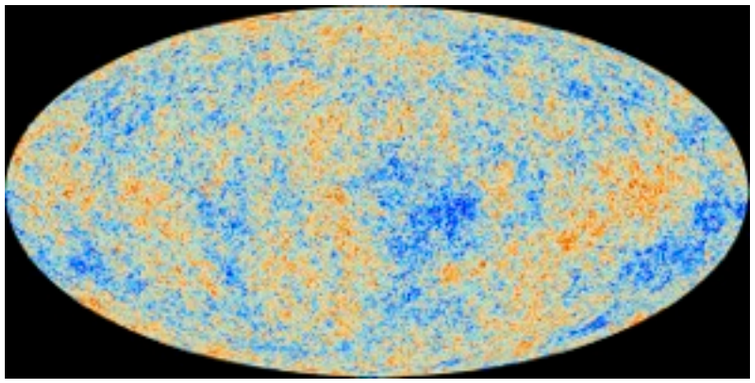
Very successful theory, but...

Phenomena NOT explained in Standard Big Bang Model

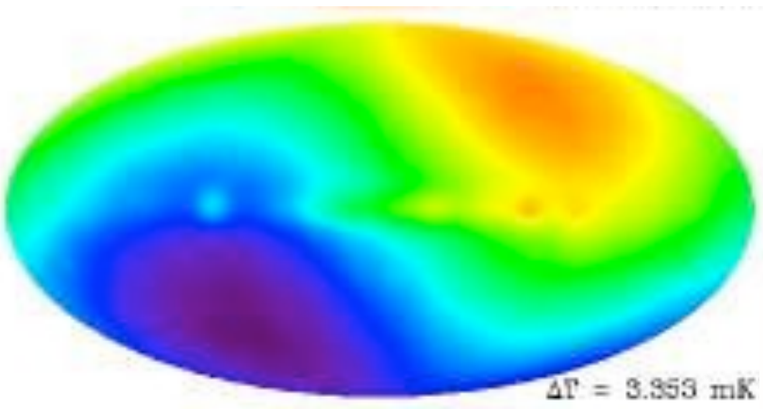
- horizon problem (why so flat?)
- flatness problem (why so homogeneous?)
- monopole problem (why so rare?)
- baryon asymmetry (why?)
- the expansion problem (yeah, why?)
- small scale inhomogeneities

added by Peacock

Horizon Problem



Current Planck maps,
$\Delta T/T \sim 10^{-5}$



Dipole anisotropy
$\Delta T/T \sim 10^{-3}$

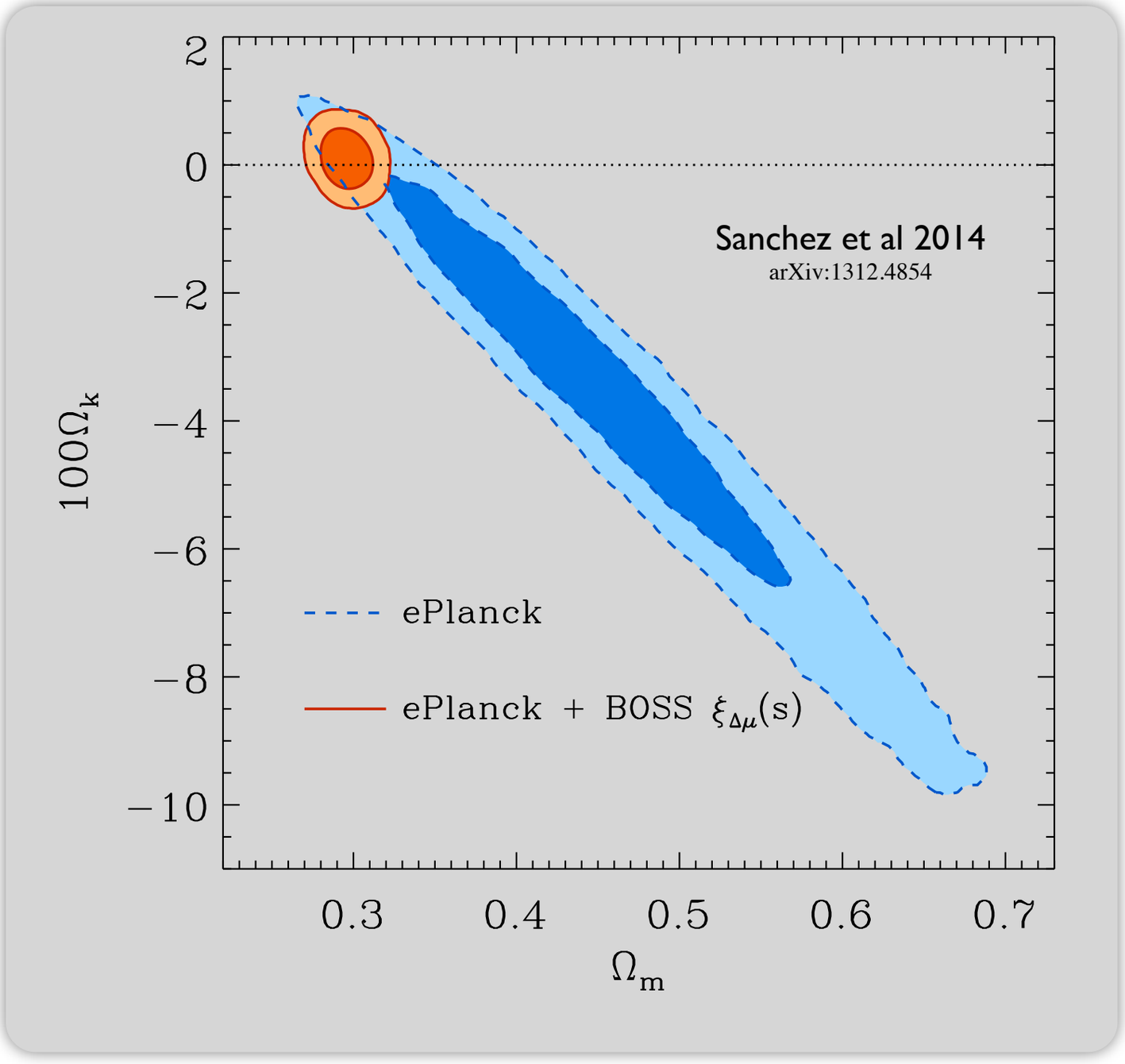
Caused by us, not the CMB!

T=2.73 K, everywhere

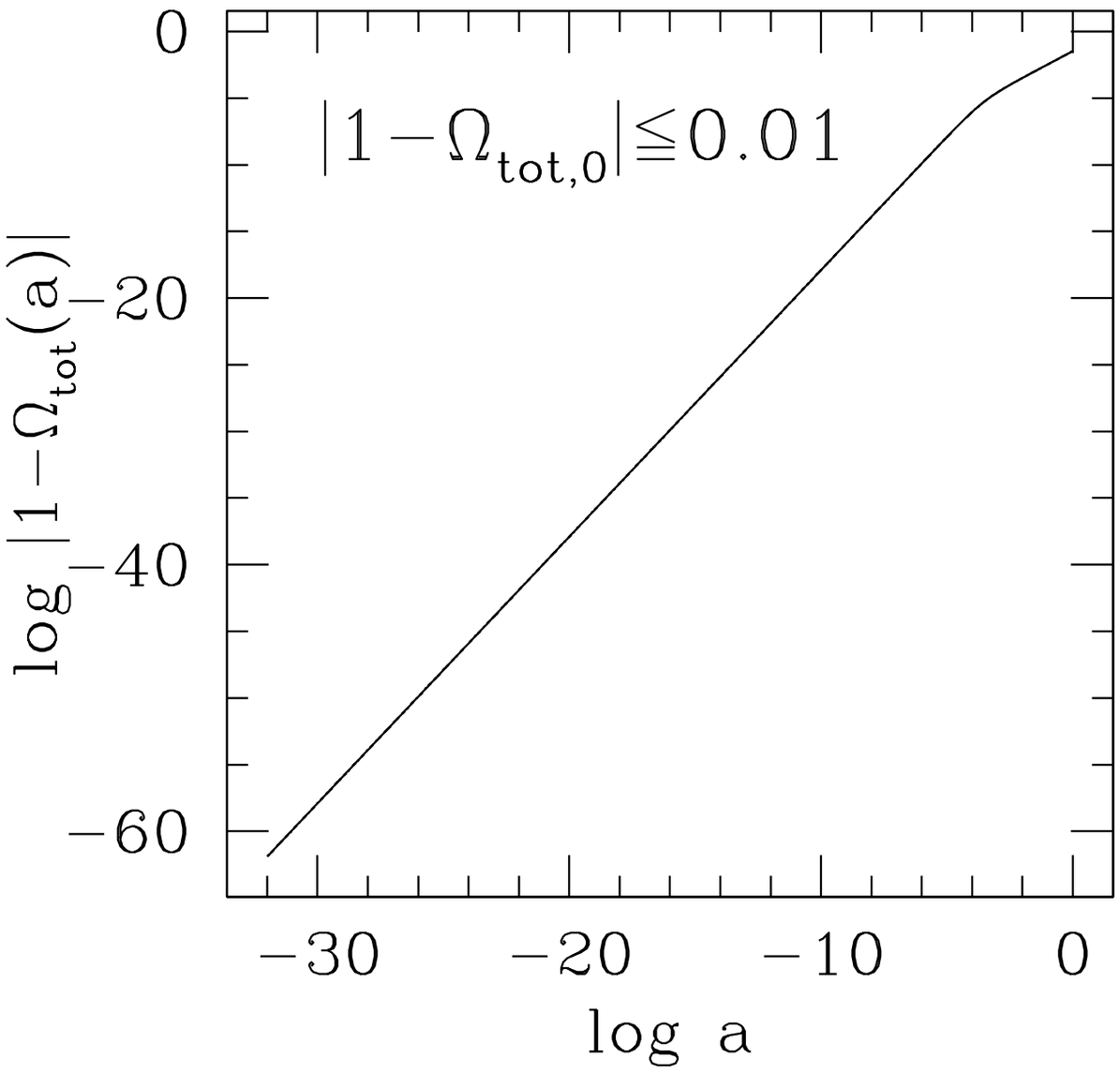
Rydenism: If you invite 20,000 people to a pot luck and everyone brings potato salad, you know they were talking to each other beforehand.

Flatness Problem

- We are, technically, flatter than a pancake.

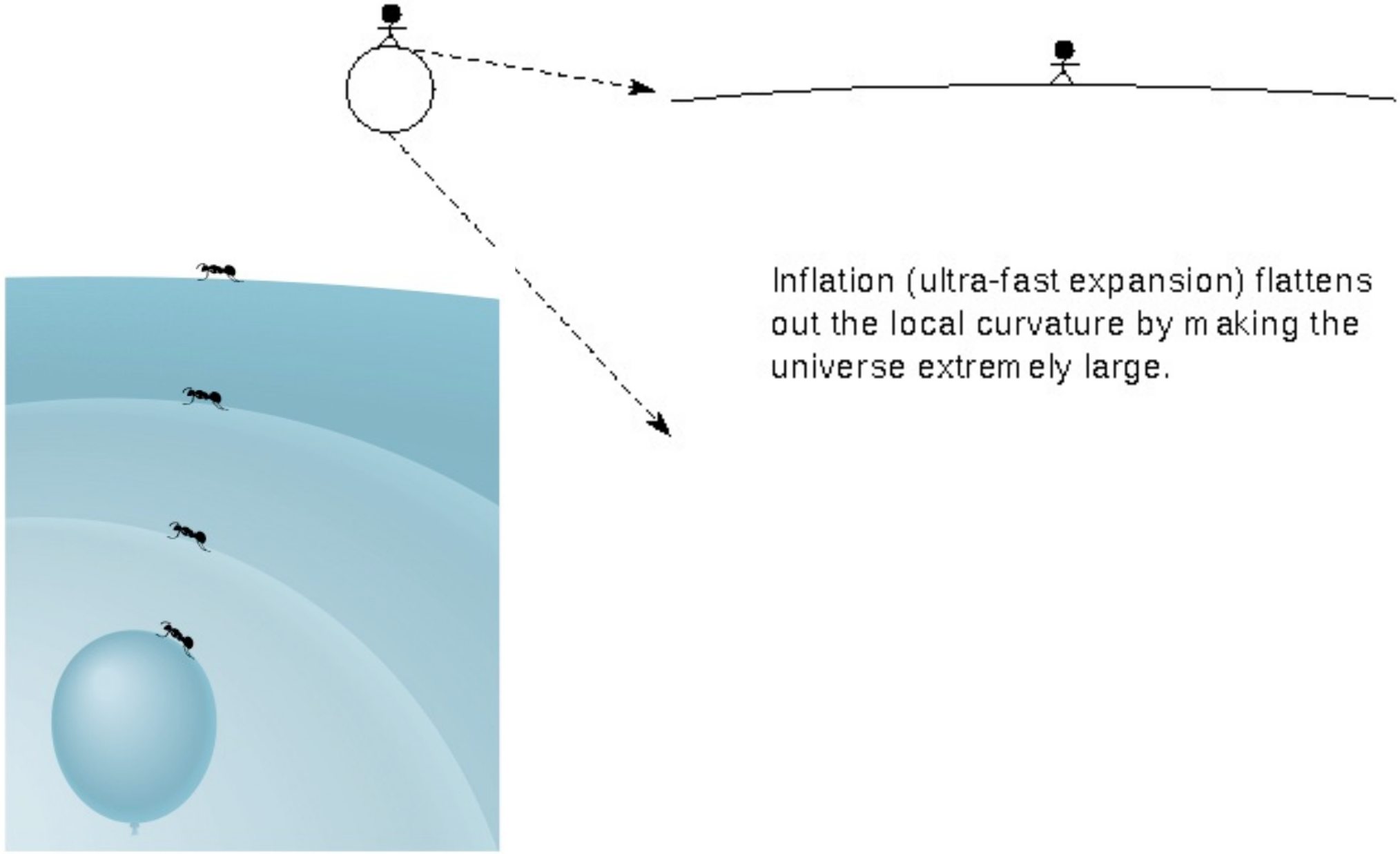


Flatness Problem



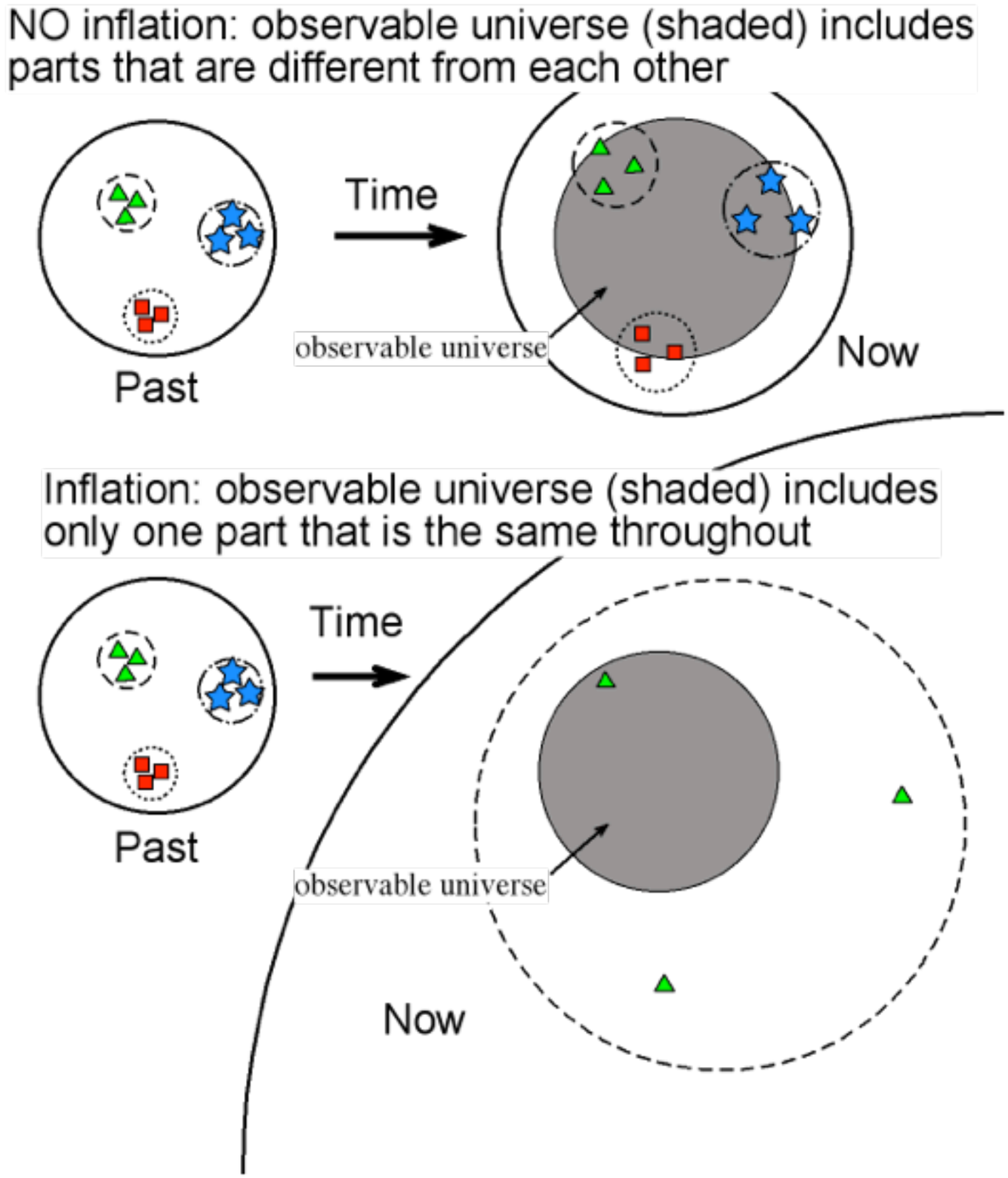
Rydenism: changing the mass of the sun by 1 part in 10^{60} would mean removing 2 electrons.

The Inflation Solution



Inflation (ultra-fast expansion) flattens out the local curvature by making the universe extremely large.

Inflation and the Horizon Problem



No Magnetic Monopoles... right?

Searches for magnetic monopoles [edit]

A number of attempts have been made to detect magnetic monopoles. One of the simpler ones is to use a loop of superconducting wire to look for even tiny magnetic sources, a so-called "superconducting quantum interference device", or SQUID. Given the predicted density, loops small enough to fit on a lab bench would expect to see about one monopole event per year. Although there have been tantalizing events recorded, in particular the event recorded by Blas Cabrera on the night of February 14, 1982 (thus, sometimes referred to as the "Valentine's Day Monopole" [38]), there has never been reproducible evidence for the existence of magnetic monopoles.[13] The lack of such events places a limit on the number of monopoles of about one monopole per 10^{29} nucleons.