

Next Two Weeks: a Roadmap

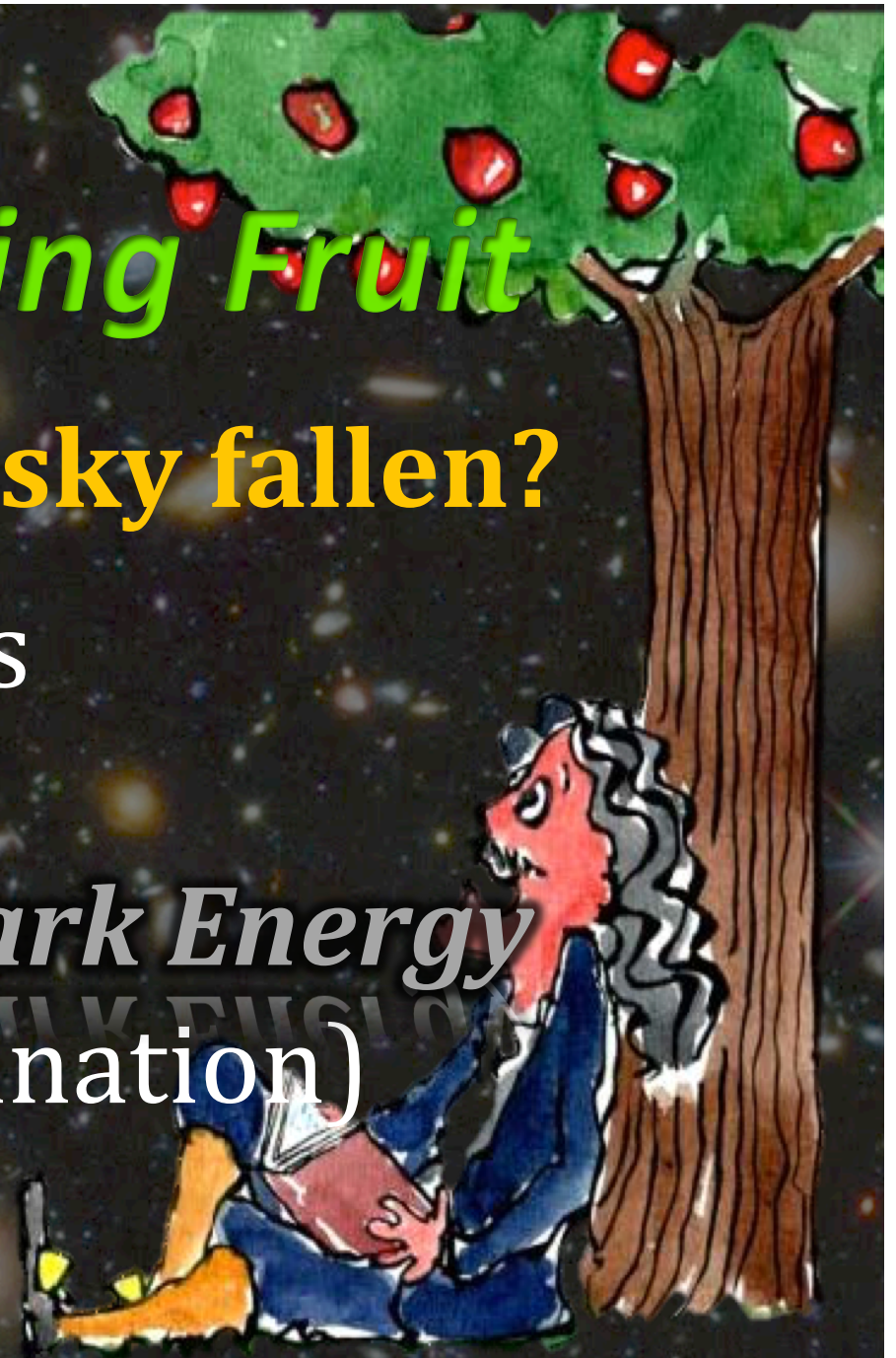
Finding our place, Relativity, the Expanding Universe

- Newton's Conundrum and Olber's Paradox
- Are we at the Center of the Milky Way?
 - Is there a cosmic center at all?
- Einstein and a radical new view of space and time
- Measuring cosmic distances and speeds
- Hubble et al. – A Universe that can't sit still
- Must time have a beginning?
 - The Big Bang vs Steady State models
- Searches for departures from the basic "Hubble Law"
- Measuring Cosmic Masses
- Dark Matter (chapter 6)

Low-Hanging Fruit

Why hasn't the sky fallen?

- Infinite Radius
- Finite Age
- Expanding *Dark Energy*
- (Or any combination)

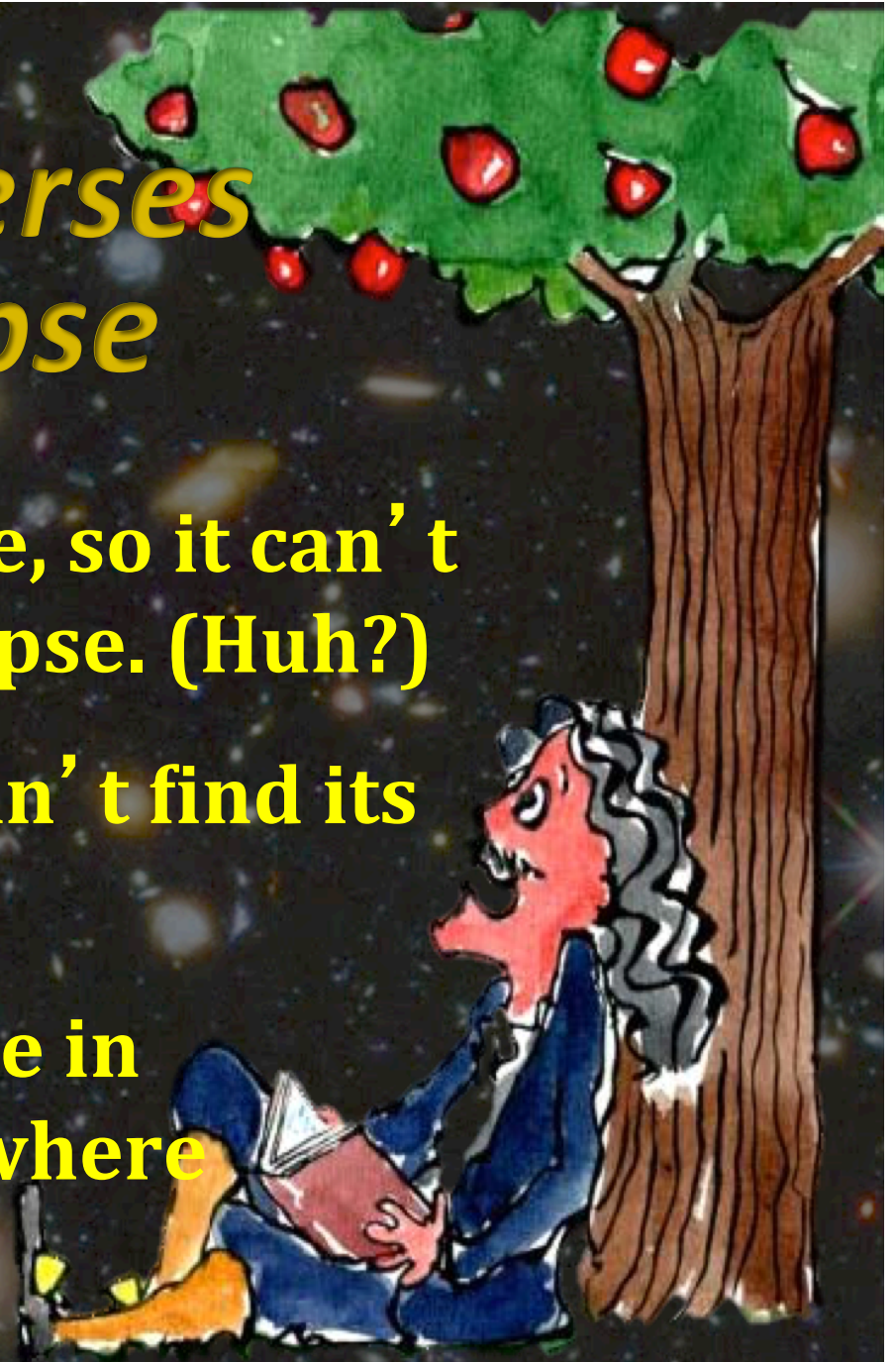


Infinite Universes don't Collapse

The Universe is infinite, so it can't figure out how to collapse. (Huh?)

An infinite Universe can't find its own center of gravity.

Gravitational forces are in perfect balance everywhere (except local lumps).



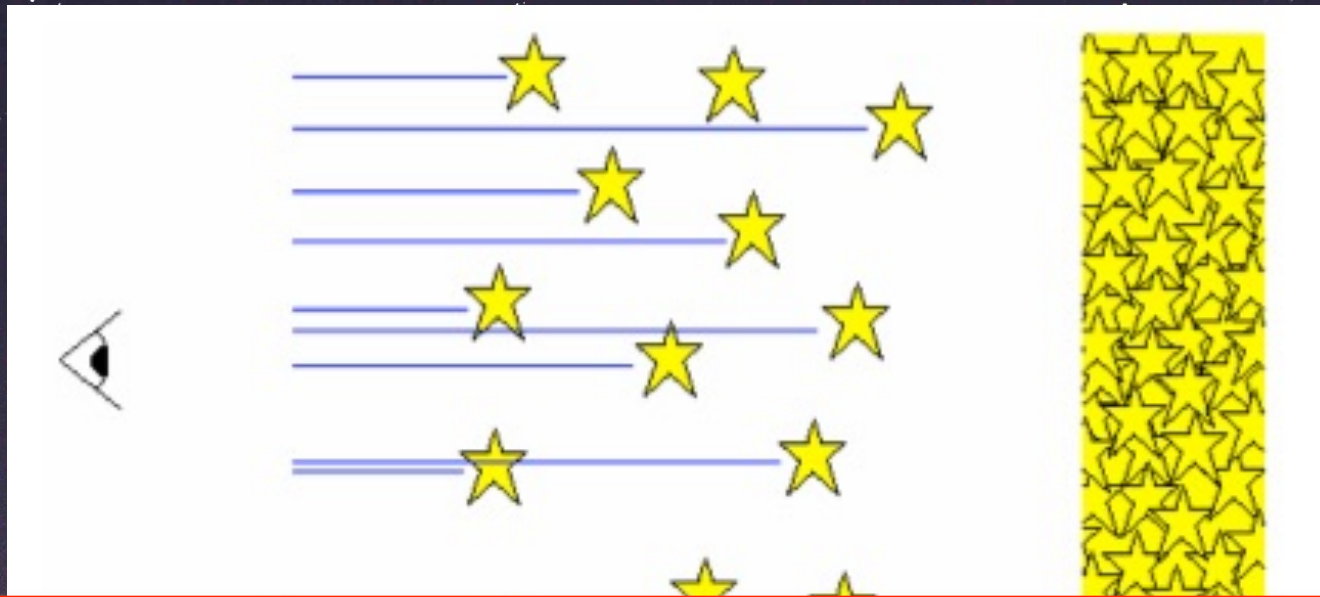
More Low-Hanging Fruit

Why is the night sky dark?

If the Universe is uniform, infinite, eternal, and static then stars are scattered randomly in space . . .

Low-Hanging Fruit

1. Why is the night sky dark?



then every line of sight would ultimately hit the bright surface of a star, and the entire sky would be about as bright as a star's surface!

Low-Hanging Fruit

Why is a dense forest opaque?



Why is the Night Sky Dark?

Three options:

1. The Universe
is finite...

There are no distant
stars, so we see voids
between the nearby
stars

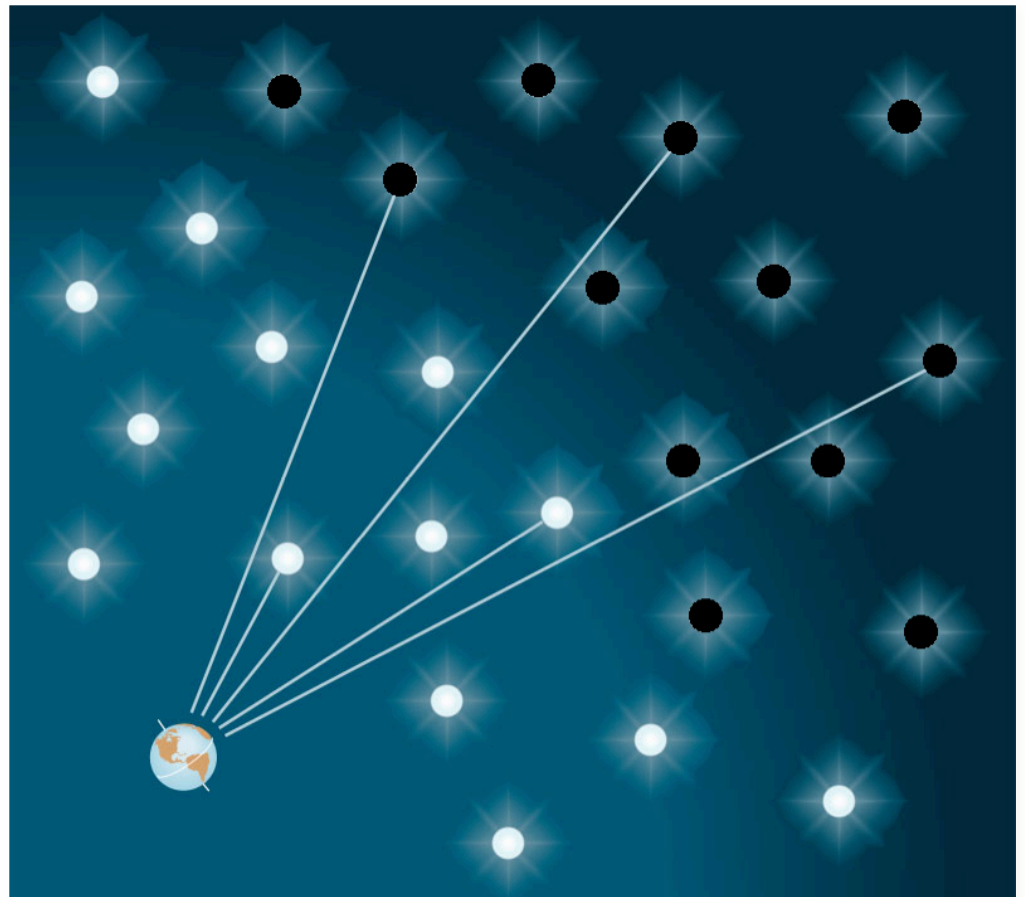


Why is the Night Sky Dark?

Three options:

2. The Universe
is not eternal...

The distant stars are
out there, but there
hasn't been time for
their light to arrive
(yet)

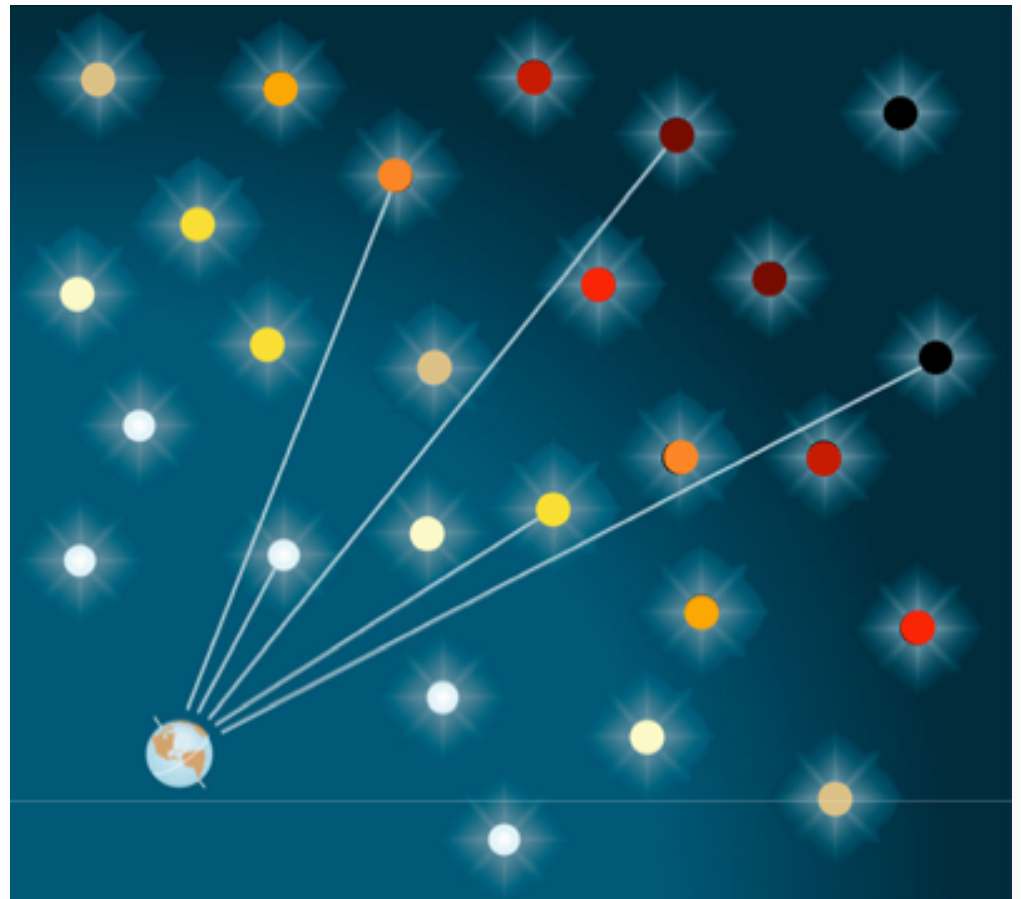


Why is the Night Sky Dark?

Three options:

3. The Universe
is expanding

The distant stars are there, but their light is so redshifted that we can't see them...



Why is the night sky dark?

- Finite Size
- Finite Age
- Expanding
- (Or any combination)