Lecture 28 — Cosmology (Part I)

So What is the Universe Made Of?

- Ordinary Matter (baryons)
  Stuff that people, planets, and stars are made of
- Dark Matter
  Needed to explain the way that galaxies rotate
- Matter
  Stuff that will slow that rate of expansion of the Universe (Dark Matter + Ordinary Matter)
- Curvature
  If the Universe is curved, there is curvature energy that must be accounted for
- Cosmological Constant
  Einstein originally included this in his equations as the "Cosmological Constant", Λ.

The Universe is Curved

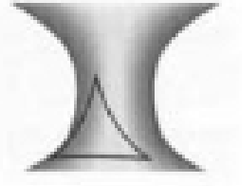
One way to know what kind of geometry should be used is to look at a triangle drawn on the surface.

POSITIVE CURVATURE

In positively curved space, the sum of the angles of a triangle are greater than 180 degrees. This is spherical geometry.

FLAT SPACE

In flat space, the sum of the angles of a triangle are equal to 180 degrees. This is plane geometry, or Euclidian geometry.



NEGATIVE CURVATURE

For negative curvature, the sum of the angles is less than 180 degrees. Sometimes this is called Hyperbolic geometry.