

# **What happened**

## **(history of universe in 3 slides)**

- **Universe begins, incredibly hot and dense (note why it begins may or may not be testable scientifically)**
- **Has very small fluctuations of little bit more or less matter in places (because of quantum mechanics).**
- **These fluctuations grow over time through gravity to make structures in the universe today (galaxies, clusters of galaxies).**
- **Early on very rapid period of expansion called inflation.**

# **What happened**

## **(history of universe in 3 slides)**

- As it expands and cools, several key times are when it makes helium nuclei (a few minutes) and when it becomes transparent to photons (cosmic microwave background). These provide key observational evidence for these early times.**
- After about 700 million years, biggest density fluctuations have grown enough to start making the first galaxies, and within these the first stars.**
- Gravity causes these galactic structures to grow by merging with each other, and as they get bigger they keep forming more stars.**

# **What happened**

## **(history of universe in 3 slides)**

- **Fusion in more massive stars turns H and He into heavier elements, ejected into space by supernovae and incorporated into next generation of stars. Cycle continues until most gas is in stars.**
- **As stars form, disks are formed around them because of angular momentum conservation. Planets are made in these disks.**
- **Overall fate of universe governed by expansion, gravity of matter pulling it together, and it turns out dark energy making the expansion accelerate.**