

## The Big Bang

Scientists believe that gravity divided from the forces of nature combined with a nuclear explosion, to bring the universe to its current state. Ever since this event the universe has been expanding. Einstein's model was one of the first to predict the expansion of the universe; recently there was a discovery made by Edwin Hubble in 1929 concluding that this expansion is exponential. In other words, the farther away a galaxy is, the faster it is moving away.

Hubble's Law- By creating a graph with the speed of movement versus distance, Hubble determined an equation for the rate of expansion in the universe:

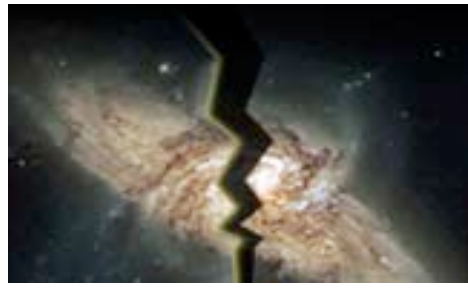
$$v=Hd$$

v= velocity (kilometers/second)

d=distance (Mpc-megaparsecs)

H=Hubble Constant (kilometers/second/megaparsec)

This is the slope of the graphed line



Ali Totta & Becca Bell  
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**The following are a few of the many and controversial theories that scientists have created determining the fate of our universe...**

**The Big Rip-** As the universe continues to expand at an exponential rate following the equation  $v=Hd$ , the stretching could begin to tear matter apart. The force behind this is a mystery scientists refer to as "dark energy". This force counteracts gravity and the natural state of all things in our universe. As the matter is torn apart, 20 billion years from now the universe could be wrenched apart in an event more catastrophic than its birth, this would be known as the "big rip."

**The Big Crunch:** If there is a substantial amount of matter within the universe, eventually gravity will take over and stop the expansion of the universe. The outward expansion will then become inward, as it cannot bear its own weight. From here scientists are unsure of the next phase, there may be a collapse into an immense black hole or possibly re-explosion forming another big bang, creating a continuous cycle between crunches and bangs.

**The Big Chill-** If the universe does not have enough matter in it for gravity to reverse its increasing rate of expansion, it will expand forever. As the stars grow farther apart they will grow dimmer and dimmer. The stars will exhaust their nuclear fuel and will burn out, leaving a universe without heat or light, a state known as the Big Chill.

Citations:

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[http://www.actden.com/sky\\_den/bigchill.htm](http://www.actden.com/sky_den/bigchill.htm)