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## Cosmic Beginning: How Did the Universe Begin and How Do We Know?

Have you ever wondered how the universe came into existence? It's a question that has puzzled scientists and thinkers for centuries. In this reading passage, we'll embark on a journey to explore the fascinating story of the universe's origin and how we have uncovered the clues that help us understand this cosmic mystery.

### The Birth of the Universe: The Big Bang Theory

The most widely accepted theory about the origin of the universe is the Big Bang theory. According to this theory, the universe began as an unimaginably hot and dense point around 13.8 billion years ago. Then, suddenly, it exploded, creating everything we see around us today.

But how do we know about this explosive beginning? Let's explore some of the key pieces of evidence that support the Big Bang theory:

**1. Cosmic Microwave Background Radiation:** One of the most significant pieces of evidence for the Big Bang is the cosmic microwave background radiation (CMBR). Imagine if you could listen to the universe's "echo." That's what the CMBR is – it's the afterglow of the Big Bang. Scientists discovered this faint radiation, which fills the universe uniformly, using specialized instruments. It is a snapshot of the universe when it was just 380,000 years old.

**2. Redshift of Galaxies:** When astronomers observe distant galaxies through telescopes, they notice something remarkable: most galaxies are moving away from us, and the farther they are, the faster they are moving. This phenomenon is called redshift. Edwin Hubble, a famous astronomer, made this discovery in the early 20th century, providing strong evidence that the universe is expanding. If we play this cosmic movie backward, it leads us to the conclusion that the universe had a definite starting point – the Big Bang.

**3. Abundance of Light Elements:** The Big Bang theory also predicts the abundance of light elements like hydrogen and helium in the universe. Observations of the universe's composition match the predictions made by the theory, further supporting its validity.

**4. Formation of Galaxies and Cosmic Structures:** Computer simulations and observations of galaxies and cosmic structures also align with the predictions of the Big Bang theory. As the universe expanded and cooled, matter clumped together, forming galaxies, stars, and clusters of galaxies.

**5. Hubble's Law:** Hubble's Law, derived from Hubble's redshift observations, tells us that the velocity at which galaxies are moving away from us is directly proportional to their distance. This law provides additional evidence for the expansion of the universe and its starting point at the Big Bang.

