Scientists study the cosmic microwave background radiation (CMB) primarily through observations made with specialized telescopes and satellites designed to detect microwave radiation from space. The most famous of these instruments is the Wilkinson Microwave Anisotropy Probe (WMAP) and the Planck satellite.

The CMB is the remnant radiation from the early universe, emitted when the universe cooled enough for atoms to form, about 380,000 years after the Big Bang. By studying the properties of the CMB, scientists can gain valuable insights into the early universe and the processes that occurred during its infancy. Here's how:

1. **Primordial Density Fluctuations**: The CMB carries imprints of tiny fluctuations in the density of matter in the early universe. These fluctuations are thought to be the seeds of structure formation, eventually giving rise to galaxies, clusters of galaxies, and other cosmic structures we observe today.
2. **Cosmic Geometry**: The CMB provides information about the geometry of the universe. By studying the patterns of temperature fluctuations in the CMB, scientists can measure key cosmological parameters, such as the curvature of space, the age of the universe, and the relative amounts of dark matter and dark energy.
3. **Cosmic Inflation**: The CMB can also provide insights into the phenomenon of cosmic inflation, a period of rapid exponential expansion thought to have occurred in the very early universe. Inflationary models predict specific patterns of temperature fluctuations in the CMB, which can be compared with observational data to test the validity of these theories.
4. **Composition of the Universe**: By analyzing the polarization of the CMB, scientists can study the composition of the universe and the properties of its constituent components, such as ordinary matter, dark matter, and dark energy. This can help constrain models of particle physics and cosmology.

Overall, the cosmic microwave background radiation is a powerful tool for studying the early universe and testing theories of cosmology and fundamental physics. Its precise measurements have provided crucial insights into the origin, evolution, and composition of the cosmos.