

Cosmic Times 2006 Glossary

acoustic

of or relating to sound

anisotropy

The property of having measurements that differ when measured in a different direction.

astrophysicist

A person who studies the part of astronomy that deals principally with the physics of the universe, including luminosity, density, temperature, and the chemical composition of stars, galaxies, and the interstellar medium.

blackbody radiation

Blackbody radiation is produced by an object which is a perfect absorber of heat. Perfect absorbers must also be perfect radiators. For a blackbody at a temperature T , the intensity of radiation emitted I at a particular energy E is given by Planck's law:

$$I(E,T) = 2 E^3 [h^2 c^2 (e^{E/kT} - 1)]^{-1}$$

where h is Planck's constant, k is Boltzmann's constant, and c is the speed of light.

cosmic microwave background (CMB)

The background of radiation mostly in the frequency range 3×10^8 to 3×10^{11} Hz discovered in space in 1965. It is believed to be the cosmologically redshifted radiation released by the Big Bang itself.

cosmology

The astrophysical study of the history, structure, and dynamics of the universe.

cosmological constant

A constant term (labeled Λ) which Einstein added to his general theory of relativity in the mistaken belief that the Universe was neither expanding nor contracting. The cosmological constant was found to be unnecessary once observations indicated the Universe was expanding. Had Einstein believed what his equations were telling him, he could have claimed the expansion of the Universe as perhaps the greatest and most convincing prediction of general relativity; he called this the "greatest blunder of my life".

cosmos

The universe as a whole

dark energy

Dark energy is a hypothesized form of energy in space that exerts a negative pressure. This changes the gravitational effect to account for the differences between the theoretical and observational results of gravitational effects on visible matter.

dark matter

Name given to the mass whose existence is deduced from the analysis of galaxy rotation curves but which until now, has escaped all detections. There are many theories on what dark matter could be. Not one, at the moment is convincing enough and the question is still a mystery.

dwarfed

Appearing smaller or inferior

fluctuations

Variations in the primordial universe

Integrated Sachs-Wolfe Effect

The Sachs-Wolfe effect, named after Rainer Kurt Sachs and Arthur Michael Wolfe, is a property of the cosmic microwave background radiation (CMB), in which photons are gravitationally redshifted, and the spectrum appears uneven.

luminous

Emitting light

Near-infrared telescopes.

Near-infrared telescopes collect light in the region of the electromagnetic spectrum just below visible light. Whereas, most infrared radiation is warm, near-infrared waves are not hot at all – in fact, you cannot even feel them. These shorter wavelengths are the ones used by your TV's remote control.

optical telescopes

A telescope that collect light in the region of the electromagnetic spectrum that is visible light.

polarization

A special property of light; light has three properties, brightness, color and polarization. Polarization is a condition in which the planes of vibration of the various rays in a light beam are at least partially aligned.

quintessence

A hypothetic form of dark energy, a scalar field that accelerated the expansion of the universe.

remnant

Left over; a surviving trace or vestige

Standard candles

An object in the universe of known luminosity that can be used to calculate distances.

supernova

(a) The death explosion of a massive star, resulting in a sharp increase in brightness followed by a gradual fading. At peak light output, these type of supernova explosions (called Type II supernovae) can outshine a galaxy. The outer layers of the exploding star are blasted out in a radioactive cloud. This expanding cloud, visible long after the initial explosion fades from view, forms a supernova remnant (SNR).

(b) The explosion of a white dwarf that has accumulated enough material from a companion star to achieve a mass equal to the Chandrasekhar limit. These types of supernovae (called Type Ia) have approximately the same intrinsic brightness, and can be used to determine distances.

Theory of General Relativity

The geometric theory of gravitation developed by Albert Einstein, incorporating and extending the theory of special relativity to accelerated frames of reference and introducing the principle that gravitational and inertial forces are equivalent. The theory has consequences for the bending of light by massive objects, the nature of black holes, and the fabric of space and time

undulations

A wavelike motion in a medium without permanent movement of the particles.

Wilkinson Microwave Anisotropy Probe (WMAP)

A NASA satellite designed to detect fluctuations in the cosmic microwave background. From its initial results published in Feb 2003, astronomers pinpointed the age of the universe, its geometry, and when the first stars appeared.