

TIMECODE LIGHT, BEYOND BRIGHTNESS AND COLOR

00: 00.00

00: 00.35 To talk about light, let's first remove it.

00: 00.40 *If you wonder what the origin of light is, the answer is immediate. Light comes to us from outer space, from the stars and the Sun.*

00: 00.49 *Inside all stars, there are countless collisions between gas atoms due to the high pressure and temperature of the core. This causes the release of huge amounts of energy.*

00: 01.02 *Much of this energy is released in the form of light and heat. This heat emerges from the boiling surface of the Sun, in huge jets of fire and bursts of gas, surrounding its surface.*

01: 11.00 *These rays of light travel through space at almost THIRTY-THOUSAND KILOMETERS PER SECOND!*

01: 17.00 *This means that they arrive on Earth from the Sun in just eight and a half minutes. While we do not perceive any color in sunlight, this white light is actually the mixture of several colors. We can appreciate this when the light passes through a different medium; for example, through water droplets or ice crystals.*

01: 22.00 *This is the same phenomenon that occurs when light passes through a glass prism ...*

01: 36.00 *Now we know how light is produced inside stars. But then, what is light?*

01: 41.00 *It was originally suggested that the Light moved only in the form of electromagnetic waves, which can be very large or very small.*

02: 00.00 *Later it was found that the Light also behaved like a torrent of tiny particles that scientists call photons.*

02: 15.00 *A third idea has emerged, that the Light behaves like a rope that moves in a straight line, consisting of intertwined electric and magnetic fields.*

02: 27.00 *Light disperses in the form of waves with different wavelengths.*

02: 35.00 *Isaac Newton observed that when a ray of light passes through a prism, it spreads out in a continuous spectrum, showing different colors, because visible light has many different wavelengths.
Each wavelength corresponds to a different color.*

02: 51.00 *Till now, we only spoke about visible light.*

Actually there are many other wavelengths that human beings are unable to perceive.

02: 58.00 *These are other types of radiation that we currently use to our advantage, thanks to technological development.*

04: 11.00 *Radio waves are emitted by energetic interactions between different objects in space and can be captured by satellite dishes, known as radio telescopes.*

04: 27.00 *Microwaves are used in telecommunications, for weather information and in microwave ovens.*

04: 37.00 *The infrared spectrum is used by scientists to detect, from Earth or from space, the heat*

emitted by the bodies they observe. On Earth, vegetation and even pests can be detected by infrared light. We use infrared in our television remote controls.

04: 58.00 *The part of the spectrum that we can see is relatively small, but these colors give additional information about the age, temperature and chemical composition of stars ...*

05: 11.00 *The red ones are the least hot, the yellow ones are of intermediate temperature, and Blues and violets are the hottest.*

05: 22.00 *The next range is ultraviolet light, invisible to us and considered to be of high energy. These are the rays that burn your skin on a sunny day. They also help the study of the ozone layer and give us information about young distant galaxies.*

05: 41.00 *Then there are the X-rays, which have very high energies and such small wavelengths that they can pass through us. This is why they are so useful in medicine when doctors take an x-ray image.*

X-rays are produced by hot objects such as supernovae, pulsars and the Sun's corona.

06: 03.00 *Finally, there are the rays with the highest energy, Gamma rays and cosmic rays. These are*

generated by the most violent events in the Universe, such as explosions of massive stars and the interaction of black holes with matter.

06: 19.00 *Although the Universe is mainly studied through the photons that enter a telescope or camera, it is also studied through the radio waves picked up by our huge antennae. This has allowed great Mexican scientists to make important discoveries. For example, Luis Felipe Rodríguez, in his doctoral thesis, making use of the great Green Bank radio telescope in West Virginia, United States, showed us evidence of a black hole in the centre of our galaxy, the Milky Way.*

06: 55.00 *Let's enjoy the wonderful world of light.*