Sunday, August 12, 2018

How get stars in 4 steps. Visible spectrum experiment, Story of a strange term.

The term spectrum, meaning "immaterial appearance" "illusion" applied, in the seventeenth century, to all optical phenomena that could not be explained.

Synonymous with accidental color, it was used for retinal impressions of simultaneous or successive contrast as well as for the iridescence seen at the edge of an object viewed through a prism.

Newton once used the term: Spectrum, to present his experiments in optics in his article published in 1671 about "his new theory of light and colors" Carefully proceeding, he projects a ray of white light from the sun passing through a flap through a hole 6 mm in diameter and deflected by a prism onto a wall, and obtains a spectrum (op cit, p 3076) about five times longer than wide.

Eliminating all other possible causes, Newton concludes that white light is a heterogeneous mixture of differently refrangible rays (op.cit., 3079)

Colors are not, he says, the qualifications of light, as it has been since Aristotle, but original properties, different in each ray; the less refrangible are red in color, and the most refrangible are deep purple, and this association of properties can not be broken by any means (op.cit., pp. 3081)

Color transmutations occur only when there is a mixture of rays. It is these colors obtained by mixing, and not those separated by the prism, which are illusory, fleeting and apparent.

The original or the first colors are red, yellow, green, blue and violet-purple, together with orange, indigo, and an indefinite variety of intermediate gradations.

A whole series of optical phenomena are thus explained, including the coloring of objects: he thus concludes on this point that the colors of natural objects have no other origin than this: they are variably constituted to reflect a kind of color in greater quantity than others (op cit, p 3084)

With these conclusions, it is clear that Newton will no longer use the term spectrum.

The prismatic colors (op.cit., Pp. 3087) are not illusory or intangible: the other colors are.

Newton's theory is immediately adopted by the public, but influential scholars, such as du Fay, doubt.

They point out that Newton presents as a fact what in reality is only a plausible hypothesis, his experience is not sufficient to prove that the prism does not create colored light rays, different by nature from white light.

Voltaire defends Newton's theory with a particular interpretation that transforms the continuous spectrum into seven main rays.

The Jesuit Castel resolutely opposes what he considers a fashion phenomenon.

What are, he said, those seven colors that the English scholar discerns, compared to the three who, as painters and dyers have known for a very long time, are enough to reconstitute an infinity?

After more than a century, intellectuals and philosophers like Goethe followed by Schopenhauer still challenge the constructions of physics.

For them, prismatic colors are a spectrum, a deceptive illusion.

The explanation by physiological causes, with the theory of Young and Helmholtz, of the trichromatic color synthesis, will solve the apparent contradiction between the practices of the colorists and the experiments of the physicists.

At the beginning of the nineteenth century, experiments with sunlight show that there is invisible radiation on both sides of the one that the prism spreads in colored rays.

In 1800, William Herschel discovered that a thermometer could be heated by exposing it to darkness on the red side; the following year Johann Wilhelm Ritter observes that paper soaked in silver chloride blackens

when he exposes it to the darkness of the violet side, faster than when he exposes it to violet.

The prismatic colors are therefore prolonged by invisible parts, infrared and ultraviolet.

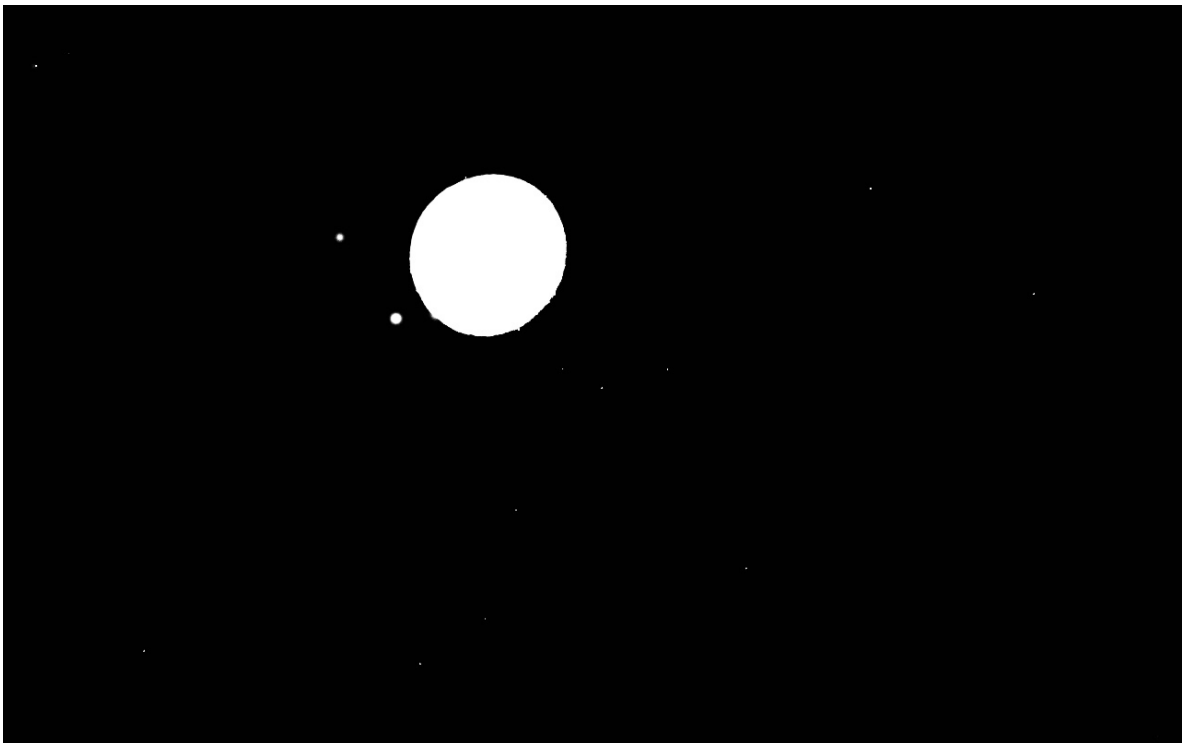
James Clerk Maxwell shows in 1864 that light is an electromagnetic disturbance.

The model of description of the periodic phenomena is applicable to it. Formulas used for acoustics describe electromagnetic vibrations; they emerge from the frequency analysis resulting from the harmonic analysis developed since Joseph Fourier for any periodic phenomenon.

Light is no more than a special case of electromagnetic wave.

Physics adopts the term spectrum, in the sense of a description of a signal by the frequencies or the wavelengths
(or even the energies) which compose it, which one obtains from the temporal description by the Fourier transformation. .

We must therefore specify visible spectrum when we speak of that of light.



How get stars in 4 steps

After the separation of optical and perception research, the arts of color and colorimetry adopt a series of characterizations of the color of their own.

The scientific study of objects based on the analysis of the light they emit is called spectroscopy.

A very important application of spectroscopy is astronomy, where spectroscopy is essential for the analysis of distant objects.

In particular, astronomical spectroscopy uses highly scattered instruments to observe the spectrum at very high resolutions.

Fraunhofer first saw the existence of dark stripes in the Sun's light, broken down by the prism.

Different chemical elements can be detected in the stars by the emission or absorption lines contained in their spectrum, the position of the lines in the spectrum can provide information on the nature of the chemical elements, as well as on the radial velocity of the stars.

The first exoplanets were thus discovered by analyzing the spectrum of stars at such a high resolution that small variations of their radial velocity, of a few meters per second,could be detected: the presence of planets was revealed by their gravitational influence on the stars analyzed, as well as their trajectories.

Posted by Veronica IN DREAM at 8:19 AM