C4.4 Where do the colors of the rainbow come from? – Tracking down technology

1 Living room lighting with light from light-emitting diodes

A light-emitting diode (LED) provides light.
This light is a certain color depending on the material used to make the LED. Because an LED converts the electricity directly to light and not largely to heat as conventional incandescent lamps do, it uses the electrical energy much better. An LED also lasts much longer than a normal incandescent lamp.
LEDs are used for lighting, for example, in flashlights or in bicycle lights, and also in living room lamps and headlights.

How an LED works:

A light-emitting diode consists of a small crystal that produces light when it is connected to a source of electricity. A light-emitting diode has two essential properties: First, it allows current to flow in only a certain direction (which is why you must pay attention to how an LED is connected to a current source, or else the LED won't light up at all). Second, the applied voltage must be sufficiently high so that current can even flow. This depends on the material used to make the LED. This material is called a semiconductor. Red LEDs need approx. 1.5 volts, green LEDs need approx. 2.5 volts, and blue LEDs need approx. 3.5 volts.
If you want "white" light for lighting instead of a particular color, you have to mix the light of LEDs of various colors. If you use a brightness controller to emphasize one color in particular and light the other colors less brightly, the lighting can be set so that any colors can be produced.

2 Color screen

Pictures are displayed on a color screen using thousands of tiny colored points of light.

Color screens can be made completely flat, which saves space. This is why they are very good for televisions, computer monitors, and smartphones.

How a color screen works:

Various technologies exist for making the pictures visible on color screens. First of all, you need very large number of small light sources, for example, red, green, and blue LEDs.
The pictures are composed of thousands, sometimes millions, of these tiny light sources. You can imagine this to be similar to when you compose a picture using fuse beads. The tiny points of light are called pixels. The more pixels a picture has, the finer and sharper the picture appears.
You can produce white light as well as all conceivable colors by mixing red, green, and blue light. A lot of electronics and technology are needed for this purpose.