

Mysteries of Photography #14: Light

Photography is all about light. But what is light?

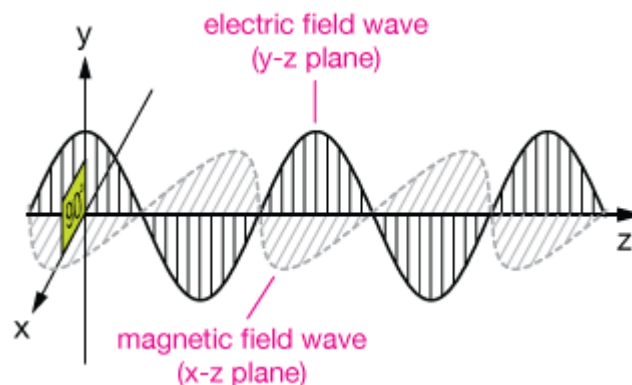
Most of the light in our environment comes from thermonuclear reactions in our sun where hydrogen left over from the Big Bang fuses together under immense heat and pressure to form helium in a complex dance of nuclear reaction that partially converts the mass lost during the fusion of the hydrogen nuclei to lots of light and heat.

OK, but what is light you ask? Well until Albert stuck his nose in, everyone knew light was a wave. Pass light through a slit and it behaved just like ocean waves passing through the break in a harbour wall. It took 30 years for Mr and Mrs Einstein's little boy to be proved correct that light came in discrete packets we now call photons.

But how can it a discrete entity but also act in concert with any other photons heading the same direction? This is where physicists don their most holy ceremonial robes and mutter the magic words: "Quantum Phenomena".

We now know that photons have oscillating electric and magnetic fields running at 90 degrees to each other and that light travels in a straight line at (ahem) the "speed of light" (unless they run into one of Albert's regions where space-time has a bend in it!) Hence light is logically termed "electromagnetic radiation".

The frequency of this oscillation and the speed of light gives us an observed frequency for that light.



Once you have a speed and frequency, we then know the wavelength of that light. The wavelength range for visible light is approximately **380 nanometres (nm) to 750 nanometres (nm)**. This range corresponds to the colours of the visible spectrum, which are:

- **Violet:** ~380–450 nm
- **Blue:** ~450–495 nm
- **Green:** ~495–570 nm
- **Yellow:** ~570–590 nm
- **Orange:** ~590–620 nm
- **Red:** ~620–750 nm

This is of course only a tiny part of the electromagnetic spectrum. It is simply the little bit that the visual pigments in our eyes can interact with.

Just remember while most of the light around us comes from the furnace of the sun, you too can make light with your own hands just by bashing the right type of rocks together (flint).

Follow up Mysteries:

1. What is colour?
2. Why is the grass green?
3. Refraction of light (lenses)
4. Diffraction of light (chromatic aberration)
5. Reflection and polarisation (circular polariser filters)

You might not think a lot of this month's article is relevant to your understanding of photography. Be patient. See the list of later topics. This is just the foundation!

To be continued.

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