TITLE - Experiments with photons

Summary apertures and slits
LCD/CRT Screens
Laser light

Author: Felipe Paz Gómez

Madrid 2016

Newton was right

The photon is a particle

Ripple waves
Summary experiments with slits / apertures

Author: Felipe Paz Gómez

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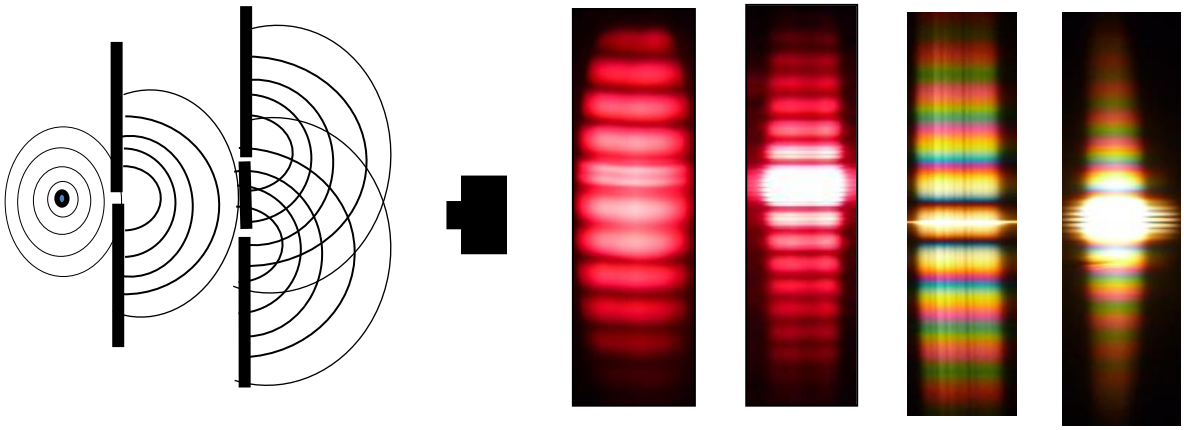
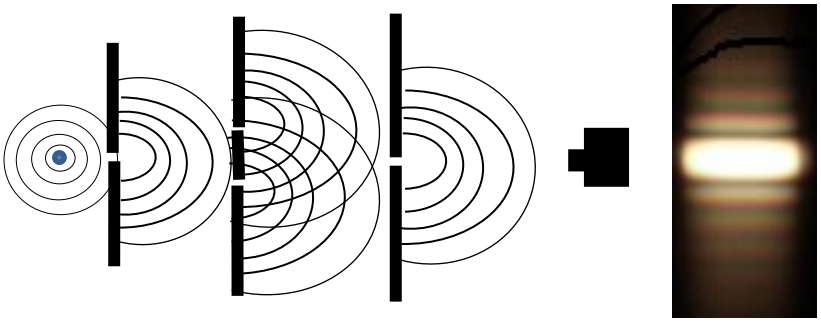
Experiments with a linear filament light source.

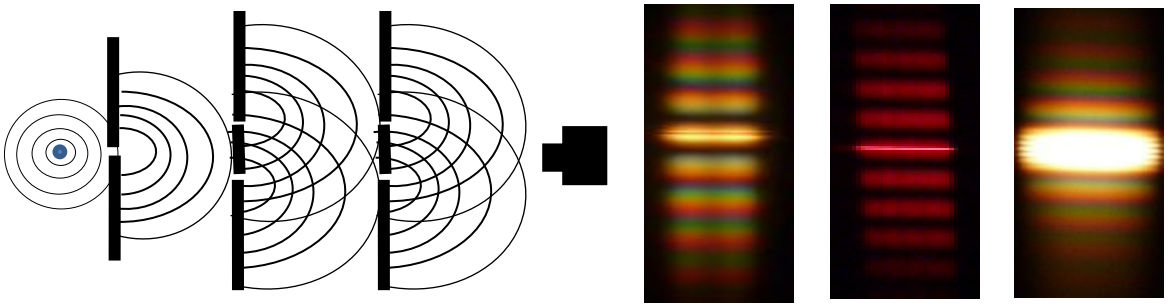
I. Characteristics of the experiment.
- Linear filament light, single frequency (red), which generates “cylindrical waves” (W.T).
- Single slit → Double aperture / Double slit, (0.1 mm).
- Direct observation and photograph with a digital camera.



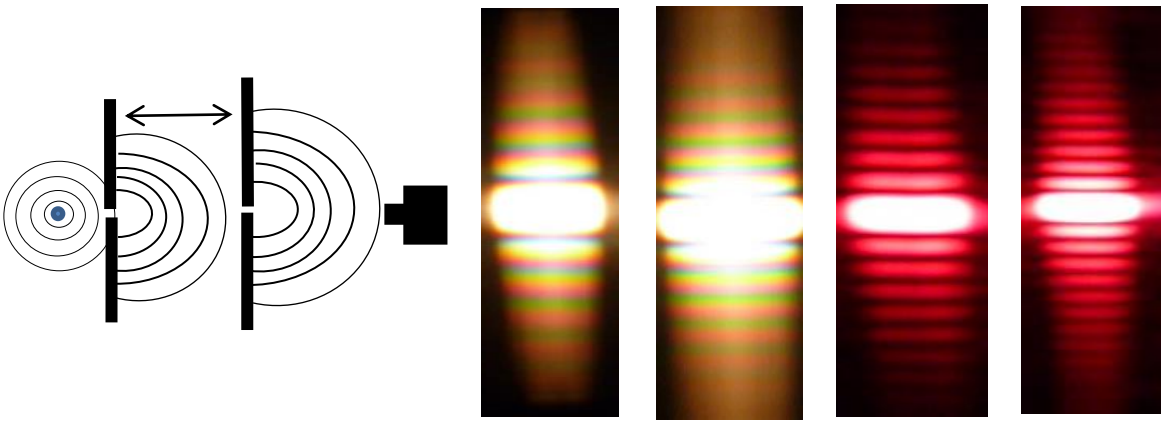
II. Characteristics of the experiment.
- Linear filament light, multi-frequency (white), which generates “cylindrical waves” (W.T).
- Single slit → Double aperture → Single slit (0.1 mm).
- Direct observation and photograph with a digital camera.



III. Characteristics of the experiment.
- Linear filament light, white and red, which generates “cylindrical waves” (W.T).
- Single slit → Double aperture → Double aperture / Double slit, (0.1 mm).
- Direct observation and photograph with a digital camera.



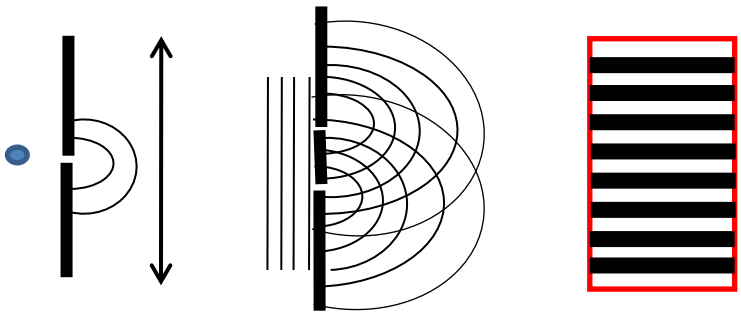
IV. Characteristics of the experiment.
- Linear filament light, white and red, which generates “cylindrical waves” (W.T).
- Single slit → Single slit (0.1/0,3 mm). Variable distance (⟷)
- Direct observation and photograph with a digital camera.



V. The following diagram is the classic representation that appears in all the Physics books we have studied in the Faculty and which is still valid. A paradigmatic experimental example of the “interferences” in “wave theory” (W.T.). Not to mention “quantum theory” which the “interferences” occur when the “wave photon” is divided into two, which simultaneously pass through the two slits they “interfere” on the screen or plate, giving rise to bands.

And don’t worry if the number of slits was odd rather than even. “Quantum minds” have solved that, too. It’s been published in prestigious Physics journals and accepted by them. Quantum Physics (Q.M.) has overcome the last obstacle! Has the “wave photon” triumphed?

The diagram is understandable to any student of Physics.



The experimental device consists of:

A light source. – A slit. – A convergent lens that converts the “initial waves” into “plane waves.” – A double slit that causes the “interferences.”

The light is “coherence”, since it comes from a single source, a necessary condition in the W.T.

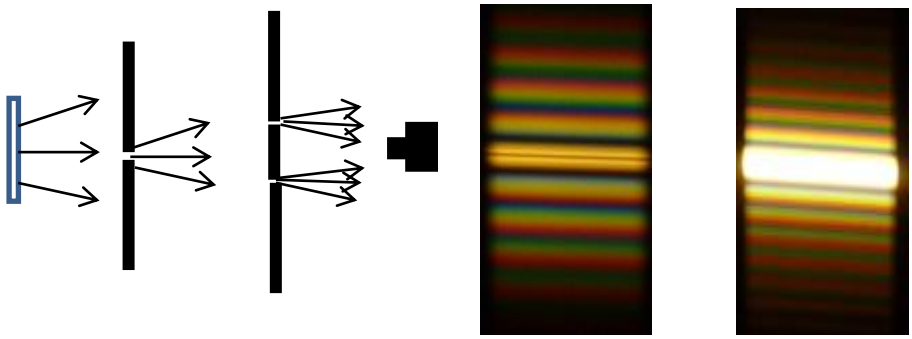
Considerations. Experiments **I** to **IV** and the results obtained must be explained by the W.T. In no case do there appear **black and white strips**, as was to be expected, if photographic plates or cameras that **detect colour** are used.

Experiments with surface light source (Su).

Definition: A luminous surface that emits light (photons) in all directions (**Su**). Mono-chromatic (**Su/colour**), multi-chromatic (**Su/B**).

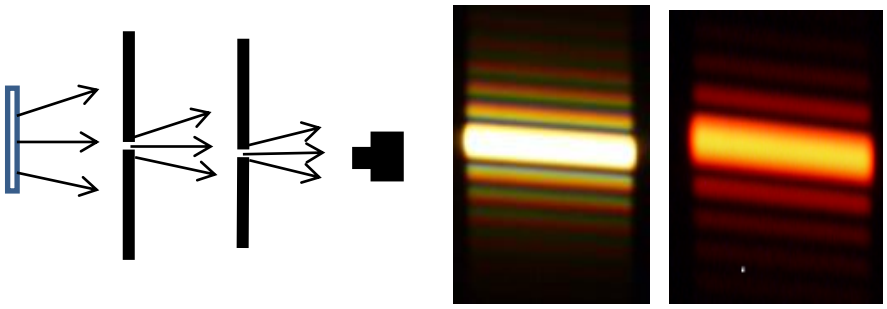
I. Characteristics of the experiment.

- Light Su/B, white, multi-frequency.
- Single slit (0.5 mm) → Double aperture / Double slit (0.1 mm).
- Direct observation and photograph with a digital camera, candle flame light.



II. Characteristics of the experiment.

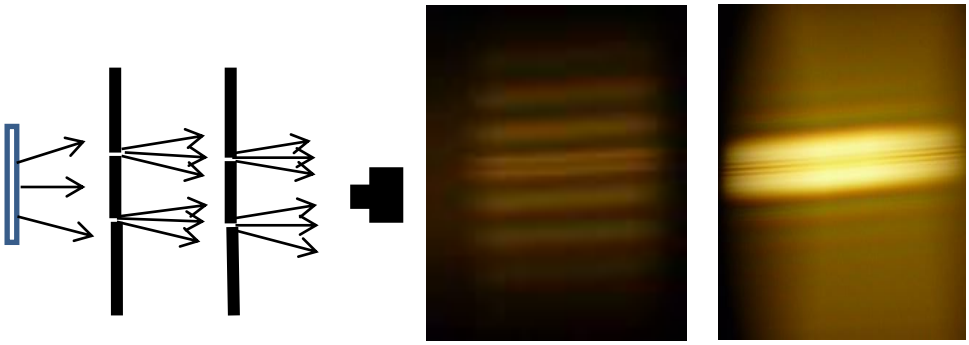
- Su/B Light, white, multi-frequency. Su/R.
- Single slit (0.5 mm) → Single slit (0.1 mm)
- Direct observation and photograph with a digital camera.



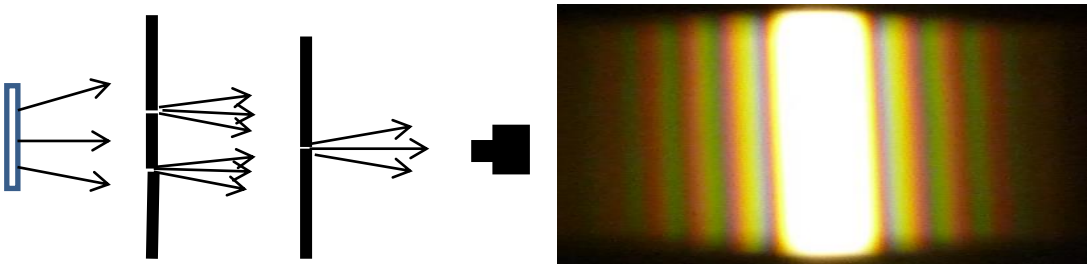
III. Characteristics of the experiment.

- Su/B Light, white, multi-frequency. Su/R.
- Double aperture (0.1 mm) → Double aperture / Double slit (0.1 mm)
- Direct observation and photograph with a digital camera.

IV.



Characteristics of the experiment.
- Su/B Light, white, multi-frequency.
- Double slit (0.1 mm) → Single slit / (0.1 mm)
- Direct observation and photograph with a digital camera.



Considerations. Experiments **I** to **IV** and the results obtained must be explained by the W.T. In no case do there appear **black and white strips**, as was to be expected, if photographic plates or cameras that **detect colour** are used.

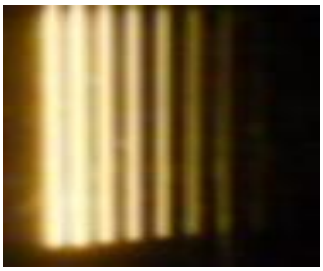
The light is not "coherence" by definition, since, it comes from a white surface.

The similarity of the photographs obtained with the different light sources, suggests a common explanation. Unless the W.T. and associated waves solve the problem for us.

Finally, easily-reproducible experimental results. The reader may or may not be in agreement. In both cases, it must give a Physical explanation.

Having observed the following photos, you have to deduce, describe how I have obtained them and if they are "interferences." As you see, if black and white strips appear constructive "interference" and "destructive" interference?

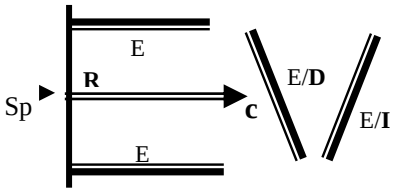
I show some of the many photos you may obtain:



Once you have thought about it, continue reading. Many of you will have discovered it. They are images in a mirror of an illuminated slit with white light (Su/B). It is obvious that if it were light (Su/C), the strips would be of the same colour. And the last photo composition?

The mirror (glass + reflective part) acts as a plane/parallel sheet. If the glass is colourless, the strips are always the **colour of the light source**.

Experimental setup with a 4mm mirror:



Mirror angled to the left, in a **"c"** direction, or to the right.

It is also observed if we place the mirror perpendicular to the plane of the slit and near **R.** The strips are more uniform.

Why do we introduce these experimental results?

So that we may talk about the so-called wavefront division and amplitude division interferometers.

Wavefront division. These use initial slits and reflections on glass mirrors.

If the strips observed with these "interferometers" were due to the mirrors that make it up, on using **white light,** we would observe brilliant strips separated by dark strips, on a colour plate, a colour camera or by direct observation.

Amplitude division. These use semi-silvered sheets and mirrors/mercury. In general, the light source is extensive. I would do the same test as in the previous case.

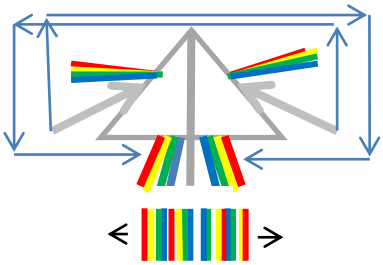
- If the result was black and white strips, its origin is obvious. There are no "interferences." They are due to the mirrors.

- If they were not generated by reflections in the mirrors, we would observe that each brilliant strip decomposes into coloured strips R / Yl / Gr / Bl / Vio. The colours are more or less defined and, according to the composition of the white light, some may not appear.

If we use monochromatic light, we would observe separated single-colour strips.

In summary: the "interferences" of the W.T are no more than diffractions caused by the edges of the apertures/slits, of the same type as those which originated in a prism or a diffraction grating. Are photons: "waves" or particles?

I have sketched the section of a transparent triangular prism and the result of the diffraction, on striking at a certain angle, a group of photons with parallel trajectories, from a luminous slit or a linear source.



And at the bottom, a composition resulting from rotating, adequately, the incident on two faces. As we see, they are similar to the results obtained with apertures, slits. The difference is in Ra/Re, we have several strips with fused, which confirms the interpretations given **G1 to G7, Volume I**. The white light is separated in its frequencies on crossing through a transparent material. How does this happen? Due to the action of the electromagnetic fields of the atom that make up the glass. Due to action of the electromagnetic fields of the atom that make up the edges of the Re/Ra. In both cases, what they cause in the photons is a dispersion according to its frequency and it separates their trajectories.

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