A wave pattern appears on a spectrum when a paper slit is placed across the spectroscope slit

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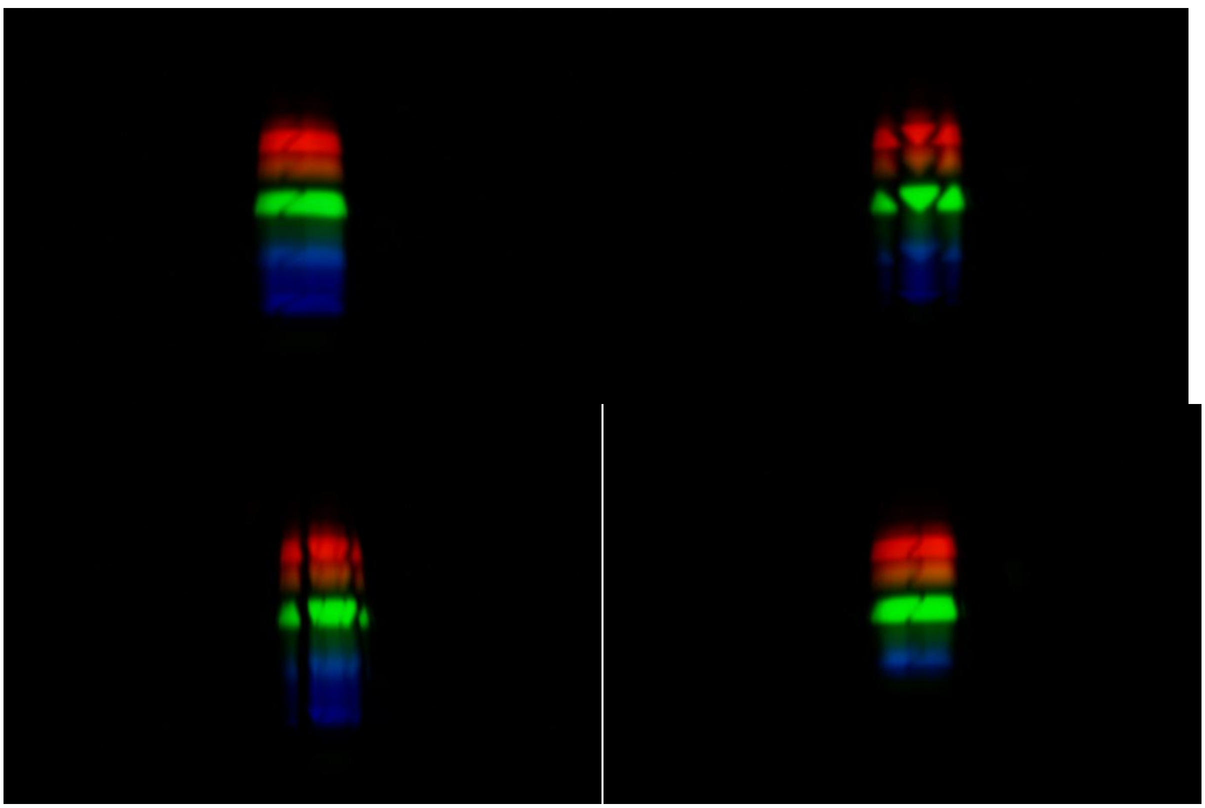
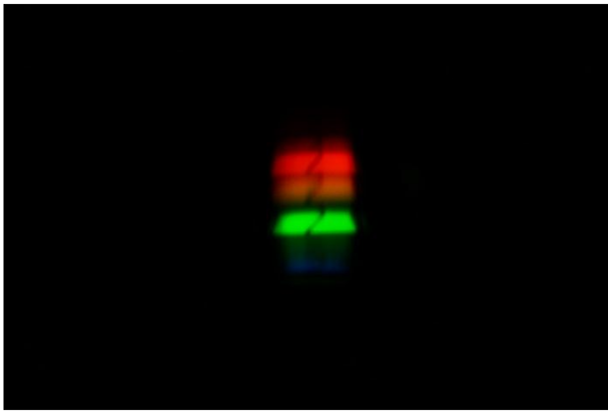
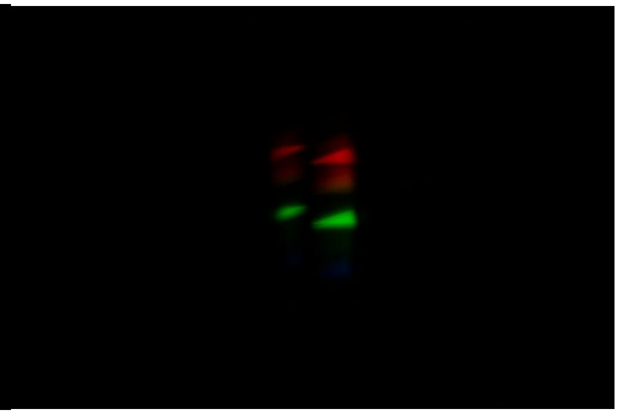
A wavelike pattern appears across the spectrum when a paper slit is positioned across the spectroscope slit. The "peaks" of this odd wave separates each spectral line. Emission lines seem to always have a "positive" amplitude. Absorption lines usually have a "negative" amplitude or a straight line.

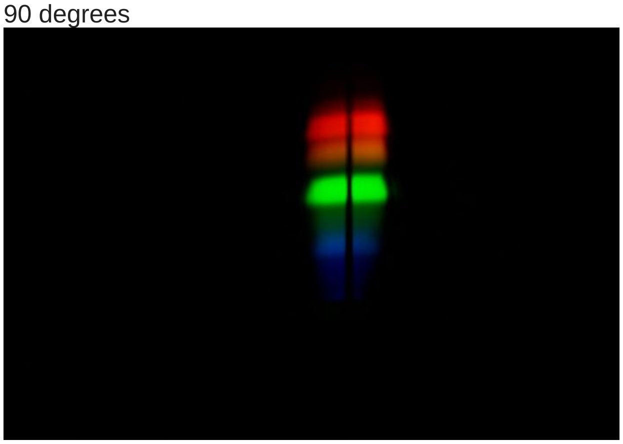
I used a spectroscope box with a slit, a cd and a viewing hole. I placed varying sized paper slits across the spectroscope slit at varying angles, this produced a wave pattern across the spectrum. I refer to this as the spectral wave. The spectral wave across the emission lines are seen in a certain way (top to bottom) and the spectral waves across the absorption lines usually are the opposite way (bottom to top). I included pictures of when I had the paper slit parallel to the spectroscope slit (interesting results with a line in each emission line) and at 90 degrees to the spectroscope slit, which showed no spectral wave at these positions. Pictures with multiple spectral waves have more than one paper slit on the spectroscope slit with one paper slit inverted to the other. Perhaps you may think this is diffraction, but the odd thing is that the spectral wave does not appear on a continuous spectrum which may be evidence this phenomenon is not diffraction because if it was, it should also be seen on the continuous (daylight) spectrum. The following images are from a light source that creates a non-continuous spectrum.



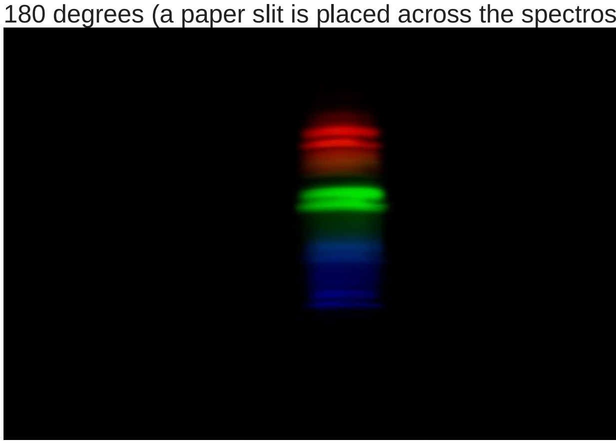




90 degrees



180 degrees (a paper slit is placed across the spectroscope slit like the double slit experiment)



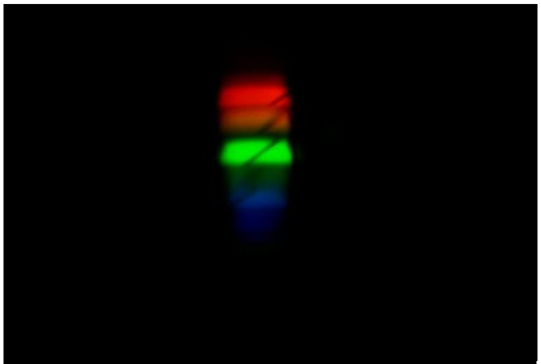
The amplitude of the wave increases the more the paper slit's angle decreases to the spectroscope slit. When the paper slit is parallel to the spectroscope slit, all emission lines have a line going through them. A larger angle to the spectroscope slit will produce a more squished spectral wave, until 90 degrees is reached, when the spectral wave straightens out into one continuous line.

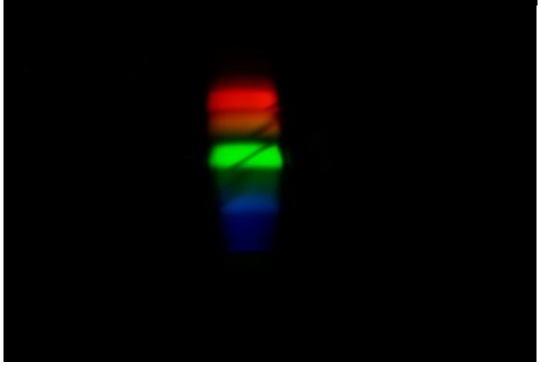
Discussion:

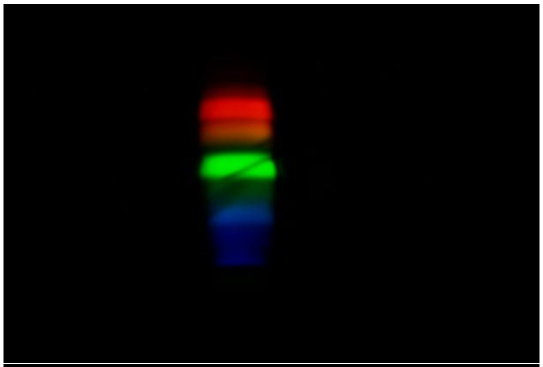
Just like water waves passing by you in a pool and you look from above the water towards a straight black line drawn on the pool floor, if you stand on this black line, the water waves make the black line look like a wave when you look at the black line to your left, the farther you look to the left the more compressed the black line seems from your viewpoint. If you look to your right at the black line through the waves, it is still a wave but inverted relative to the other side. Look down and the black line looks straight. The process of turning your head and shifting your gaze is analogous to rotating the paper slit. Now if there were no waves, the line would appear straight, just as it does when observing a continuous spectrum source. Thus this experiment may hold the answer to the wave particle duality of light. Sometimes we see a spectral wave (wave), sometimes we see a straight line (particle). We even see an interference shaped pattern in the picture labelled 180 degrees. This spectral wave may be extrapolated and be a signature form for an object, the same as a spectrum provides information. With this method, the slit can be very large for purposes of measuring the spectrum of very distant galaxies to measure their redshift as the emission lines can be very thick from a wider slit, and with the spectral wave, it is easy to differentiate the emission lines and absorption lines because of the spectral waves behaviour.

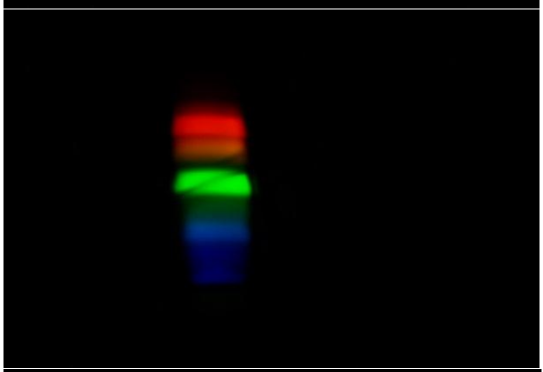
Another experiment:

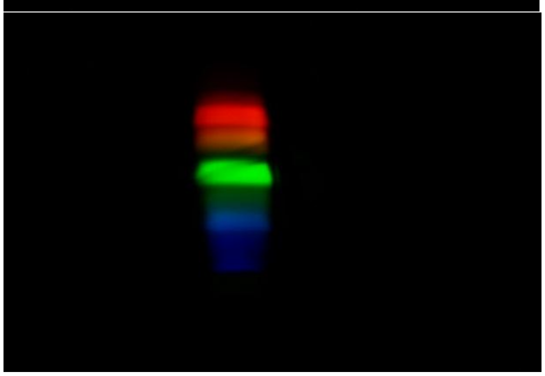
I hovered a thin paper slit between the slit and the cd grating and raised and lowered the paper slit (the paper slit was almost parallel with the spectroscope slit, just a few degrees off), when the paper slit was closer to the spectroscope slit, it showed an angled spectral wave, when I lowered the paper slit towards the cd grating, the spectral wave turned and the spectral wave started to straighten. The spectral wave rotates and straightens out when closest to the cd grating (I didn't rotate the paper slit at all). It appears that the slit is causing the paper slit's shadow to rotate in an interesting way. The process is shown in the following pictures:











This phenomenon also occurs with a continuous spectrum source, but without the wave pattern. The shadow from the paper slit on the spectrum rotates almost 90 degrees and is always a straight line.

Also note, when the paper slit is parallel to the spectroscope slit, there is one line in each spectral emission line as shown by the picture labelled 180 degrees. But when a continuous spectrum light source is used, this pattern does not appear.

To truly understand this odd behaviour, performing the experiment yourself will help you see the phenomenon better as the camera used isn't that great. Building the spectroscope is very cheap. Make sure to adjust the width of the spectroscope slit, use differing widths for the paper slit and use differing lengths from the spectroscope slit to the cd until you find the best combination.