A Spectral wave on a spectrum – A new discovery from an experiment which allows precision spectroscopy.

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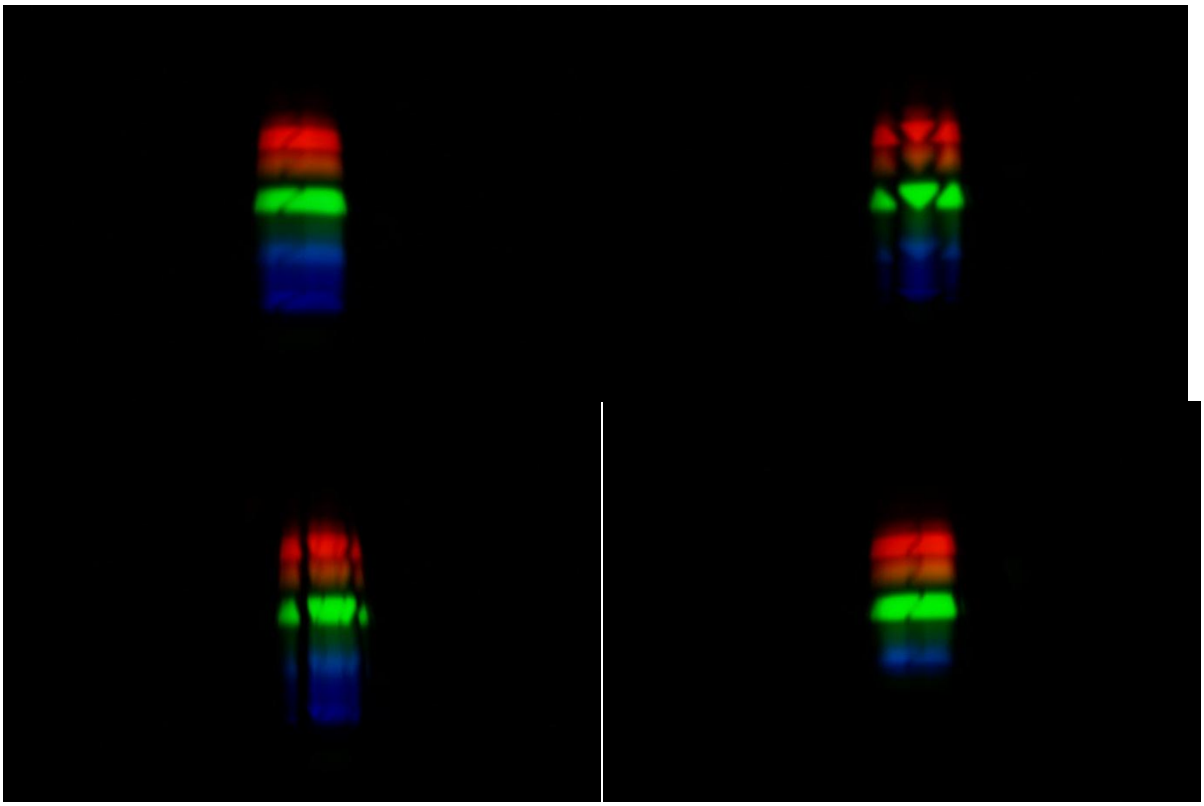
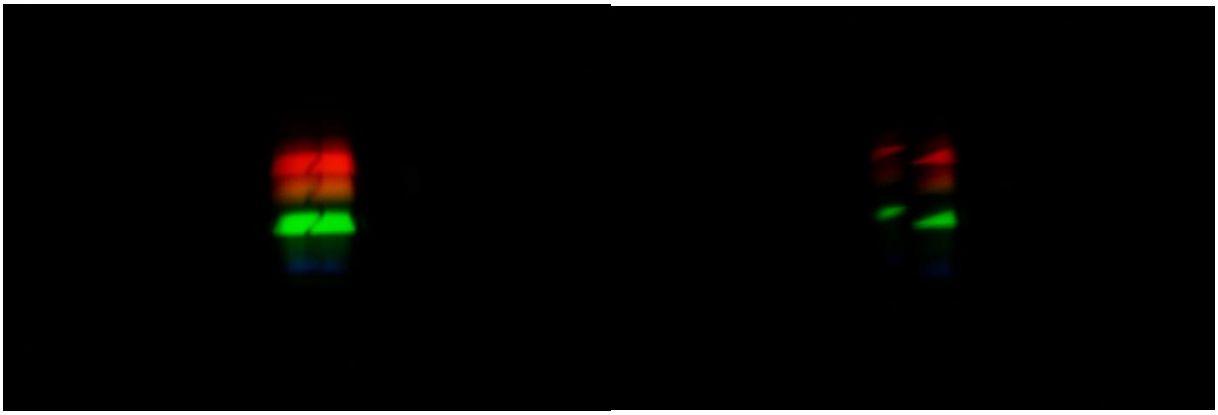
A wavelike pattern is produced across the spectrum when a paper slit is positioned across the spectroscope slit. The "peaks" of the wave separates each spectral line. Emission lines have a "positive" amplitude and absorption lines have a "negative" amplitude. This spectral wave can be extrapolated and be a signature form for any object, the same as a spectrum provides information, but more precise. With this method, the slit can be very large, and the emission lines can be very thick, and with the spectral wave, it is easy to differentiate the emission lines and absorption lines because the spectral wave flips for absorption and emission lines. With this experiment, the first order spectrum can be used for precision spectroscopy.

I used a spectroscope box with a slit, a cd and a viewing hole. I placed varying size 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 are always the opposite way (bottom to top) or vice versa. 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.





90 degrees and 180 degrees

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

Just like water waves 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 for 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. Thus this experiment may be further proof that light does travel as a wave represented by the spectral wave.

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 turns 45 degrees and straightened 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 slits shadow to turn in an interesting way. The process is shown in the following pictures: