Team Second

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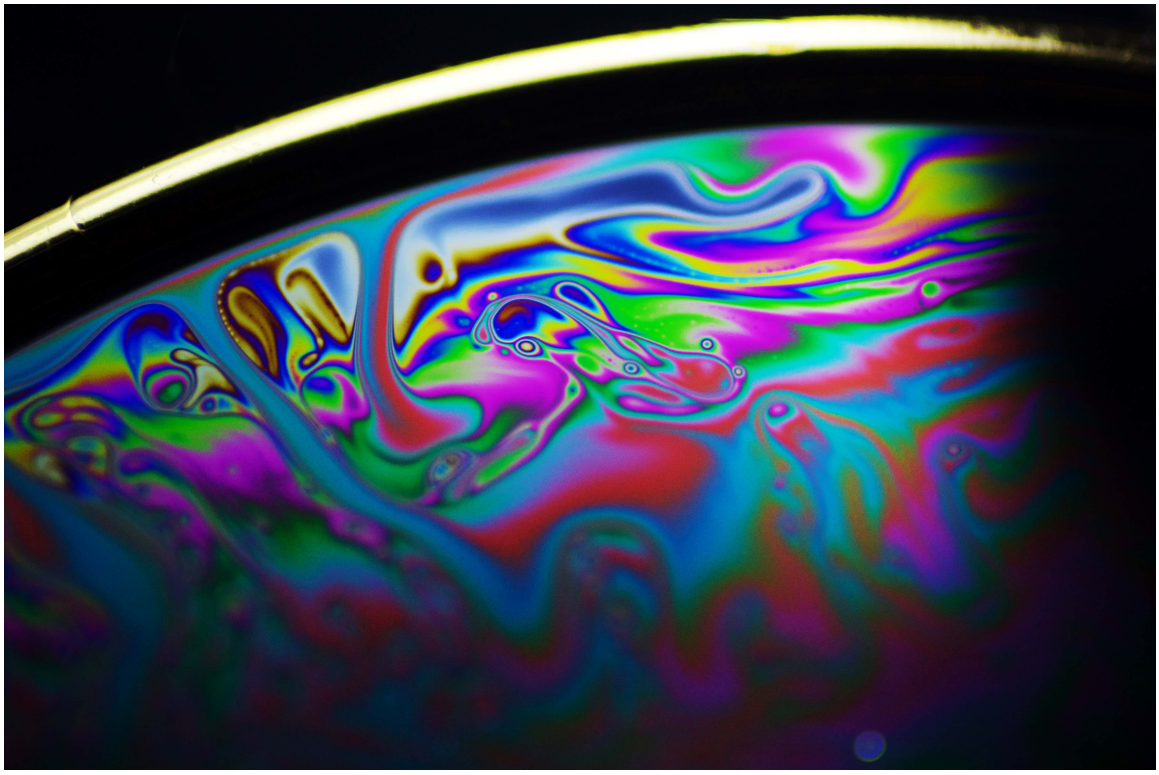

Introduction

The purpose of this image is to illustrate how light reflects off of a soap film. The image was difficult to capture, as the soap film did not last very long. It took several tries to just get the mixture of soap and water just right as well as getting the light at the right angle.

Background

The colors formed in the image are caused by light reflecting off of the soap film. White light contains the wavelengths of all of the visible light colors. As the light hits the top of the soap film, part of it reflects off the top and some passes through. When the light that passes through hits the bottom of the soap film, some of that light will be reflected back up. When the correct thickness of soap film is present, a certain wavelength of visible light will be reflected off the top and bottom of the soap film in phase. This is how the individual colors in the image are created. Each color or wavelength of light represents a different thickness in the soap film.

Visualization Technique

The setup to take the image was pretty simple. A black shirt was laid across a table. On top of that were two old notebooks set far enough apart to hold the

bracelet up. The notebooks were the same height to keep the bracelet flat. The bracelet, which is used to hold the soap film, was then set on top of the notebooks. An LED lantern light with a tissue wrapped around to diffuse the light was set behind the notebooks so the light sat at about a 60° angle from a line perpendicular to the bracelet. The full set up can be seen in Figure 1 and 2.

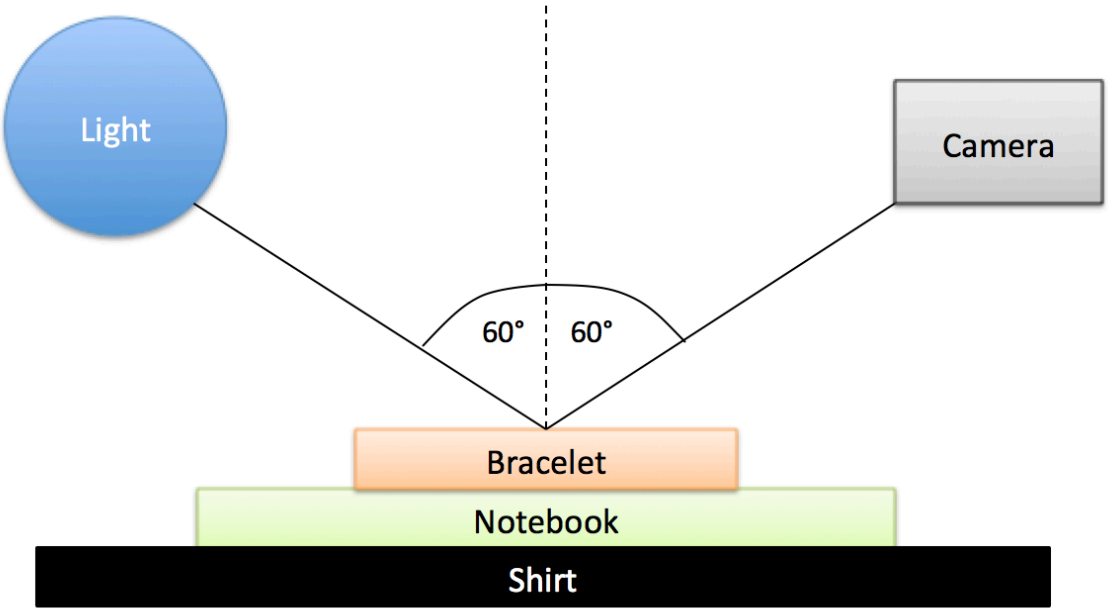

Figure 1: Side view of set up

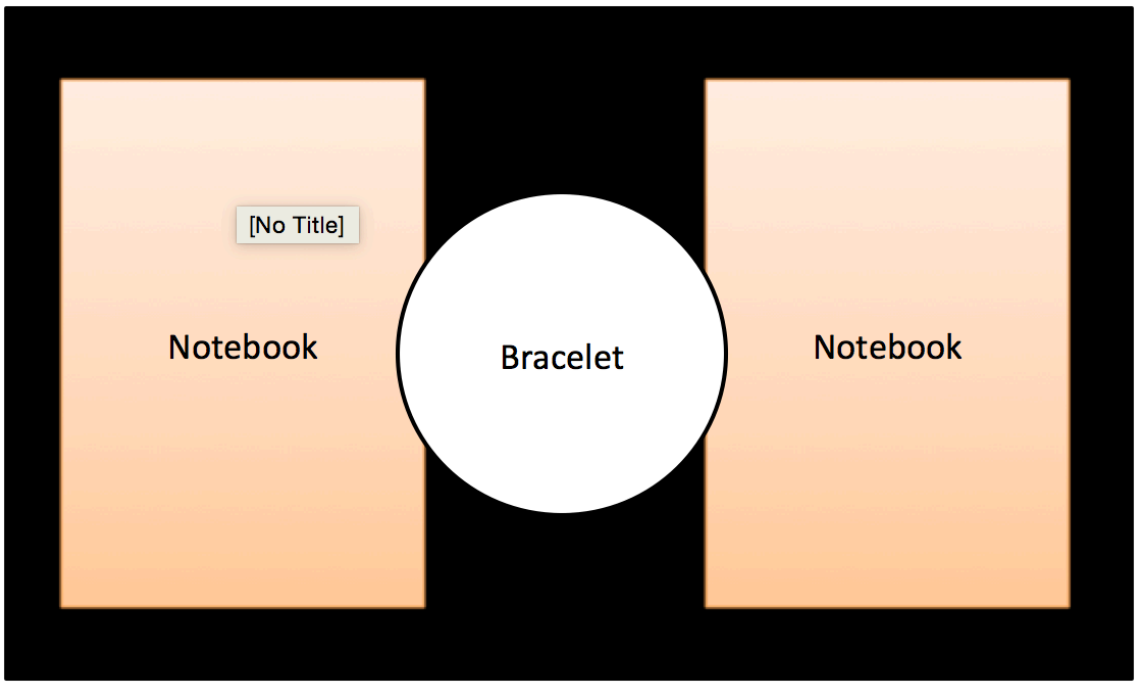

Figure 2: Top view of set up

Materials used in this setup are easy to obtain around the house or at the grocery store. For the bubble mixture, Ajax dish soap, water, and sugar are used. The ratio is for every cup of water, 1 Tbsp. of soap and ½ Tbsp. of Sugar and mixed together in a large bowl. The sugar is used to add particles to the soap film and make the film last longer. The bracelet is a 4" diameter brass bracelet. The bracelet is dipped in the bowl and then set gently on the two notebooks. After the set up and camera are ready, gently blow on the soap film to create a little disturbance in it.

Photographic Technique

A Nikon D5000 DSLR camera was used with a macro lens. A macro lens is used because the actual effect is very small. The field of view of the image is only about 1.5 inches. Also, the lens was very close to the soap film at only about an inch away. The focal length of the film was at 60 mm. The light reflected off of the soap film was not the brightest, so the aperture and the ISO had to be adjusted for such. They were set to f/5 and 400, respectively. The soap film was moving so the shutter speed had to still be kept small, and that was set to 1/125 seconds. The only post processing on the image was using the curves tool to up the contrast and make the colors stronger. The unedited image can be seen in Figure 3. Both images had pixels dimensions of 4288x2848.

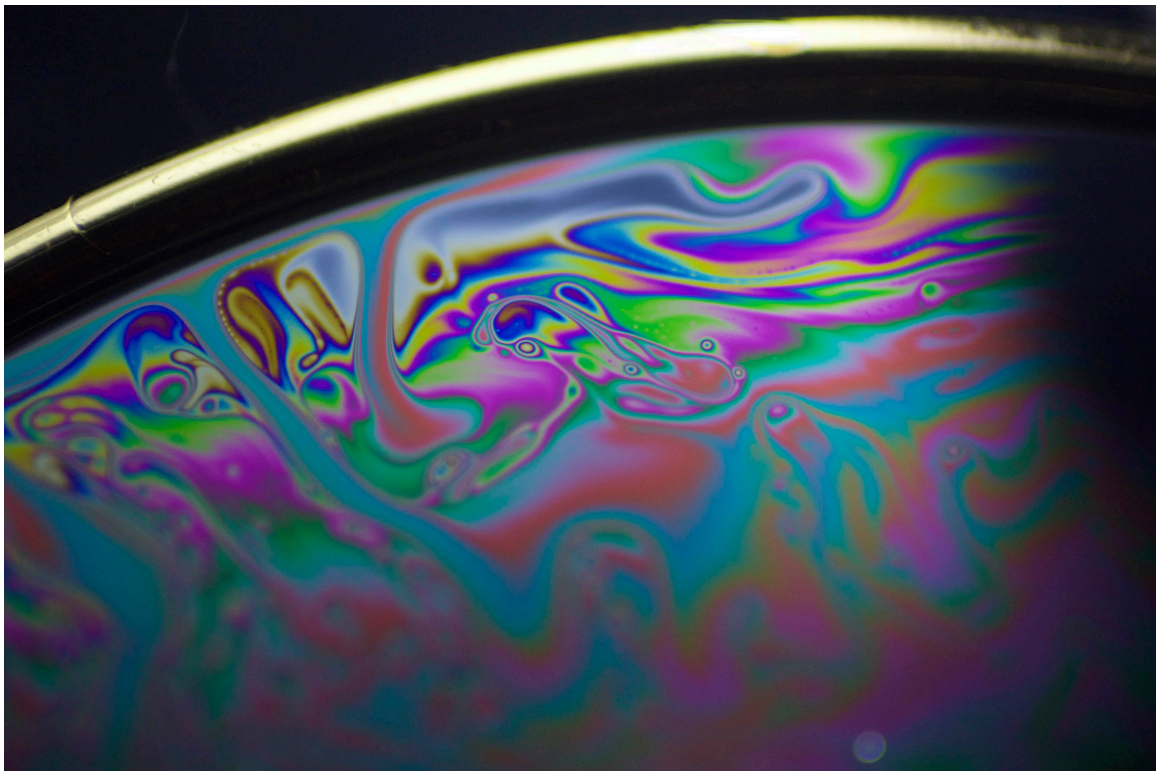

Figure 3: Original image

Conclusion

The image turned out exactly the way I wanted it to. The colors look great. The patterns are interesting and still illustrate the movement of the soap film.

Personally, I like that the bracelet is visible in the image. I think it adds to the overall look of the image. I also thinks it adds a nice boundary between the flow and the black background. To extend on this image, more sugar could be added to get more visible particles in the image. Also, different color lights could be experimented with to see how that changes the colors in the image.

References

"Soap Film Interference." Hyper Physics. Georgia State University, n.d. Web. 16 Nov. 2015. http://hyperphysics.phy-astr.gsu.edu/hbase/phyopt/soapfilm.html.

Tompkins, Eric. "Understanding Interference Patterns in Soap Films." Laser Teaching Center. Stony Brook University, n.d. Web. 16 Nov. 2015. http://laser.physics.sunysb.edu/~ett/report/.