

**Team Third**

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**Boulder, Co**

**12/14/2019**

**Contribution Credits:**

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**Figure 1:** Final result of team third

## **Introduction**

For the third team assignment, we have conducted an experiment on the effect of sound waves on water. We have done the experiment using different speakers, containers, and light colors to get the best result possible. We actually found that using a smaller round speaker gives a better result than using a bigger more powerful rectangular speaker. I think that the experiment was a success and we got what we wanted. The intent of this experiment was to see how fluids would react after making sound waves hit them. As the picture indicates, the container was on top of the speaker which made the container vibrates and gave us a good result.

## **Experimental Setup**

The picture was taken at the ITLL. Setting the experiment up, we have added 25 ml of water on a 250 ml beaker. We put the beaker on top of the speaker and connected the speaker to Antonio's phone. We brought a small flashlight and put on the table as well. The flashlight was not the best for the experiment. However, it can produce different colors. The speaker that we have used for this experiment is JBL Clip 2. It is not the newest model, but its performance was good enough for the experiment. We have used an app called Audio Signal Generator that produces controllable sound waves. We had to play with the app to see which values have better effect on the beaker and is it vibrating or not. One of the team members was changing the values on the app while another teammate was holding the container to keep it from sliding. The beaker that we used was a 250 ml beaker. The dimensions of this beaker were 9 cm high and has a 7 cm diameter. Thus, the field of view was approximately 8 x 8 cm.

## **Physics**

The physics behind this experiment is interesting and not intuitive to everyone. Because, sound waves are all over us and we cannot see them. Sound waves have frequency and amplitude. For our experiment, we have used a frequency around 110 Hz. Producing loud sound waves on fluids can make the sound waves appear on the fluid itself. This phenomenon is called Faraday waves. We have visualized the effect on our experiment, and it was a success. We could see the pattern of the sound wave on the water and the patterns changed when we changed the frequency and the intensity of the waves.

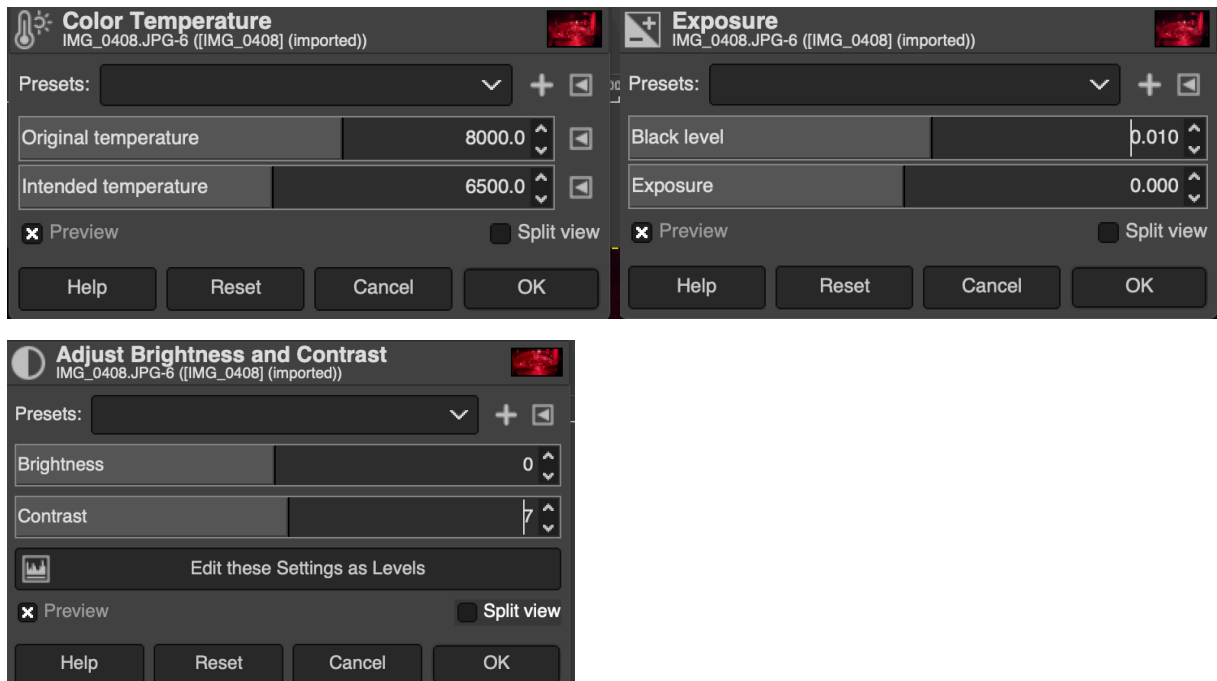
## **Techniques**

- Camera

I have used my Canon rebel SL2 conducting the experiment. I think this picture illustrates the effect properly. The picture was taken while using the red light which gave a good feel on the picture. The picture mode on the camera was AV. The shutter speed was 1/1250 which I think is needed for such experiment. Additionally, I used manual focusing to capture the flow more easily. The F number is f/5.6 and the ISO value is 12800 which I needed to capture such a flow in a dark room where there is only one flashlight. The focal length is 55 mm and the dimensions of the original picture are 6000 x 4000 pixels. Additionally, the distance between the glass and the camera is between 1 to 2 inches.

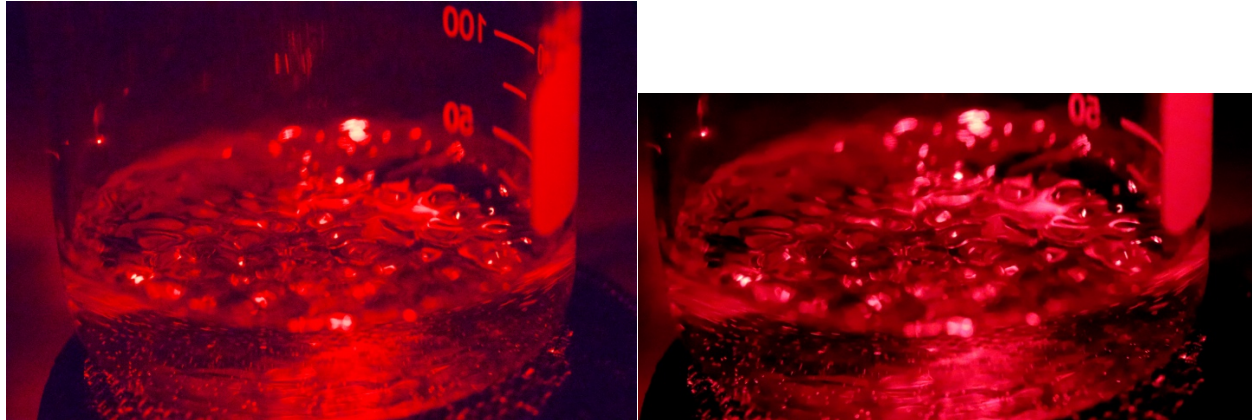
- Editing

I have used Gimp to edit the picture a little to make it look better. I have not edited the picture too much just simple touches. Initially, I have cropped the picture because most of it was distracting. Furthermore, I have changed the original temperature, black level, and the contrast. The values are shown below.



**Figure 2:** Values changed in Gimp

The result can be compared below.



**Figure 3:** Comparison between the original picture on the left and the final result on the right.

## **Conclusion**

To conclude, we have successfully captured Faraday waves on water. The result could have been a lot better if we used bigger speakers, put the fluid directly on the speaker instead of using a beaker, or even using different fluids. It was interesting seeing the effect and trying to capture the most intense wave possible. Lastly, I can say that conducting this experiment met the artistic and scientific requirement for the assignment.

## References:

Koch, April. & Robb, Amanda (NA) *Pitch and Volume in Sound Waves*. Retrieved from <https://study.com/academy/lesson/pitch-and-volume-in-sound-waves.html>