

## Aich Physics Circle News (Stray Cats Aich)

12/2016

### Wonderful trip to Bruno in Czech

This summer I traveled to Bruno in Czech Republic to attend

#### 13<sup>th</sup> International Conference on Hands-on Science.

Because the members of Hands-on Science Network welcomed me very warmly, I could attend the conference very comfortably. And, I enjoyed various exciting presentations that attracted my heart. My wife and I were also fascinated by scenery in Czech Republic. I want to appreciate all the stuff and participants for wonderful conference.

SUGI



↑ Sessions were in a familiar atmosphere  
↓ Mendel studied inheritance in this church



↑ I demonstrated some experiments  
↓ Explore the limestone cave(Excursion)



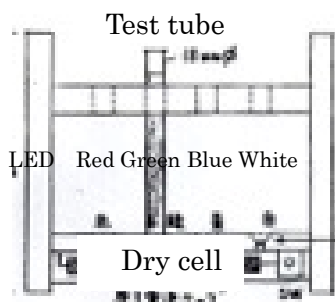
## Recent topics

### 1. Beautiful “absorb and scattering of light” experiment using test tube stand (K.Ishikawa)

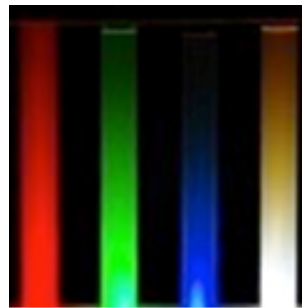
Equipment is made of test tubes, test tube stand and four kinds of LED bulbs fixed under the test tubes (Fig. bottom left). LED bulbs under the test tubes light the liquids from the bottom of the test tubes. We tried two kinds of liquid in the meeting. One was wax diluted water that was slightly cloud that enables us to demonstrate what happen to sunbeam in the atmosphere. Figure at the center is the result. Blue light is scattered and decrease rapidly. Red light is opposite. It is not scattered and brighter than other colors.



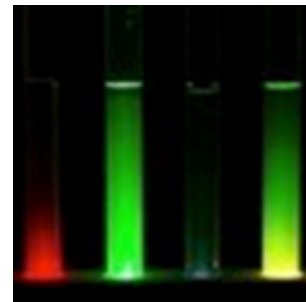
Second one is liquid of coloring matter extracted from leaves (Fig. right). It is a famous story that green light is not absorbed in a leave and be reflected, so the leaves look green. Green light is very bright, that means chlorophyll does not absorb green light. On the other hand, Red and blue lights are dark because of strong absorption.



Equipment



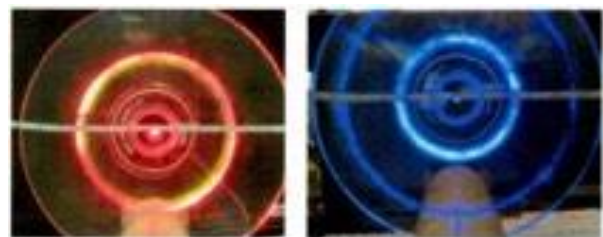
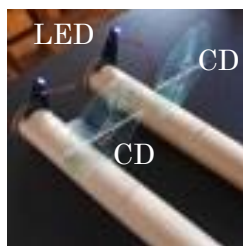
Wax diluted water



liquid of coloring matter

### 2. Diffraction experiments and an puzzling assignment (Ono)

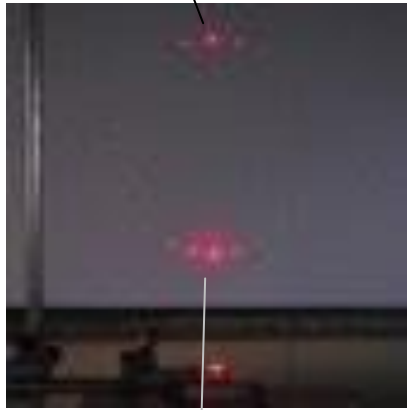
Mr. Ono has been making hand-on equipment usable for diffraction classes. One is the experiment using CD disk, the coating of the surfaces are removed. Place two CDs side by side and see the orange light and blue light from LEDs, respectively. Diffraction pattern becomes circular and the pitch of the pattern is different depending on the color.



He raised a question. “If we locate the transmission grating perpendicular to the light beam, bright spots locate on line with the brightest spot ( $m=0$ ) as the center. Then what happen to the spots if you rotate the grating along the axis normal to the slit and beam?”

Experimental result is below. Spots locate along an arc! We were very surprised at this result because we have never done such experiments and anticipated the result as locating linear. Now the discussion about this result is pending and became our assignment.

Reflected diffraction pattern



Transmitted diffraction pattern



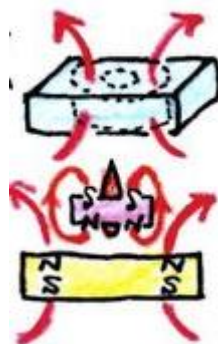
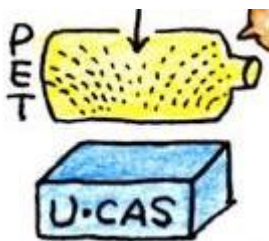
Radius of the arc seems the same as that of arc of red light

### 3. Students' activity – Float a top in the air (Koyo High school's students)

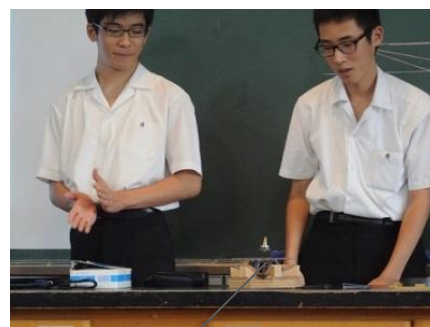
High school students visited the Stray Cats meeting and had a presentation about their recent investigation. They challenged to make equipment that float magnetic top in the air. This kind of equipment is already sold as a commercial made toy named "U-CAS". U-CAS is a famous toy in Japan which consists of a top (magnet) and box (maybe magnets inside). Rotate the top at the adequate position in the air above the box, the top float in the air stably for a while.

At first they investigated the magnetic field around the box of U-CAS by using tiny iron wires that are floating in oil. And they made the similar magnetic field using 6 small cylindrical magnets. In the meeting they demonstrated that the rotating magnetic top really float in the air and were greeted with loud cheers.

Chips of iron wire



Future scientists



Floating top

#### 4. Open a black box in the IH induction heating (S.Maeda)

Recently IH induction heating is getting popular because of safety. Mr. Maeda challenged to make the equipment and use for cooking. The point is to send high frequency current to the coil. He made an inverter circuit with a frequency of 30kHz. He demonstrated the cooking of a sunny side egg and ate it! We could made sense of the mechanism of the IH induction heating very well.



#### 5. Transformer experiment using Papua New Guinean coin (Sugi)

I introduced the coins used in Papua New Guiana (PNG) where I lived two years. Currency in PNG is Kina and Toea, 1 Kina is about 1/3 US dollar and 100 Toea is 1 Kina. The characteristic of them are that they are attracted to a magnet except 50 Toea. They are made of ferromagnetic material, might be Ni. 1 Kina coin has a hole, so it must be suitable for the core of the transformer. Though I did only qualitative experiments using radio, the PNG coin transformer really worked. It is bad not to be able to send you the sound from the speaker.



1 Kina 50 Toea 20 Toea 10 Toea



I picked up only topics that have originality, there are other interesting topics we enjoyed in the meeting. See the web page <http://www2.hamajima.co.jp/ikiikiwakuwaku/>. But sorry, only Japanese pages.