The 7 Problems for NZYPT 2015

**1. Liquid Film Motor**

Form a soap film on a flat frame. Put the film in an electric field parallel to the film surface and pass an electric current through the film. The film rotates in its plane. Investigate and explain the phenomenon.



**2. Two Balloons**

Two rubber balloons are partially inflated with air and connected together by a hose with a valve. It is found that depending on initial balloon volumes, the air can flow in different directions. Investigate this phenomenon.

**3. Magnus Glider**

Glue the bottoms of two light cups together to make a glider. Wind an elastic band around the centre and hold the free end that remains. While holding the glider, stretch the free end of the elastic band and then release the glider. Investigate its motion.

**4. Singing Blades of Grass**

It is possible to produce a sound by blowing across a blade of grass, a paper strip or similar. Investigate this effect.

**5. Thick Lens**

A bottle filled with a liquid can work as a lens. Arguably, such a bottle is dangerous if left on a table on a sunny day. Can one use such a ‘lens’ to scorch a surface?

**6. Magnetic Pendulum**

Make a light pendulum with a small magnet at the free end. An adjacent electromagnet connected to an AC power source of a much higher frequency than the natural frequency of the pendulum can lead to undamped oscillations with various amplitudes. Study and explain the phenomenon.

**7. Circle of Light**

When a laser beam is aimed at a wire, a circle of light can be observed on a screen perpendicular to the wire. Explain this phenomenon and investigate how it depends on the relevant parameters.

End of the 7 New Zealand Young Physicists’ Tournament problems for 2015.