

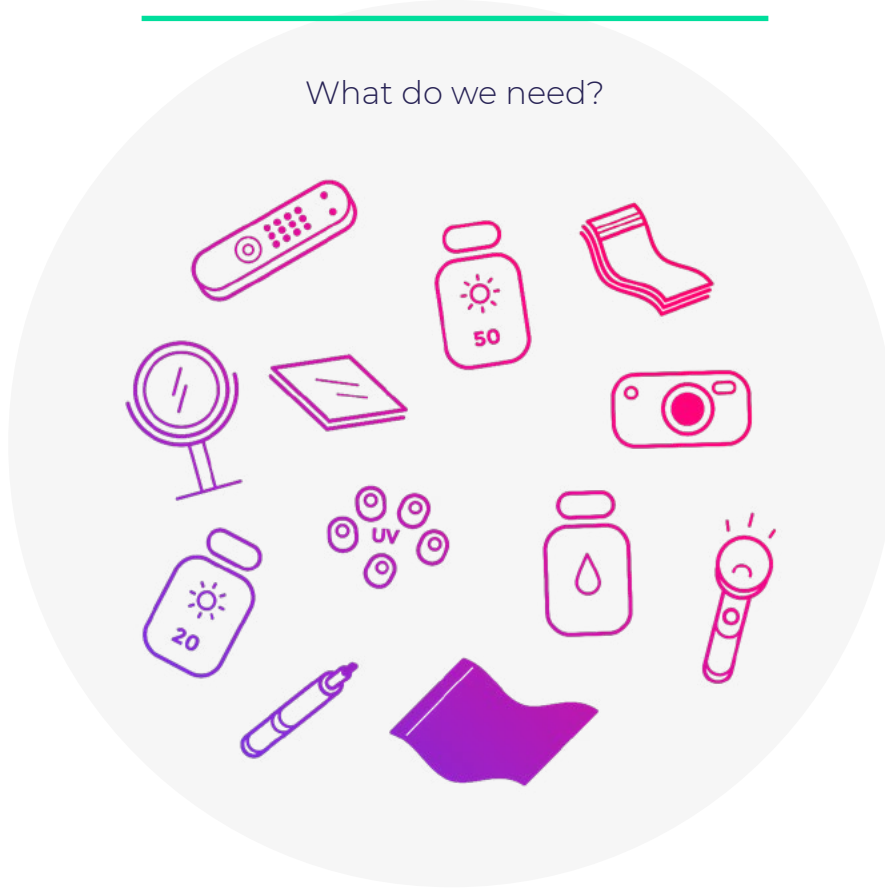


LAB 4

The mystery of the
unseen light

LET'S GET GOING!

What do we need?



MATERIALS

- Beads sensitive to ultraviolet light
- Small transparent plastic bags
- Factor 20 sun cream
- Factor 50 sun cream
- Moisturising cream
- Marker pen
- Black rubbish bag
- Mirror
- Transparent plastic

INSTRUMENTS

- Television remote control
- Digital camera (can be a mobile phone)
- Torch (can be the one on a mobile phone)



SAFETY MEASURES

- This experiment must be carried out under adult supervision, although none of the steps requires special care.

PHASE 1

Detecting invisible light



- 1 / The first step is to find out if you can detect invisible light. The first thing you need so you can see invisible light is to look for a source and a detector that will help you to see it. In this first phase, you are going to find out which detectors will be useful.
- 2 / The infrared light source will be a remote control, which communicates with the television using infrared light.
- 3 / Take the remote control and the mobile phone torch. Press some buttons on the remote control and switch on the torch. Can you see any light coming from the control? What about the torch?
- 4 / Repeat the same exercise, but this time divide the group in two. Some take the torch and the remote control and the others the digital cameras. The people with the cameras must place themselves opposite the people holding the torches and controls, pointing the camera towards the light sources as if they were going to take a photo of them.
- 5 / Those with cameras must check that they can see the two light sources properly on the screen. The others then turn on the torches and press the remote control buttons.
- 6 / If you wish, you can record a video of this to share with the rest of the class.

PHASE 1

What detectors work so that you can see visible light?

What about infrared light?

SPACE FOR ANSWER 

PHASE 2

What is infrared light like?



- 1 / Now you have found a detector for infrared light and can see it, you need to know whether it behaves in the same way as visible light. To find out, you will compare how the torch and the remote control LED behave when faced with different obstacles.

- 2 / The following steps must be repeated for the torch and for the remote control.
 - Place a piece of transparent plastic between the remote control or the torch and its detectors. Can the different kinds of light pass through the plastic?
 - Place a piece of black plastic (the rubbish bag) between the remote control or the torch and its detectors. Can the different kinds of light pass through the plastic?
 - Place a mirror between the remote control or the torch and their detectors. Is the light reflected or absorbed by the mirror?

PHASE 2

How do the two kinds of light behave?

Fill in this table with the characteristics you see.



	Visible light	Infrared light
Does it go through the transparent plastic?	<input type="checkbox"/>	<input type="checkbox"/>
Does it go through the black plastic?	<input type="checkbox"/>	<input type="checkbox"/>
Is it reflected by mirrors?	<input type="checkbox"/>	<input type="checkbox"/>

Taking into account the results of the observations, what are the similarities and differences between visible and infrared light?

SPACE FOR ANSWER

PHASE 3

Can you see light without detectors?

- 1 /** You have shown that, with detectors, you can capture different types of light that you can't see with the naked eye. But what if we didn't have detectors allowing us to see it? In science, we often can't directly see a phenomenon, but we can see its effects. And based on these effects we have to deduce what the phenomenon we are studying is like.
- 2 /** Remember what we discovered in the Laboratory 3 challenge: light has energy, which means it affects certain materials it interacts with. Do you remember what happened to the balloons? You will use this effect, which you already know, to see if you can detect new types of invisible light
- 3 /** We have a source of ultraviolet (UV) light very near to us, lighting up our world every day. As a class, collect all the information you can about ultraviolet light.

PHASE 3

Have you heard of ultraviolet light? What do you know about it?

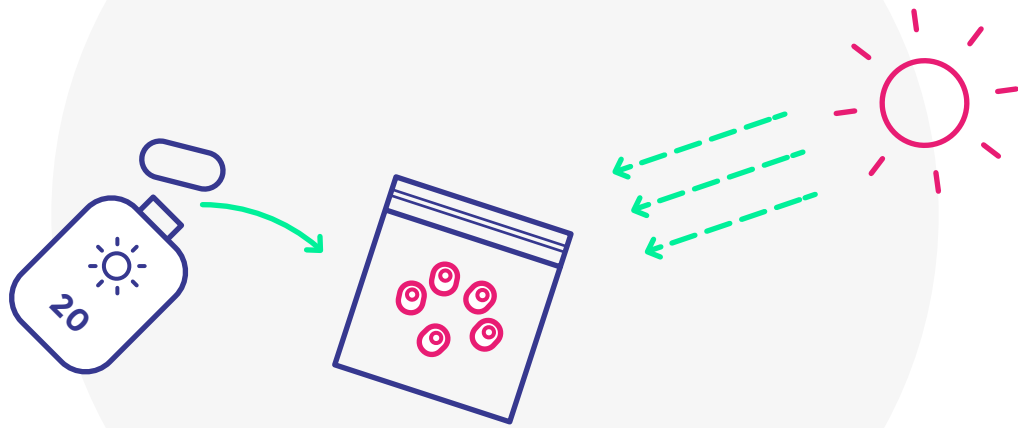
SPACE FOR ANSWER 

If your eyes can't see ultraviolet light, how do you know it exists?
What effects might distinguish it from other types of light?

SPACE FOR ANSWER 

PHASE 4

What effects does ultraviolet light have?



- 1 / You are going to find out using items that are sensitive to ultraviolet light.
- 2 / You will prepare the experiment in a dark place. If you are in the classroom, you can put the shutters down or go to somewhere with no light.
- 3 / Separate the beads into 3 small plastic bags that are properly closed.
- 4 / Mark each bag with the kind of sun cream you are going to use and cover it with the cream.
 - Cover the first bag with factor 50 sun cream.
 - Cover the second with factor 20 sun cream.
 - Cover the last bag with moisturising cream.
- 5 / Once the bags are prepared, expose them to sunlight for 1 or 2 minutes and observe what happens. You can record or photograph the process.

PHASE 4

What has happened to the beads in each bag?

How can you explain it?

SPACE FOR ANSWER 

SOLVE THE MYSTERY!

Science has helped us see something
our eyes hadn't noticed before!
Now it's time to solve the puzzle.

HOW CAN WE SEE INVISIBLE LIGHT

SPACE FOR ANSWER 



AN ALBA SYNCHROTRON PROJECT