



## LAB 3

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Capture the image!

## LET'S DO IT!

What do we need?



### MATERIALS

- ☐ The observation box from Lab 2
- ☐ The box lid from Lab 2
- ☐ Tracing paper
- ☐ Different objects for observation (those of Lab 2 will do).
- ☐ Black paint
- ☐ White glue or silicone
- ☐ Adhesive tape

### TOOLS

- ☐ Magnifying glass (ideally with a 50 mm diameter and 75 mm focal distance).
- ☐ White-light LED flashlight (you can use a mobile flashlight).

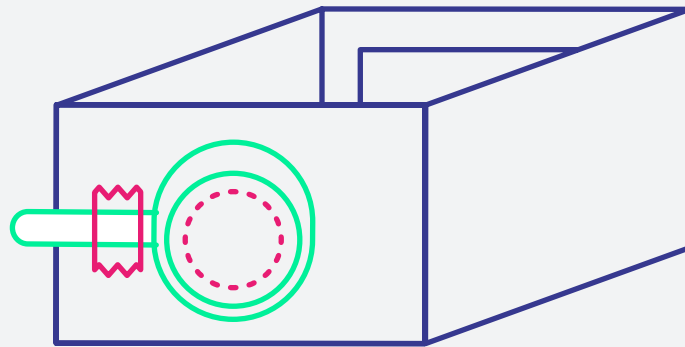


### SAFETY MEASURES

- ☐ This experiment must be carried out under the supervision of an adult.
- ☐ You have to protect the tables to avoid painting them black.

# PHASE 1

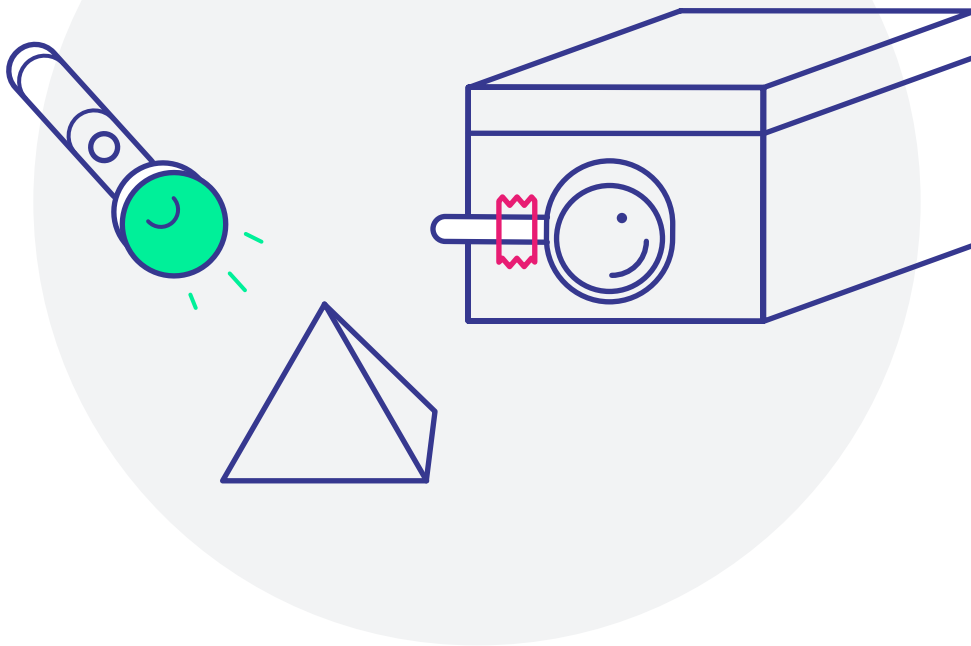
## ASSEMBLING THE CAMERA OBSCURA



- 1 /** Paint the inner side of the box and of the lid black.
- 2 /** Stick tracing paper to the inner part of the side with the rectangular hole in it so that it makes a screen. It can be glued or fastened with tape.
- 3 /** Stick the magnifying glass to the outer part of the side with the round hole in it (with tape, white glue or silicone) so that the lens is perfectly centred on the hole. It is essential that the hole is a bit smaller than the lens.
- 4 /** Cover the box with the lid and... you have a camera obscura!

## PHASE 2

WHAT IMAGES DOES IT CREATE?



- 1 / Point the side of the camera obscura with the magnifying glass towards the object you want to observe. Place the object about 40 cm away from the lens.
- 2 / Dim the room lighting: you don't need total darkness, but the darker it is, the better the images will be generated.
- 3 / Light the front of the object with a flashlight (you can use the flashlight in your mobile phone).
- 4 / Observe how the image of the object takes shape on the tracing paper.
- 5 / Move the object nearer or farther from the lens until the image is focused on the tracing paper.

## PHASE 2

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What image can we see on the tracing paper?  
Take a photograph and stick it or draw it in this space.  
You can also trace it directly on the tracing paper with a marker.

**DRAW IT HERE** 

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What is special about this image?  
How is it like and unlike the object we see?

**WRITE THE ANSWER BELOW** 

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## PHASE 2

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Draw the route that the rays lighting the object have followed to shape the image. Why is it that in order to see the objects correctly focused we had to change their distance to the lens?

**WRITE THE ANSWER BELOW**



How are our eyes similar to the camera obscura?  
What is the equivalent of the lens in our eyes?  
And what is the equivalent of the tracing paper?

**WRITE THE ANSWER BELOW**





## LET'S SOLVE IT!

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Congratulations, you have created your first detector! At the ALBA Synchrotron we also send light to the samples we want to analyze and a very sophisticated detector captures the result of this light-matter interaction.

With the camera obscura we have discovered the process by which we see through our eyes, our own light detectors. But the reality we see through the camera obscura, is it like the one we see with our eyes?

**WHY DON'T WE SEE THE IMAGES INVERTED?**

**WRITE THE ANSWER BELOW** 

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**WHY CAN WE FOCUS THE IMAGES WITH OUR EYES?**

**WRITE THE ANSWER BELOW** 

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