

Activity 4_5: Can we see the Infrared radiation?

Problem question:

All objects with a temperature above the absolute zero emit thermal radiation. But, what is thermal radiation? Thermal radiation is the light which is emitted by an object because of the thermal motion of its atoms and it depends on the object temperature. An object at a very high temperature (above 600° C) emits visible thermal radiation. At lower temperatures, an object do not emit visible light but it radiates an invisible light called Infrared radiation. We cannot see Infrared radiation by our naked eyes, but some special electronic devices can. What instruments can we use to see Infrared radiation? Why could be so important to see Infrared radiation?

Experiment:

Required: Computer with webcam, a television with its IR remote control.

Procedure:

Step 1: Start the experiment by observing the front of a IR remote control. You can see a very little lamp (led) which must be pointed towards the television in order to select your favourite channel. When you press the button of the remote control an infrared signal is transmitted from the led to the television.

Question 1: By looking at the remote led, can you see any light when pressing the button?

Question 2: Can the infrared signal of the remote control cross the glass of a window? Try with different materials (transparent plastic bottle, black plastic bag, etc.)

Step 2: Point the remote control in front of the webcam and press a button.

Question: Can your webcam see any light by looking at the remote led?

Step 3: Switch off all the visible light sources (total darkness) and point the remote control in front of your eyes.

Question: Can you see any light?

Step 4: With all the visible light sources still switched off (total darkness), point the remote control towards a book placed on the table.

Question: Can you see the book by using your webcam?

Discuss what observed during the whole experiment together with the other members of the working group and report your comments in the following:

Problem: We have experienced the source of invisible infrared light from a remote control. But any object with a temperature above the absolute zero emits infrared radiation. Can we use some special instruments to see infrared radiation coming from warm objects? What kind of applications could we think about the detection of infrared radiation?

See the slide-show movie at: www.uop-perg.unipa.it/establish/videoIR1_eng2.wmv

Discuss what observed during the slide-show together with the other members of your working group.

Report your comments in the following:

A deepening question: Why the webcam cannot see the infrared radiation coming from warm objects? Investigate the physics of near and far infrared.

FINAL DISCUSSION AND CONCLUSION

Let's go back to the initial problem: A low energy house

