A regular column of enchanting curiosities, toys and crowd-pleasing demonstrations.

An interesting classroom discussion: what is the right subject of the photograph?

Look at the photograph: the children are my own. You are probably saying to yourself: “So what?”. An important clue is that it was taken in northern Italy on 11 August 1999 about at 1 pm. Perhaps you are still mystified. The point is that a partial solar eclipse was taking place.

Many people that day were watching the spectacle, observing the sun through protective sheets of glass or homemade optical instruments so that they could just discern a small crescent in the sky. Me too.

But while I fiddled with my rudimentary telescope—a pinhole camera made from a long cardboard tube with a hole at one end and a flimsy at the other—my 11-year-old daughter shouted: “Dad, look under that tree. What a lot of eclipses!” It was true. Large, clear images of the sun sparkled in the shadow of a leafy tree. Rather than looking up at the sky, one needed to look down at the ground.

I immediately took a photograph to capture the eclipse images on the bodies of my son and daughter.

This peculiar picture can be used with students to introduce geometrical optics in an unusual way. The discussion can begin with the question of what is the right subject of the picture and, after revealing the little secret, some phenomenological considerations can be made.

First of all, the crescent-shaped spots in the photo suggest that the usual circular bright spots within the shadows of the trees are images of the sun, rather than images of the small gaps left by the rustling leaves. Students realize that we are surrounded by images of the sun in everyday life, e.g. those formed by sunlight filtering through shutters, Venetian blinds or holes in heavy curtains, parasols and beach-umbrellas.

Moreover, a simple experiment can be performed using a sheet of paper with a hole made by a pencil (a few millimetres in diameter) and using a light source such as a chandelier holding several incandescent lamps. Holding the sheet very close to a screen, a unique spot is visible: the image of the hole. As the sheet is moved further away from the screen, the image of the hole evolves and splits into distinct spots which gradually become clearer and sharper. There are as many spots as there are bright lamps, indicating that the light sources are imaged. Their shapes resemble the filaments of the lamps and, with care, they can be focused by adjusting the sheet–screen distance. Observing the filament images individually reveals that they are upside-down, resembling the behaviour of a pinhole camera.

All these observations suggest a classroom discussion in terms of geometrical optics, based on the straight line propagation model of light for image formation. It is a simple example of how an activity that arises from paying attention to everyday phenomena can make the learning of physics relevant and contribute to improving students' powers of observation and a scientific approach to problems.

Finally, a brief historical note: the Arabian philosopher-scientist Abu Ali Hasan Ibn al-Haytham (Alhazen) used the pinhole camera principle to examine solar eclipses about a thousand years ago!

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Look carefully to see a myriad partial eclipses.