



LIGHT POLLUTION AND SHIELDING

ACTIVITY INSTRUCTIONS

<http://www.ncsciencefestival.org/starparty>

OBJECTIVES

- Compare the effectiveness of an unshielded light vs. a shielded light.
- Discuss ways ineffective lighting affects our lives.
- Come up with a simple solution that keeps needed lights on but directs shielded light where needed, when needed, and at reduced wattage and cost, while allowing us to better see the stars.

SUGGESTED AGE RANGE

Ages 5 and up

ACTIVITY DURATION

5-10 minutes, depending on discussion time

SETTING

Indoors in a very dark room; or outdoors at night, away from unshielded lights

MATERIALS

- Small white flashlight that can be operated in “candle mode”
- PVC cap or other items to act as shields
- White surface such as a paper plate
- Figurine about 1.5 inches tall
- Optional: *There Once Was a Sky Full of Stars*, written by Bob Crelin and illustrated by Amie Ziner

PREPARATION

1. This demonstration is most effective in a very dark setting. If indoors, turn all lights off and cover any windows with a double layer of black trash bags.
2. Make sure your flashlight is in candle mode (or is otherwise designed such that a bare bulb sticks out). You want everyone to see the glare from the exposed bulb when you are not using the shield.
3. Set up a street scene with the figurine standing on the “ground” (paper plate) right next to the unshielded “streetlight” (flashlight standing on its end in candle mode). Recommended: Tape the figurine to the paper plate, especially if you plan to walk around with the demo.

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PROCEDURE

1. Optional: Begin by reading and discussing the picture book *There Once Was a Sky Full of Stars*.
2. Ask your participants about their experiences viewing the night sky. On clear nights, why can you see more stars from some locations than others? Let's explore why that is.
3. Turn the room lights off (or do the demonstration outside at night) so that the only light source is your unshielded "streetlight." Observe how well you can—or, more likely, can't—see the figurine. Note how the exposed bulb glares brightly in your eyes. The sky is aglow with wasted light.



4. Now cover the flashlight with the PVC cap (or any other shield, such as your hand), to represent a shielded streetlight. Now the figurine and surrounding area are brightly illuminated. Glare is eliminated. The sky is dark. You can see more stars!



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PROCEDURE (CONTINUED)

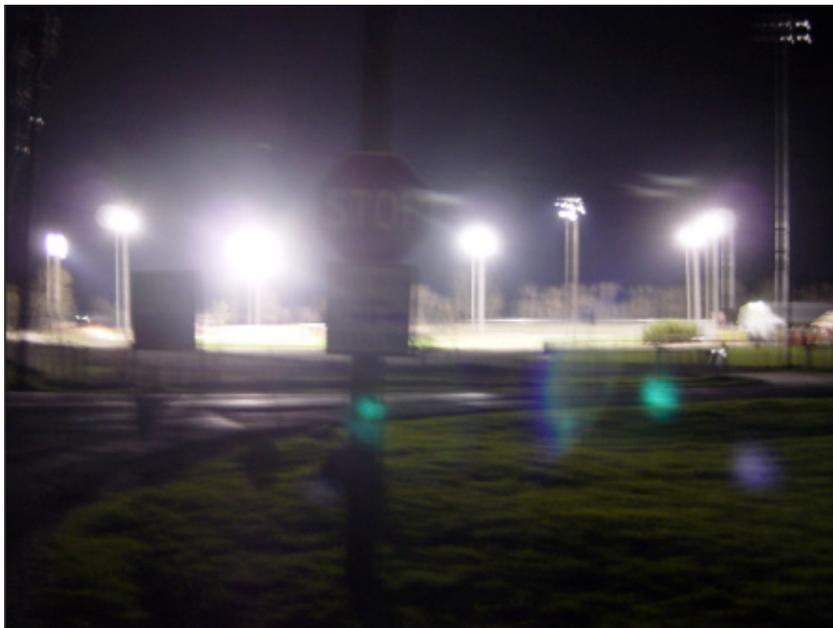
5. Prompt discussion: What differences do you notice with and without the shield? How does the lighting of the area directly under the streetlight change? How would shielding affect your view of the stars?
6. Explain several positive outcomes you get with full shields:
 - Light is directed downward where it is wanted, so lower wattage bulbs can be used, saving energy and money.
 - There is no direct glare to impair night vision or cause light trespass.
 - General light pollution overhead (“skyglow”) is lessened.

Bottom line: Shielding improves the quality of life for people, animals, and plants; saves money and energy; and preserves our beautiful dark skies.

BACKGROUND INFORMATION

Three main types of light pollution:

1. **Glare** is too much background light. Can you see the stop sign or read the sign below it in this image?



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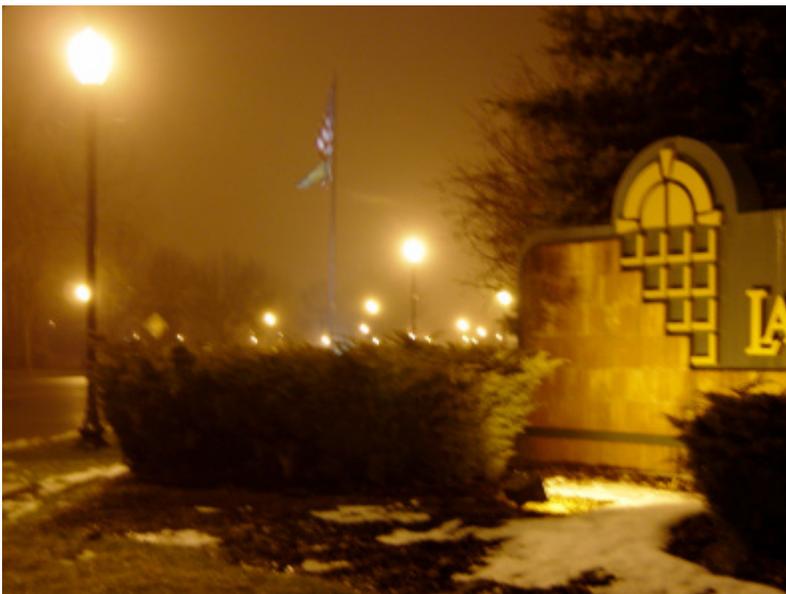
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BACKGROUND INFORMATION (CONTINUED)

2. **Light trespass** is light that spills into an area where it is unwanted. Would you be able to sleep if your bedroom window faced this neighbor's light?



3. **Sky glow** is lots of light scattering off particles in the air, giving the appearance of a glowing sky. Do you see any stars in this image?



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MORE RESOURCES

1. Watch a version of this shielding demo in this 19-second video:
<http://www.youtube.com/watch?v=nb7eryzSBno>
2. Learn more about light pollution and find resources for educators: <https://www.darksky.org>
3. Participate in an international citizen science campaign to measure the brightness of your night sky:
<https://www.globeatnight.org>

CREDIT

Thanks to the National Optical Astronomy Observatory and to Chuck Bueter for permission to adapt demos from these sources:

- http://www.globeatnight.org/dsr/Dark_Skies_Rangers_Lessons/Demonstrating_LightPollution&Shielding.pdf
- <http://analyzer.depaul.edu/paperplate/lights.htm>



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