

Photons Escaping from the Sun

We are going to turn the classroom into a model of the Sun, using balloons to represent photons. The center of the room will represent the core of the Sun, and the rest of the room the outer parts of the Sun. The last seats at the edge of the room are the surface of the Sun where photons escape (the photosphere). You are a particle the photon bounces off. Balloons will be given to students in the "core" of the classroom to start their motion, as this is where the Sun generates its energy. Everyone will then tap the balloons gently to each other to simulate the "random walk" of photons through the Sun. Don't try to direct their motion! Any photons hitting the walls or getting to the last persons at the edge of the room (i.e., arriving at the Solar surface), will "escape" and be taken out of the game.

1. Predict how long it will take half the balloons to reach the edge of the room. Guesses are completely acceptable.

2. The instructor will stop the game after about half of the balloons (photons) have reached the edges of the room (escaped from the Sun). Record how long this took.

3. Compare your initial guess to the final time.

SHORTER ____ or LONGER ____

4. How many times longer does it take for a balloon to randomly walk from the center to the edge of the room, compared to the time it takes for it to travel that distance directly?

5. Explain how this game relates to how photons carry energy from the core to the surface of the sun.

