

# Lazer Dazer®



## Introduction

Spin the disk and watch the electrons orbit the nucleus! A great way to demonstrate the classical Bohr model. Look at the Dazer from different angles and you can actually see the protons, neutrons, and electrons in the atom—with a three-dimensional effect.

## Concepts

- Light
- Protons, neutrons, and electrons
- Models of the atom

## Materials

Lazer Dazer®

Smooth, flat surface

## Safety Precautions

*Materials used in this activity are considered nonhazardous. Please follow all standard laboratory guidelines.*

## Procedure

1. Place the Lazer Dazer on a smooth, flat surface.
2. Give it a spin and watch the electrons orbit the nucleus.

## Disposal

This Lazer Dazer is great because once purchased, it can be used again and again! No disposal required!

## Tips

- Remind your students that this is only a classical mechanical model of the atom and is not fully accurate in depicting the quantum mechanical description of the atom. As with any model, it has strengths and weaknesses and cannot fully depict the atom. However, students will have fun with the Dazer, as they love to spin and watch it. It also enhances simply looking at picture models in a book and will stimulate discussion of atomic structure that would not otherwise occur.
- Try using this in a cooperative learning mini-lab activity by having a classroom set of Dazers (one for each group of 2–3 students). Have students generate a list of how this model corresponds to the real and most current model of the atom. Have students then generate a list of how it does not accurately depict the atom. Use it as a good cross-curricular exercise for modeling, analogies, and writing skills.

## Discussion

The Lazer Dazer is a toy that spins on a smooth surface for a long time. Each Dazer is covered with a film that acts as a diffraction grating, with about 14,000 lines or grooves per inch. The grooves act as tiny prisms, and when light hits them, it is diffracted (broken up) and the full spectrum of colors is produced, with different colors visible at different angles. This diffraction grating is created holographically with lasers.

The Dazer has a picture shaped like an atom with electrons in orbitals around the nucleus. The protons and neutrons in the nucleus are depicted, as are quarks within the protons and neutrons. With the model standing still (not spinning), it represents the classical Bohr model of the atom. The Bohr model includes the idea that electrons orbit the nucleus only in certain, discrete energy states called *energy levels*.

When the Dazer is spun, it can be used to explain the transition from the classical Bohr model to the more recent and accurate quantum mechanical electron cloud model of the atom. The electron cloud model includes the idea that the electron orbitals describe the probability that an electron will be found in a particular region about the nucleus, but the orbitals do

not indicate the exact position or path of the electron.

If the spinning Dazer is viewed at different angles, different colors of light are visible (depending on the type of classroom lights). These colors represent the energy released in the electron transitions between different energy levels.

## Acknowledgment

Special thanks to Lee Marek, Naperville North High School, Naperville, IL for bringing the Lazer Dazer to our attention.

**The *Lazer Dazer*® is available from Flinn Scientific, Inc.**

Catalog No.	Description
AP5446	Lazer Dazer

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.