

**SOUTH CAROLINA STATE MUSEUM**  
**PRE-VISIT MATERIALS**  
**Grades 4-12**

**LIGHT AND LASERS**

**TO THE TEACHER:**

The pre-visit packet contains: lesson background, curriculum standards, and terms and definitions.

GRADES:	4-12
LENGTH OF LESSON:	45 minutes
CLASS SIZE:	80 students max.

During the Science Discovery Theatre presentation, a science educator will demonstrate how lasers work, as well as, their numerous applications.

Hands-on activities are designed to:

- Demonstrate uses of lasers in science and everyday life
- Familiarize participants with laser technology
- Highlight South Carolina's connection to the laser industry.

Dr. Charles H. Townes, originally from Greenville, South Carolina, was a pioneer in wave amplification. In 1964, he received the Nobel Prize in physics for his research which later led to the development of lasers. The laser is a device which produces an intensified beam of pure, coherent light. Lasers are a vital part of our everyday lives. They are found in everything from compact disc players to surgical operating rooms to price scanners at the supermarket.

**Science Curriculum by Grade according  
to South Carolina State Standards**

<b>4<sup>th</sup> grade</b>	<b>4-1.2; 4-1.7; 4-5.1; 4-5.2; 4-5.5</b>
<b>9<sup>th</sup>-12<sup>th</sup> grades</b>	<b>P-7.1; P-7.4</b>

## TERMS AND DEFINITIONS

1. **atom** - The smallest unit of an element.
2. **coherent** - A pure beam of light moving in the same direction.
3. **electromagnetic waves** - Energy produced by an oscillating electric charge that travel in a wave-like motion.
4. **electrons** - Negatively charged particles that move around the nucleus of an atom.
5. **fiber optics** - A network of thin strands glass or plastic used to transmit light.
6. **hologram** - A three-dimensional image whose pattern can be used to optically store, retrieve, and process information.
7. **LASER** (Light Amplification by the Stimulated Emission of Radiation) - An optical source that produces light by emitting photons in a coherent beam.
8. **MASER** (Microwave Amplification by the Stimulated Emission of Radiation) – A device that produces coherent electromagnetic waves through amplification due to stimulated emission.
9. **Nobel Prize** - Award given to individuals who have completed outstanding research, invented ground-breaking techniques or equipment, or made an outstanding contribution to society.
10. **monochromatic** - Having a producing light of only one wavelength.
11. **spectrum** - The visible range of colors when light is separated using a prism.
12. **Dr. Charles H. Townes** - A native of South Carolina and a 1964 Nobel Prize co-winner for his contribution in the development of the maser and the laser.