Tesla Coil

P6-3550

INSTRUCTIONAL GUIDE

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- Tesla Coil
- Removeable tip
- Instructional Guide

Recommended for Activities:

- Fluorescent light
- 300-500 W incandescent bulb
- Neon Wand (P6-3360)

Introduction

Versions of the Tesla Coil are widely used as igniters for high power gas discharge lamps, common examples being the mercury vapor and sodium types used for street lighting. Blue-violet plasma filaments produced from a Tesla Coil can be seen as a result of the ionization of air due to the high voltage from the Tesla Coil. More familiar to students is the Plasma Globe which uses a low power variation of the Tesla Coil to ionize gases within the globe. Tesla Coils have been used in "Star Trek" movies for special effects and used a glass-plate-type of plasma globe in the most recent "star Trek" film.

Background

A Tesla Coil is a type of transformer invented by Nikola Tesla around 1891. They are used produce high voltage, high frequency, low current AC electricity, stepping up ordinary 110-volt electricity to between 10,000 and 50,000 volts. Tesla used these coils to conduct innovative experiments in electrical lighting, phosphorescence, x-ray generation, electrotherapy, transmission of electrical energy without wires for broadcasting, and the transmission of electrical power.

Activities

Safety:
Although a Tesla Coil produces relatively high voltages associated with low currents, it is not advisable to allow students to take direct shocks from these devices. While the voltage is high, the current is low, and since high-frequency currents travel almost entirely at the surface of a conductor, the current does not produce much of a shock when passing through the body. However, it will burn the skin at the point where the spark strikes it. Any heart electrical abnormalities could be affected by the coil. It is safe, however, for simple experiments in the classroom to illustrate the effects of high voltages.

- A Tesla Coil will generate sparks and corona of course, because of the high voltage created. Place a fluorescent light tube held in one hand or on a lab table will light when the high-frequency spark jumps to one end of it with no wires. Even a burned-out fluorescent light tube will glow when the Tesla Coil is held nearby.

- A 300- to 500-watt incandescent light bulb produces a very beautiful effect when the Tesla Coil is placed on a lab table in the dark and placed so the spark jumps to the base of the bulb. This effect is similar to the plasma globe, another popular demonstration. The gas within the bulb becomes ionized by the high voltage and characteristic blue plasma streamers are generated within the bulb from the wires and bulb filament.
- Small neon bulbs or gas tubes will glow with their characteristic color when a spark is generated. This is a great example of spectroscopy and how each gas exhibits its signature color when excited by a high voltage.
- Two parallel stiff copper wires can be positioned vertically and bent so that they are separated slightly as the wires rise, a "Jacob's Ladder" can be constructed. As the Tesla Coil is touched to the wires, a violet spark is generated across the gap between the two wires and will rise due to the heating of the air as the spark is produced. This effect has been used for years in monster B-movies as "mad scientist" lab equipment. It is a great effect to demonstrate to your students. Wear a crazy wig and play a little horror movie music to add to the effect!

Related Products

Tesla Coil replacement tip (P6-3551) Replacement tip for Tesla Coil Product# P6-3550.

Wimshurst Machine (P6-3350) Produce a higher current with a lower voltage! Produce static electric charges and discharges with our Wimshurst Machine. This is always an impressive demonstration.

Hand Crank Van de Graaff Generator (P6-3400) Now you can demonstrate all of the classic Van de Graaff experiments for less! Our new hand-crank model can develop potentials of up to 200 kV and produce a spark 3.2 inches long.

Plasma Globe 7 inch (P2-7110) Safely create and explore lightning right in your classroom. The Plasma Globe offers you a safe, fascinating way to demonstrate how lightning works as well as explain the concepts of potential differences and electron orbital jumping.