Georgia Institute of Technology


# Linear Circuits

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*An introduction to linear electric circuit elements and a study of circuits containing such devices.*

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# Tesla Coil

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*Present how Tesla coils work, including mutual inductance and resonance.*

# Lesson Objectives

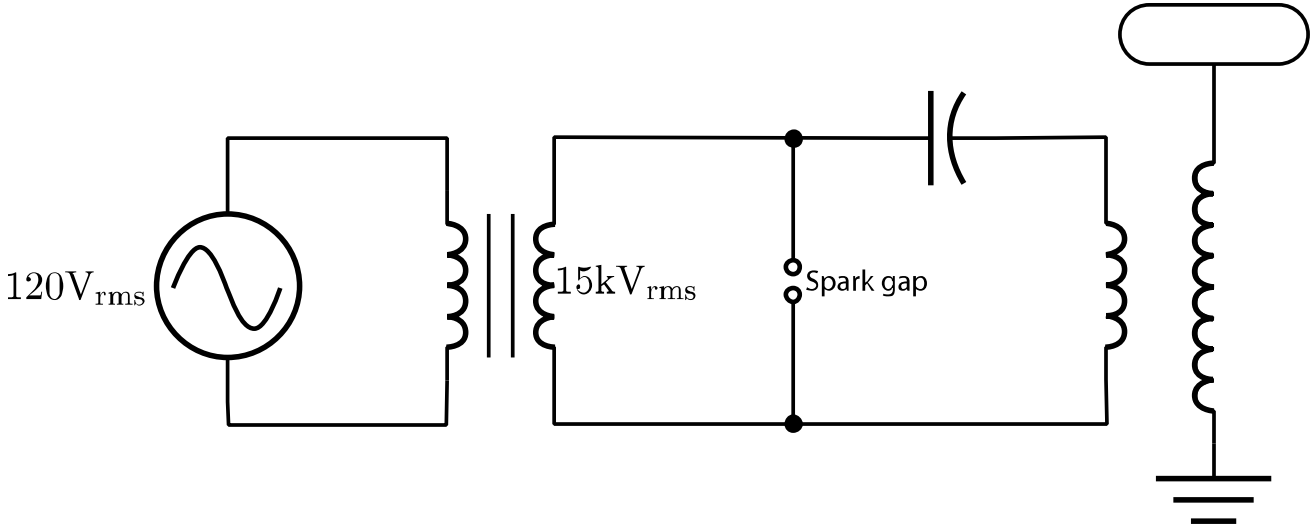
- Read Tesla coil schematic
- Analyze the behavior of a Tesla coil system

# Tesla Coil

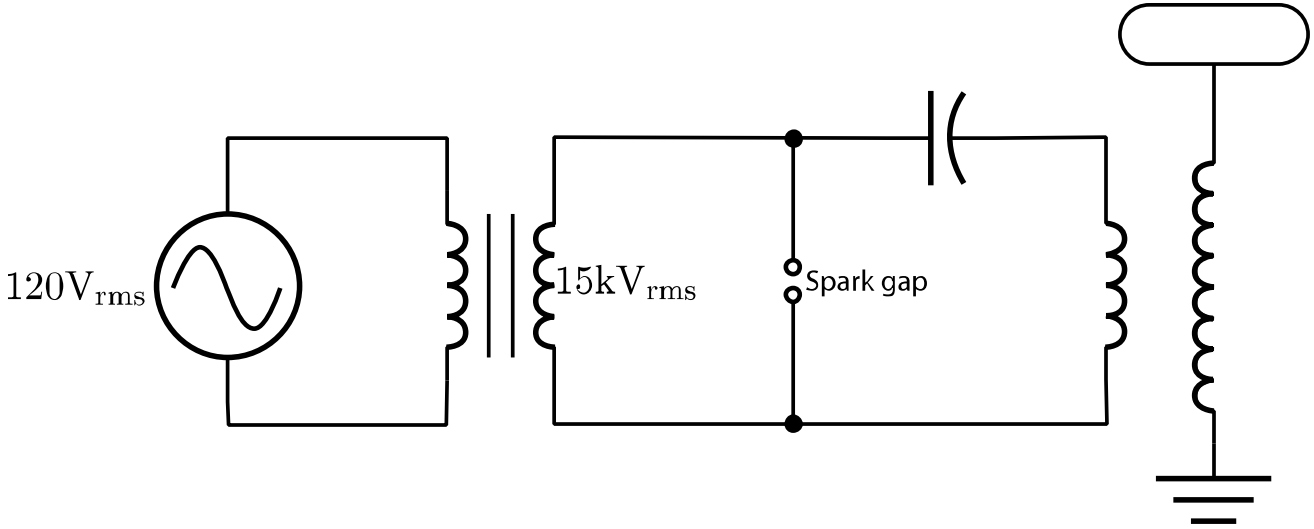
[1] Pereckas 2008

- Invented by Nikola Tesla around 1891
- Works by using
  - High voltage
  - Low current
  - High frequency
- Power transmission without using wires

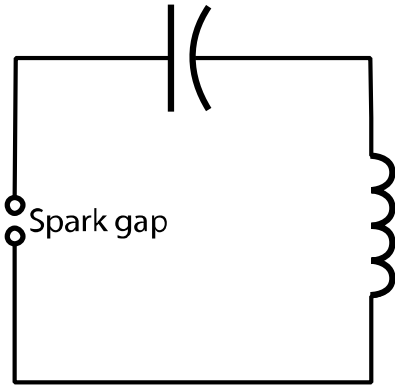
# Tesla Coil Schematic

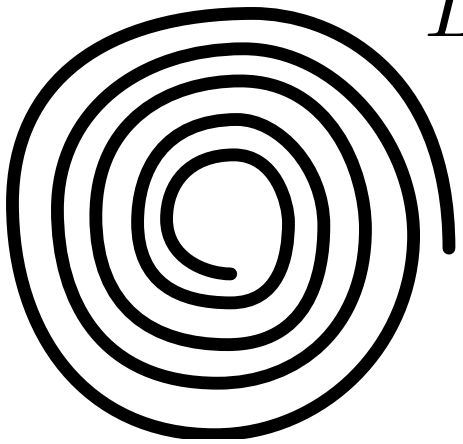


# Step-Up Transformer



# Resonance Circuit

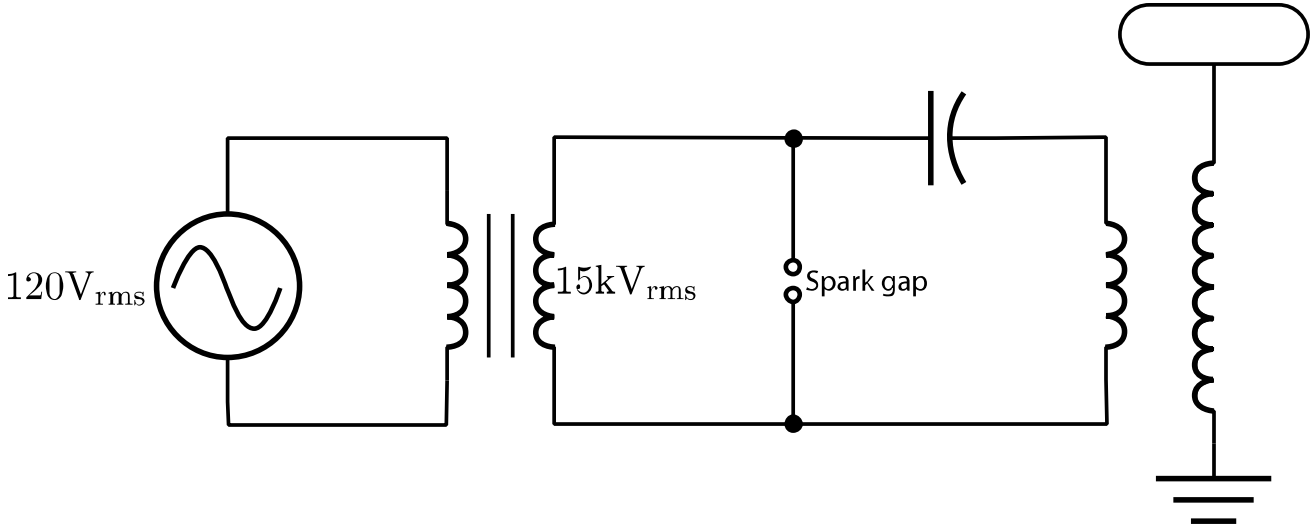


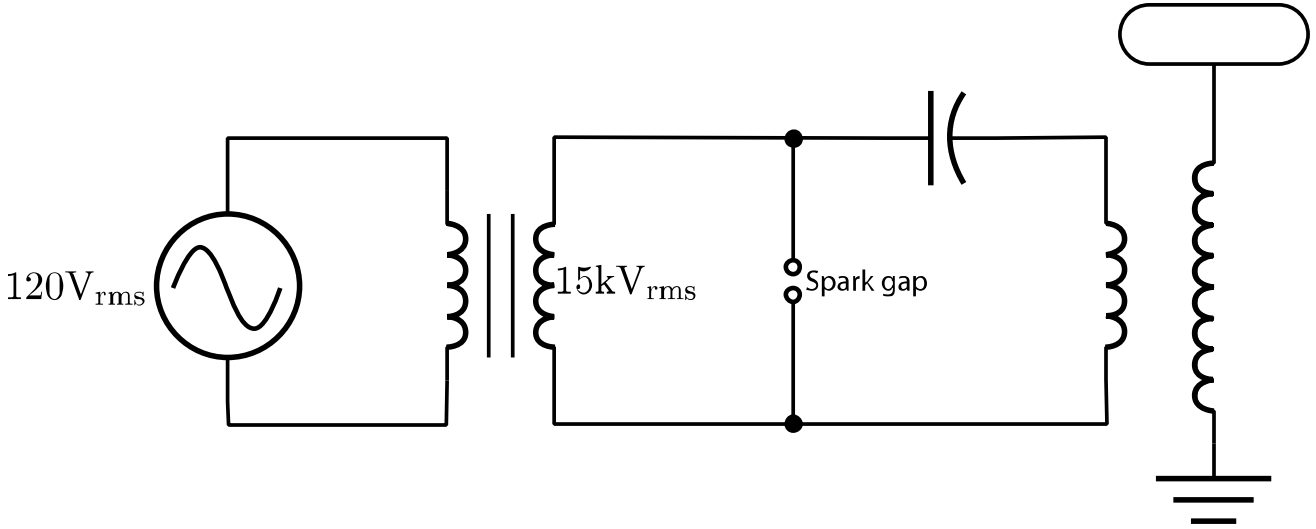
$$L = \frac{(NR)^2}{8R+11W}$$ [2]

[2] Classic Tesla

# Mutual Inductance



# Toroid – Capacitor to the World




$$C_{\mathrm{Tor}} = 1.4(1.2781 - \frac{d_2}{d_1})\sqrt{\pi d_2(d_1 - d_2)}$$ [3]

[3] Tesla Coils 4 Christ

# Summary

- Tesla coils make use of several of the phenomena discussed in this class
- The circuit diagram incorporates the environment as part of the circuit

# Resources


- [1]Pereckas, Michael -Tesla Coil (2008) www.flicker.com/photos/beigephotos/
- [2]www.classictelsa.com
- [3]Teslacoils4christ.org
- [4]Thegeekgroup.org