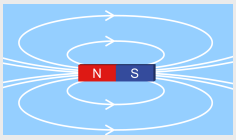
PhET Tips for Teachers

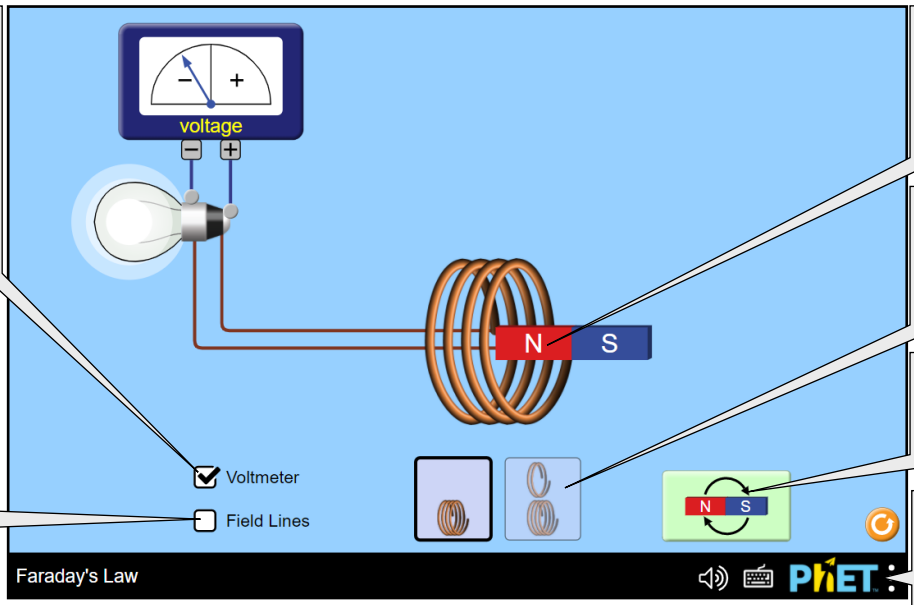
Faraday's Law

In **Faraday's Law,** students can investigate how a changing magnetic flux can produce a flow of electricity.

OBSERVE the magnitude and polarity of the induced emf by enabling the voltmeter

VIEW the magnetic field lines





MOVE the magnet through the coil

COMPARE two different coils simultaneously

FLIP the polarity of the magnet

ACCESS sim features (sound on/off, keyboard shortcuts)

Suggestions for Use

Challenge Prompts

- How many ways can you cause induction? Explain your method(s) citing evidence from the simulation.
- Sketch two different situations in which the light bulb lights up. Indicate the N/S poles of the magnet and the direction of its motion. What is the direction of the induced current in each case?
- Predict what happens to the brightness of the bulb when the number of turns in the coil is reduced by half, but the speed of the magnet remains the same.
- How does the speed of the magnet affect the brightness of the bulb?

Customization Options

Query parameters allow for customization of the simulation, and can be added by appending a '`?`' to the sim URL, and separating each query parameter with a '`&`'. The general URL pattern is:
`…html?queryParameter1&queryParameter2&queryParameter3`

For example, in Faraday's Law, if you want to mute audio (`sound=muted`), and disable external links (`allowLinks=false`) use:
https://phet.colorado.edu/sims/html/faradays-law/latest/faradays-law_all.html?sound=muted&allowLinks=false

To run this in Spanish (`locale=es`), the URL would become:
https://phet.colorado.edu/sims/html/faradays-law/latest/faradays-law_all.html?locale=es&sound=muted&allowLinks=false

Query Parameter and Description	Example Links
`locale` - specify the language of the simulation using ISO 639-1 codes. Available locales can be found on the simulation page on the Translations tab. Note: this only works if the simulation URL ends in "_all.html".	`locale=es` (Spanish) `locale=fr` (French)
`Sound` - if muted, audio is muted by default. If disabled, all audio is permanently turned off.	`sound=muted` `sound=disabled`
`allowLinks` - when `false`, disables links that take students to an external URL. Default is `true`.	`allowLinks=false`

Inclusive Features

Input Features

- Use Tab to focus the magnet using the keyboard and press the 1, 2, and 3 number keys to move the magnet at a constant speed across the play area.

Sound and Sonification

- A tone plays that changes in volume based on the magnitude of induced emf.
- With the voltmeter enabled, the pitch of the tone also indicates the polarity of the induced emf.
- With the voltmeter enabled, a click plays as the meter hits the limit at either the positive or negative voltage side to emphasize the maximum possible emf generated.
- See the Sound Features Video for more useful tips on how concepts and sound are integrated in this sim. See the published Sound Design Documentation for more details on all sounds in this simulation.

See the simulation page for all supported inclusive features.

See all published activities for Faraday's Law here.
For more tips on using PhET sims with your students, see Tips for Using PhET.