



The **Anderson Bridge** is a device used in physics labs for the precise measurement of inductance in terms of resistance and capacitance. It is an important tool for studying AC circuits, especially when determining the value of unknown inductances.

### Function of Anderson Bridge

- **Measurement of Inductance:** The primary function of the Anderson Bridge is to measure the inductance of a coil or other inductive components by balancing a bridge circuit. It is a modified form of the Maxwell's bridge used for more accurate measurements of low inductance.
- **Balancing the Bridge:** The Anderson Bridge works by balancing the inductive impedance of a coil against a known resistor and a variable capacitor. When the bridge is balanced, the unknown inductance can be calculated from the known values in the circuit.
- **Use of AC:** Since inductance is only observable in alternating current (AC) circuits, the Anderson Bridge operates under AC conditions. A signal generator provides the AC voltage, and a detector measures the null or balanced condition of the bridge.

### Significance in Physics Labs

1. **Precise Measurement:** The Anderson Bridge is favored for its high precision in measuring small inductances compared to other methods. This makes it useful in laboratories where accuracy is essential.
2. **Understanding AC Circuits:** It helps students and researchers understand the behavior of AC circuits and how inductive, capacitive, and resistive elements interact in such circuits.
3. **Exploration of Resonance and Impedance:** By using the Anderson Bridge, students can explore concepts like resonance and impedance in AC circuits, since balancing

the bridge involves understanding how these elements contribute to the overall circuit behavior.

4. **Calibration and Testing:** It is also used to calibrate inductors and in testing the performance of other AC circuit components.

## Key Components

- **Resistors ( $R_1$ ,  $R_2$ ):** Known resistances in the circuit.
- **Capacitor (C):** A variable capacitor used to balance the inductive component.
- **Inductor (L):** The unknown inductance to be measured.
- **AC Source:** Provides the alternating current for the bridge.
  - **Detector/Galvanometer:** Detects the null condition of the bridge.



A **Cathode Ray Tube (CRT)** is a vacuum tube containing one or more electron guns and a fluorescent screen used to view images. In physics labs, CRTs are often used for experiments in electromagnetism, electron behavior, and wave-particle interactions. Here's an overview of its function and significance in a physics lab:

### Function of a CRT:

1. **Electron Emission:** A **cathode** (negative electrode) emits electrons when heated. These electrons are accelerated and focused into a beam by an electric field created by a positively charged **anode**.
2. **Acceleration and Deflection:** The electron beam travels through the vacuum inside the tube. Magnetic or electric fields can be applied using external or internal coils or plates to deflect the electron beam in a controlled way. The deflection can be vertical or horizontal.
3. **Impact on Fluorescent Screen:** When the electron beam strikes the **fluorescent screen** at the end of the tube, the screen emits visible light at the point of impact. This creates a spot of light on the screen that can be moved around by adjusting the electric or magnetic fields.
4. **Display of Signals:** In an oscilloscope, which is a type of CRT, the electron beam is manipulated to display time-varying signals, like voltage or current over time, which are critical in many experiments.