

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 (R1, R2):** 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.

Significance of CRT in Physics Labs:

1. **Visualization of Electron Behavior:** CRTs allow for the direct observation of the behavior of electrons, including their deflection by electric and magnetic fields. This is fundamental in understanding the principles of electromagnetism and charge motion.
2. **Experimental Demonstration of Lorentz Force:** By applying external magnetic or electric fields, CRTs provide an experimental setup to study the **Lorentz force** (the force on a charged particle due to electromagnetic fields), which is essential in classical mechanics and electrodynamics.
3. **Measurement of e/m Ratio:** CRTs are used in specific experiments (like the **Thomson experiment**) to measure the charge-to-mass ratio (e/m) of an electron by analyzing its deflection in magnetic or electric fields.
4. **Wave-Particle Duality:** Experiments involving CRTs can demonstrate properties of electrons, such as diffraction or interference patterns, which are important for understanding the wave-particle duality concept in quantum mechanics.
5. **Signal Analysis in Oscilloscopes:** A CRT in an oscilloscope is vital for signal analysis, where it helps in studying electrical signals' amplitude, frequency, and phase. This capability is crucial for experiments that involve time-varying phenomena in fields like electronics, radio waves, and acoustics.



Newton's Ring Experiment is a classical physics experiment that demonstrates the phenomenon of **interference of light**. It helps in understanding the wave nature of light, specifically the formation of constructive and destructive interference patterns due to the superposition of light waves reflected from different surfaces. Here's a detailed look at its function and significance:

Function of Newton's Rings Experiment: