Study of Light-Emitting Diodes (LEDs)

Presented by

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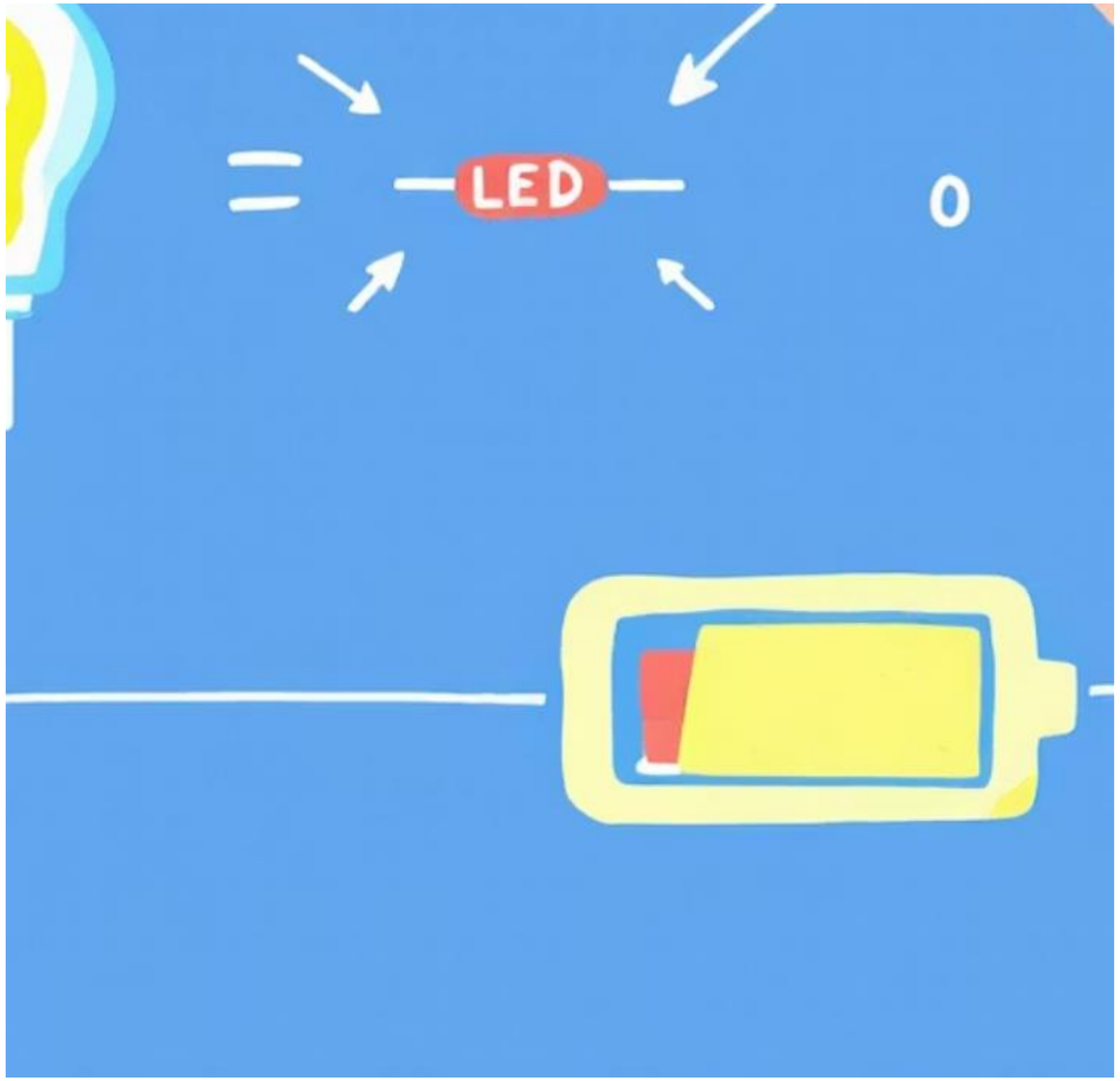
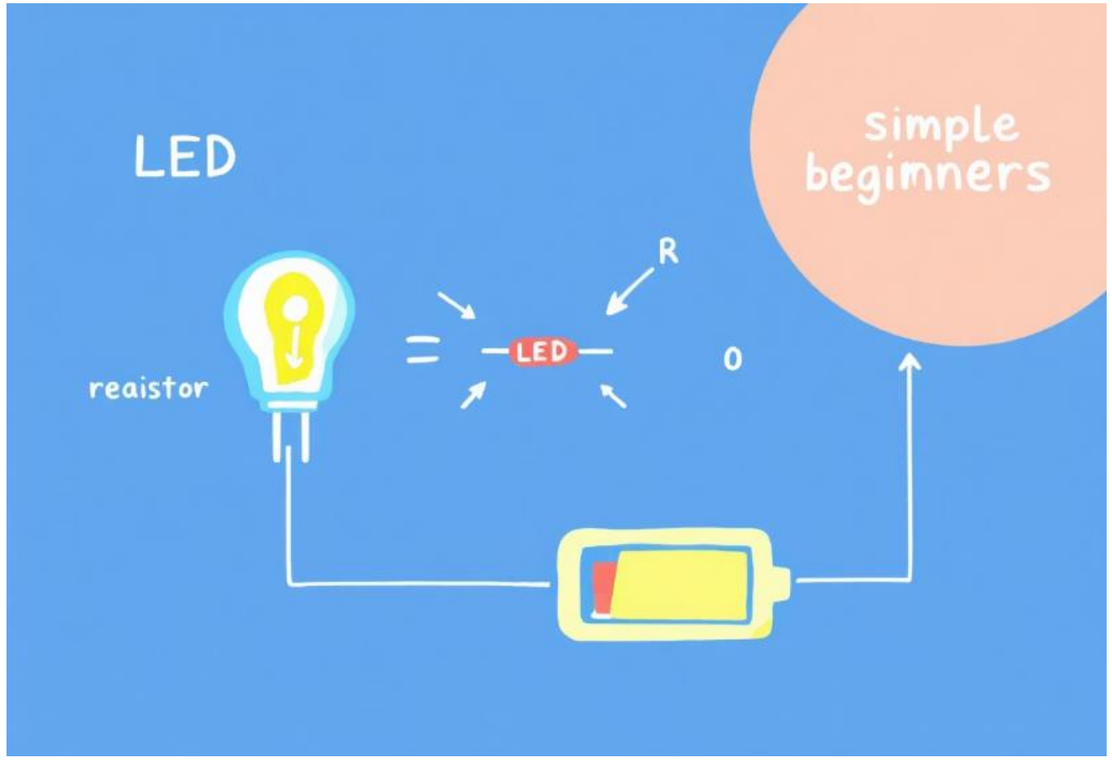


Understanding LED Objectives

Our study of LEDs aims to achieve key objectives. First, we seek to understand the working principle of LEDs.

Next, we plan to analyze their electrical characteristics. Finally, we intend to explore LED applications in lighting systems.



LED Theory and Basics

Semiconductor Devices

LEDs are semiconductor devices that emit light.

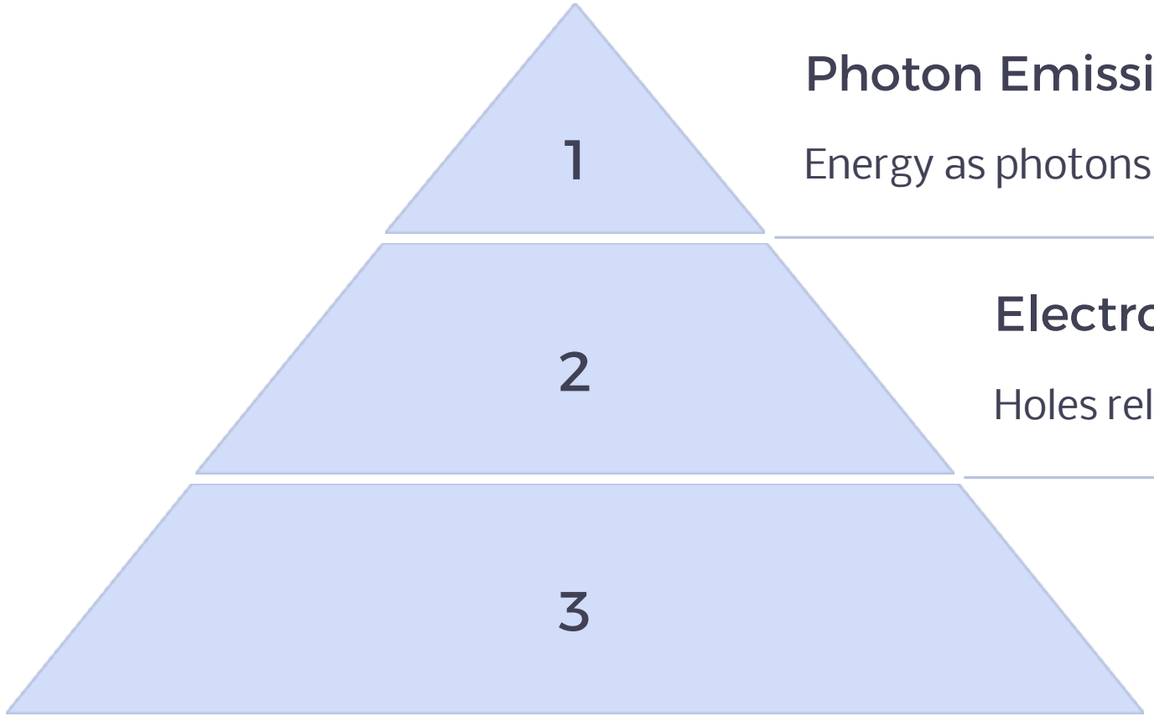
Electroluminescence

Light is emitted through electroluminescence, a fundamental process.

Bandgap Dependency

The color of emitted light depends on the semiconductor bandgap.

LED Working Principle



Photon Emission

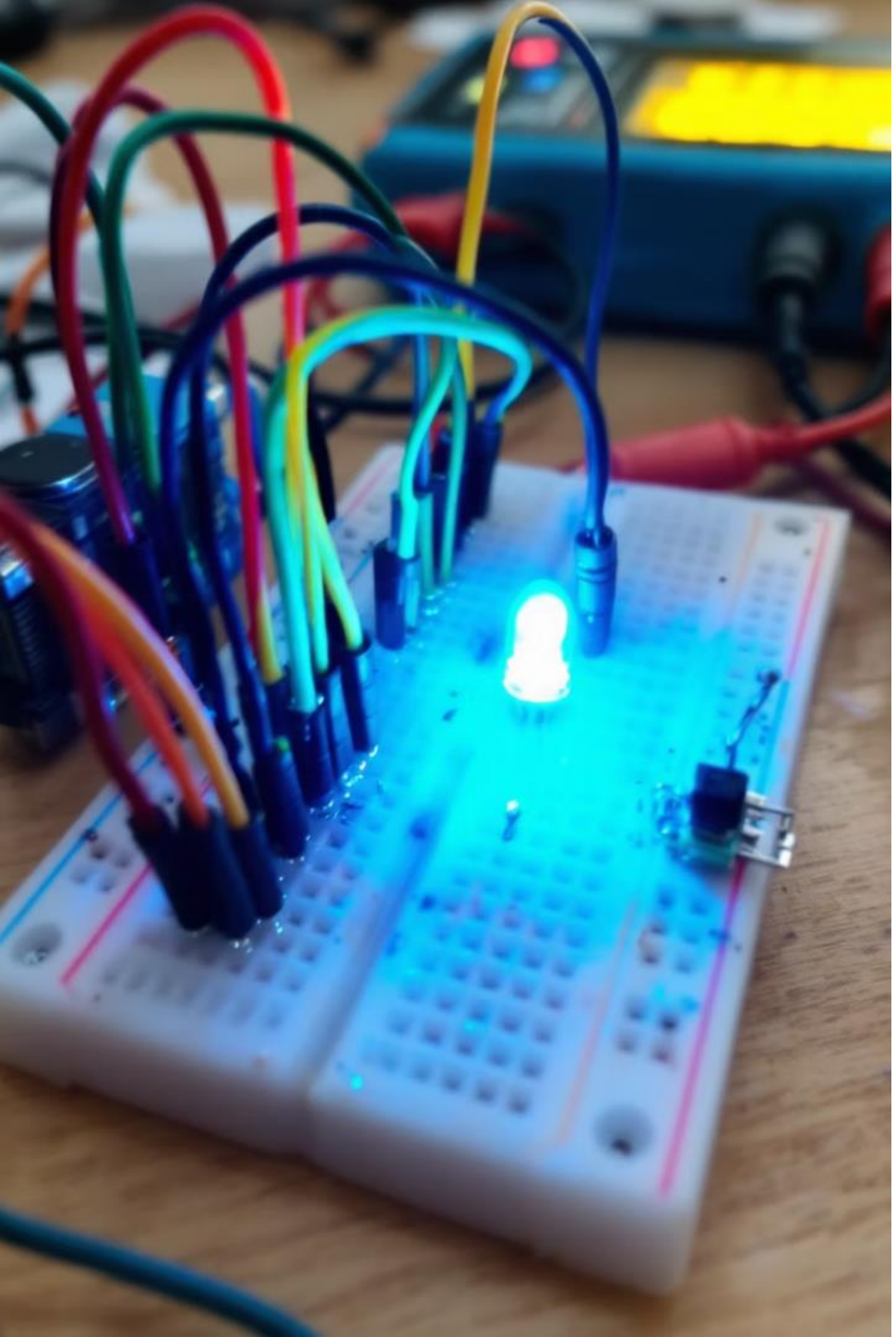
Energy as photons.

Electron Recombination

Holes release energy.

Threshold Voltage

Light emission starts.



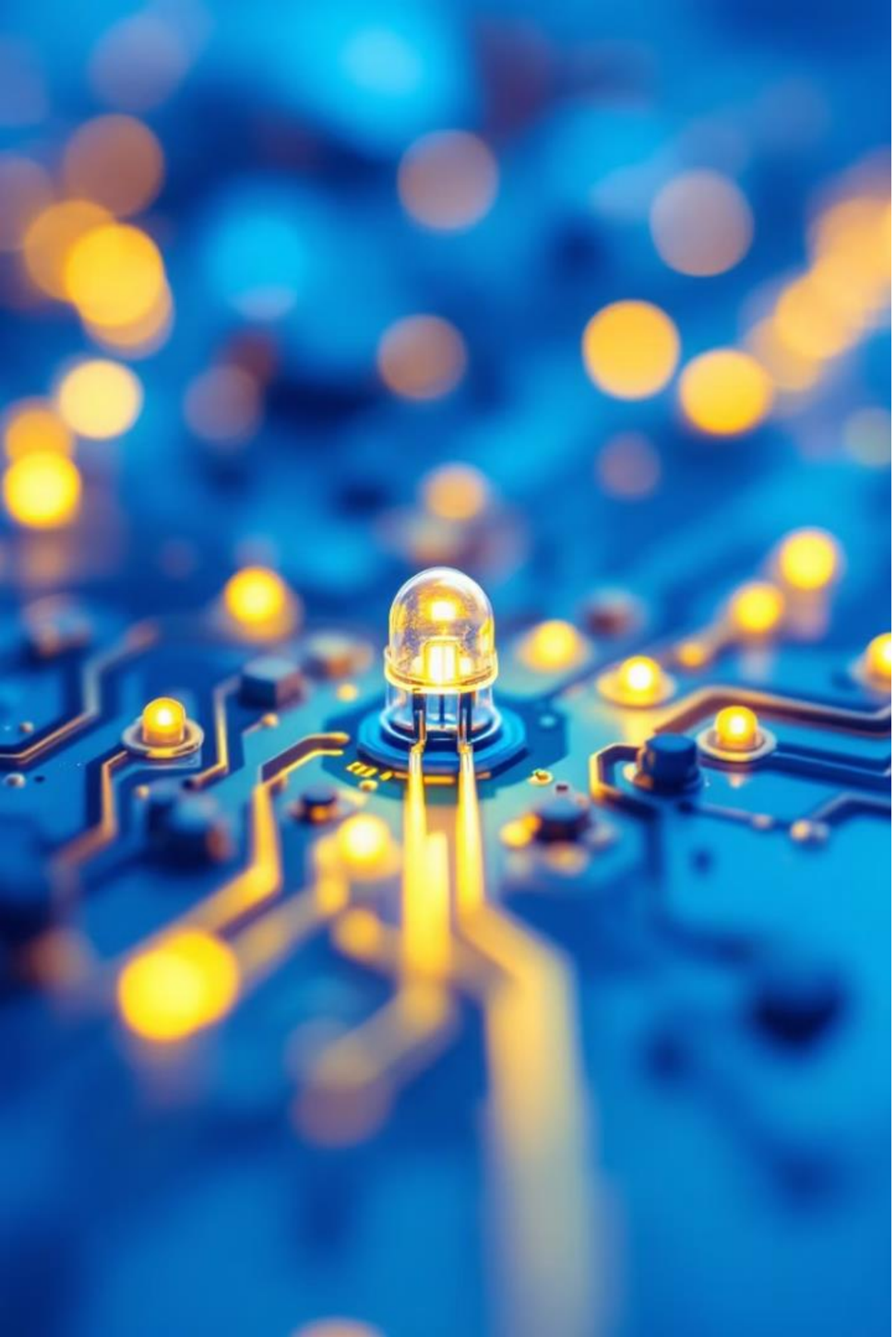
Experimental Setup Components

Red LED

Power Supply

470 Ohm Resistor

Our experimental setup includes essential components. A red LED is used as the light source. A power supply (3V - 12V DC) provides the necessary voltage. Additionally, a 470 Ohm resistor limits the current.



Forward Bias Testing Procedure

1

Series Connection

Connect LED and resistor.

2

Voltage Application

Apply different voltages.

3

Brightness Observation

Observe changes in brightness.

V-I Characteristics and Reverse Bias

V-I Characteristics

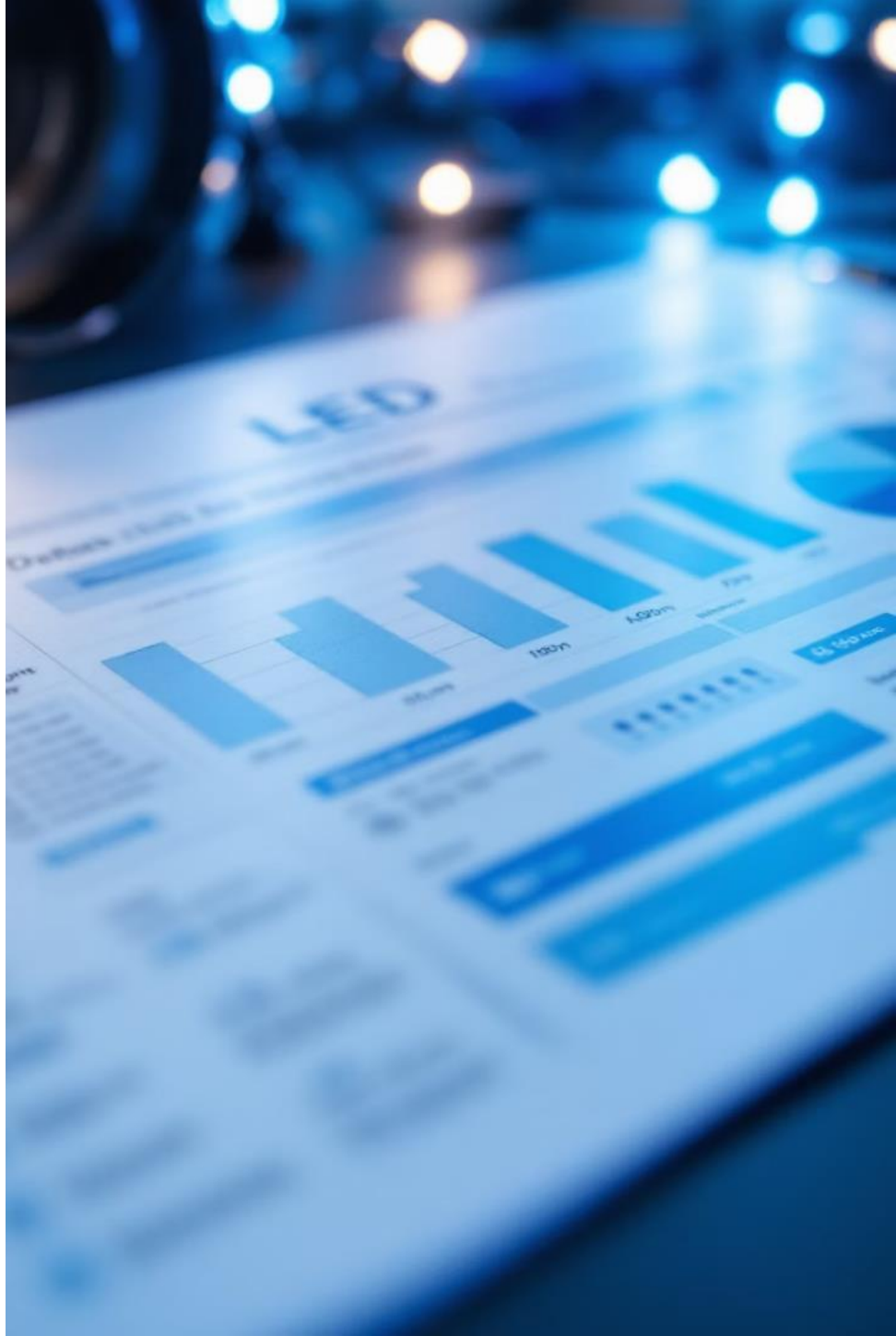
1. Measure current at increasing voltages.
2. Identify the threshold voltage.

Reverse Bias Test

- Reverse LED connection.
- Observe current flow (negligible).

Observations and Data

Measurement Name	Value
LED Type	Red
Threshold Voltage	2V
Forward Current	15mA
Reverse Leakage	Negligible



Key Conclusions

Voltage Threshold

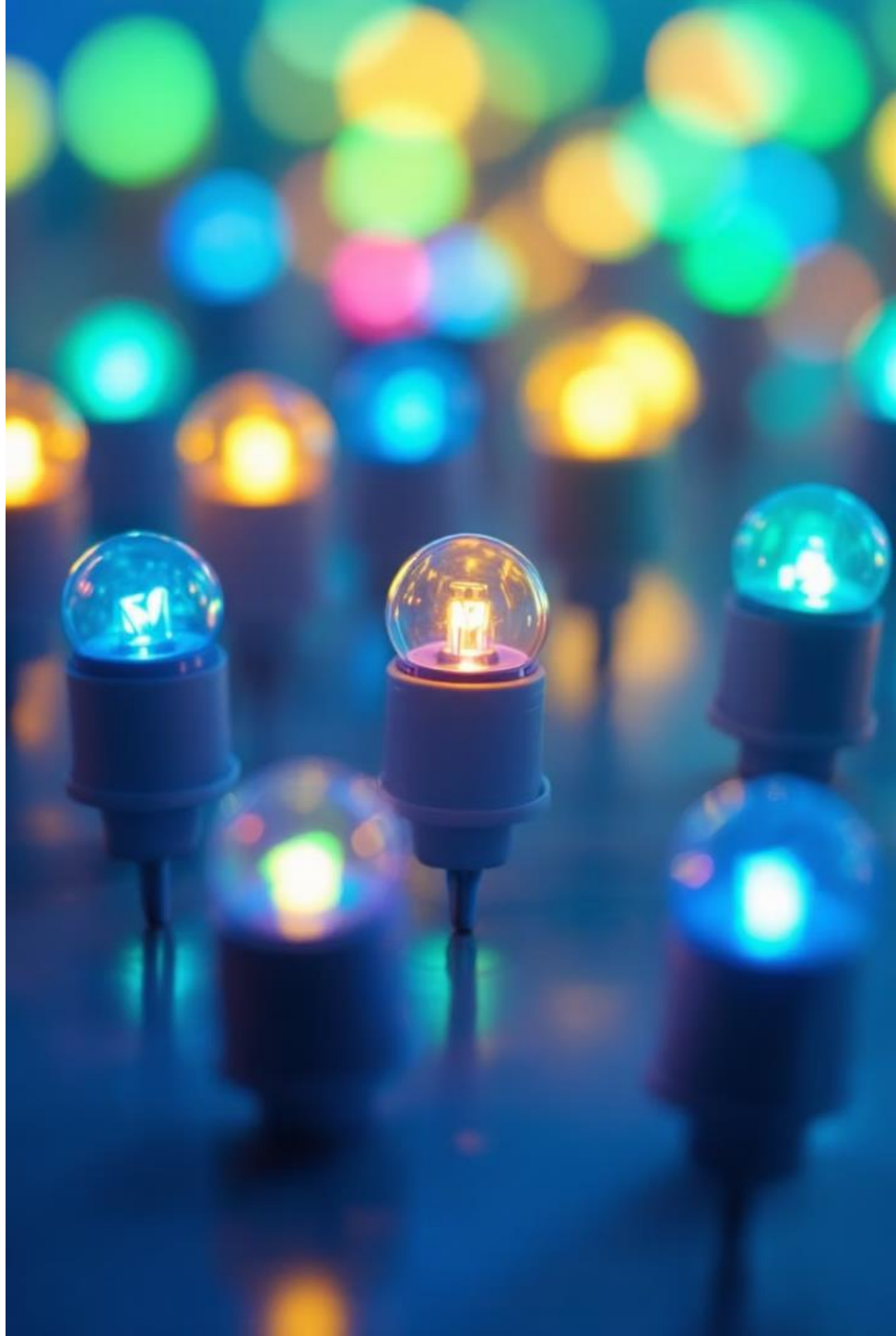
LEDs work above threshold.

Brightness & Current

Brightness increases with current.

Reverse Bias

Minimal current in reverse.



Applications and Final Thoughts

Indicator Lights

LEDs are widely used as indicator lights in various devices.

Display Panels

They are essential components in display panels and screens.

Lighting Systems

LEDs are increasingly common in general lighting systems.

The End

Thank you