Display

CMSC 435/634
CRT Tube

Basic Design of a CRT Tube

- **Interior metallic coating at high positive voltage**
- **Heating filament**
- **Cathode**
- **Control grid**
- **Focusing system**
- **Vertical deflection**
- **Horizontal deflection**
- **Phosphor coating**
- **Electron beam**
Random Scan
Raster Scan
Interlace Options

Interlaced

Non-Interlaced
Light

- Visible Range: 390-700nm
- Luminance has large dynamic range
  - 0.00003 Moonless overcast night sky
  - 30. Sky on overcast day
  - 30000. Sky on clear day
  - 16,000. Snowy ground in full sunlight
- Actual colors result from spectral curves
  - dominant wavelength, hue
  - brightness, lightness
  - purity, saturation
Physiology

- Rods
  - active at low light levels (scotopic vision)
  - only one wavelength sensitivity function

- Cones
  - active at normal light levels
  - three types: sensitivity functions with different peaks
Spectral Sensitivity

![Graph showing spectral sensitivity with peaks at different wavelengths for L, M, and S colors.](image)
Color CRT

Cathode Ray Tube

- Picture tube
- Electron guns
- Electron beams
- Color signals
- Shadow Mask
- Screen
- Phosphor dots
Shadow Mask
Monitor Gamut

\[\text{Red} \quad x = 0.67 \quad y = 0.33\]
\[\text{Green} \quad x = 0.21 \quad y = 0.71\]
\[\text{Blue} \quad x = 0.14 \quad y = 0.08\]
\[\text{White} \quad x = 0.313 \quad y = 0.329\]
Color Options

True Color
- Pixel Value
  - red
  - green
  - blue

LUT
- red
- green
- blue

Final Resulting Color

Pseudo Color
- Color Index Value
  - red
  - green
  - blue

Pixel Value
- red
- green
- blue

LUT

Final Resulting Color
Gamma Curve

![Graph showing Monitor Response, Correction Curve, and System Response against Luminosity and Voltage.](image)
Gamma Correction
Laser Printer
Ink Jet Printer
LCD
General Raster Display