

University of Virginia

Department of Physics

Physics 606: How Things Work II

Lecture #25 Slides:

Televisions

Television

Question:

A television image is created by beams of moving electrons that collide with the inside front surface of the television picture tube and cause it to glow. Will a magnet held still near the picture tube affect the image that forms?

Observations About Television

- Radio waves carry an image somehow
- Image can be black & white or color
- Television takes a moment to turn on or off
- Image is affected by magnetic fields
- Photographs of televisions look funny

Creating an Image

- A television creates its image dot by dot
- It scans the screen 60 times per second
- A full frame is two scans – two fields
- Our eyes are slow; we see continuous motion

Fluorescence

- Electrons collide with phosphors inside screen
- Phosphors are electronically excited
- Phosphors emit their excess energy as light
- Different phosphors emit different colors

Aiming the Electrons

- Electrons are “boiled” off a hot wire
- They’re accelerated toward positive charge
- They’re focused and steered *en route* to screen
 - Focusing is electric and magnetic
 - Steering is magnetic