

Color Vision SIM Homework

1) (5 pts total) You upgrade the TV in problem 1 to a color TV which has 3 phosphor dots (one red, one green, and one blue) for each pixel and 3 electron beams (one dedicated to each color) to illuminate these dots.

a) (1 pts) Explain how the incoming electrons interact with the phosphor dots to produce light and what differs between these 3 types of phosphors so that they produce different colors of light.

b) (2 pt) Since you now have a color TV, you decide to get fancy with your picture. You decide to produce a thin horizontal line at the center row of the TV, but you want your line to look like this.



Explain how you could do this by controlling each of the electron beams (the blue one, the red one, and the green one). Your explanation should include what you would need to do and the physics of why it would work. You can reference the answer you gave in Question 1A if you like.

c) (3 pts) Check your answer to the previous question using the Color Vision Simulation available from http://phet.colorado.edu/simulations/sims.php?sim=Color_Vision

i) How are you able to make the man see yellow using this simulation? Explain why we can see this as yellow even though we are only using red, green, and blue lights.

ii) What changes do you see in the simulation when you adjust the brightness of the red light?

iii) How do these changes affect the stimulation of the three cones within the man's eye? Does it affect what color his brain says he is seeing? Why or why not? Does it affect the wavelength of the light hitting his eye? Why or why not?

iv) In this context, explain how we can see something on the color TV as the color white or as the color grey?

d) (1 pt) In the back of your favorite comic book is an ad for a giant magnifying glass that attaches on the front of your TV screen. It claims that this will allow you to see far better detailed images of your favorite TV actors. What is the problem with this claim?