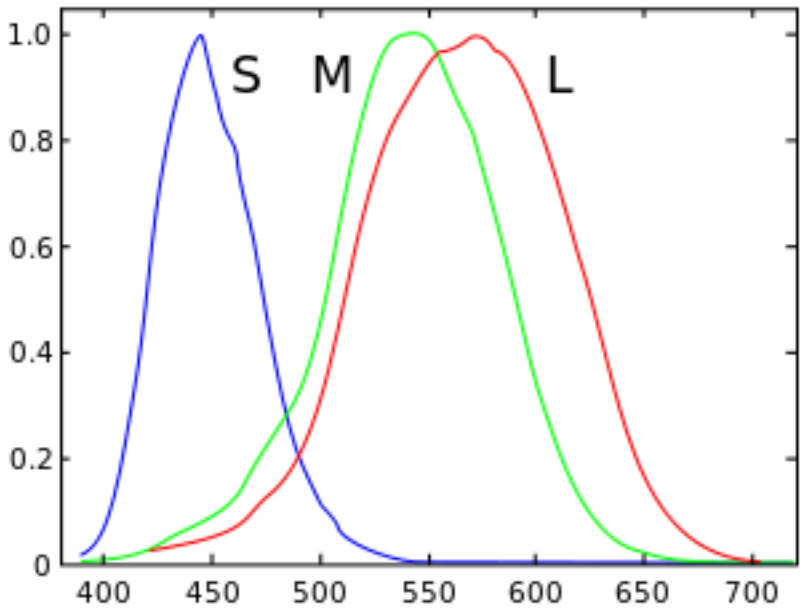
COLOR

color is a “human phenomenon” physical difference is in wavelength.

“visible” light is between 4000Angstroms and 7000Angstroms
the human eye perceives 4000 Angstroms as blue/violet light and 7000 Angstroms as deep red.
Color is the response of the eye to certain wavelengths of light.
2 types of cells in eye : cones (color) and rods(value) with 3 types of cones for trichromatic vision
visual abnormalities may = color blindness red/green colorblindness is most common and most common in men - aprox 5/100
- tetrchromatic many insects,spiders, some fish, birds and reptiles. Also believed that as many as 1/2 of women - gives the ability to make enhance color distinctions.
Synesthesia - may cause colors to be seen with music or with letters or numbers…



The eye perceives wavelengths as color - this has only to do with light- pigment has no color without light.
Color perception is one of the most precise determinations our senses can make - the average eye can distinguish between aprox 7,500,000 hues.
white light is a combination of all wavelengths - prism
color is produced when light hits an object. The object will absorb some of the wavelengths of light and depending on it’s “color” will reflect those wavlengths.
2 best known systems for precisely identifying color
Ostwald and Munsel are now digitally supplemented by very precise colorometry.
Terms:
Hue: that property of a color which distinguishes it from a grey of the same brilliance. ex red, blue, green etc.
Saturation/ CHROMA: Freedom from mixture with white.refers to the amount or percentage of a hue in a color mixture
Brightness: difference from black
VALUE: the relative lightnesss or darkness

the eye is not uniformly sensitive to all wavelengths. Sees best in yellow green -eye is designed to use these wavelengths best

color dealing with light is called additive color mixing. Primary colors are: red,green and blue. Secondary colors are straw, magenta and cyan. mixing these yields white.
in additive color mixing - you are adding wavelengths as you are mixing.

color dealing with pigment is called subtractive color mixing - this is the type most people are familiar with. Primary colors are red, yellow and blue. Secondary colors are orange, green and violet. mixing yields black. As colors of pigments are mixed more wavelengths are absorbed or subtracted out.

In the theatre, we normally use filters to produce colored light. Starting with essentially white light, a filter absorbs all wavelengths except those of the desired color.

filters can take different forms and have historically evolved.

1st uses: colored liquid in glass containers

stretched silk panels to bounce light off

sheets of colored gelatin (dried) used until at least 1975. As light sources got brighter - and hotter gelatin needed to be replaced. It burned easily - and the smell!

acetate based materials - roscolene/ cinemoid -slightly more heat stable and self extinguishing - this is good until higher powered and hotter tungsten halogen lamps are in widespread use.
polyester gels introduced in 1969as GELTRAN - the original deep dyed polyester - the GELTRAN process still in use by GAM
mylar
deep dyed polyester GAM
surface dyed polyester - Lee, Apollo
polycarbonate70%(LEXAN)/ polyester30% mix - roscolene
color still migrates over time and heat from the center of the gels, necessitating their replacement.
in theatre sheet sizes- 20X24 come from gelatin days - std size baker's sheet, film industry usually uses rolls 24" or 48" wide X 50' long
Swatchbooks used by designers for color selection. Each manufacturer has a unique numbering system and arrangement. The swatch book also contains a page with color name, number and transmission information.
swatchbooks also have diffusion media which are used to vary the quality of the shadows. - also used to blend beams or colors.

A major selling point of newer instruments is “cool beam “ technology.
dichroic filters
use thin film technology - like soap bubbles - uses thin layers of optical coatings.
passband = the range of wavelengths allowed to pass through the filter
stopband= the range of wavelengths reflected.
Dichroics can achieve highly saturated colors. Light not in passband are reflected back - not absorbed like other filters, so there is little heat.
Used in some projection lamps-red and in-fared light allowed to pass through while rest of visible light is reflected - this is called cool beam technology -NOTE:warning: some enclosed fixtures may pose a serious fire hazard with these lamps and should only use lamps make with “no cool beam”
Advantages of Dichroics:
-better filtering
-any passband/stopband config possible
-no heat
-much longer life
Disadvantages of Dichroics:
-higher initial cost
-fragile

Color is also produced through the use of LED fixtures. The LEDs produce light in a very narrow range of wavelengths - colors are pure and vibrant. this is pure additive color mixing.
originally thought that theoretical RGB mixing would allow any color to be created
this was then augmented by RGB&A(amber) for greater brilliance.
Study initiated by USITT led to the creation of the Selador fixture - 7 different colors.
Allows for a greater range of color mixing (red, red/orange, amber, green,cyan, blue, indigo)
Still wavelength “holes” making it difficult to match some colors.