LEBANON CAMERA CLUB

Converting Digital Images to Black & White

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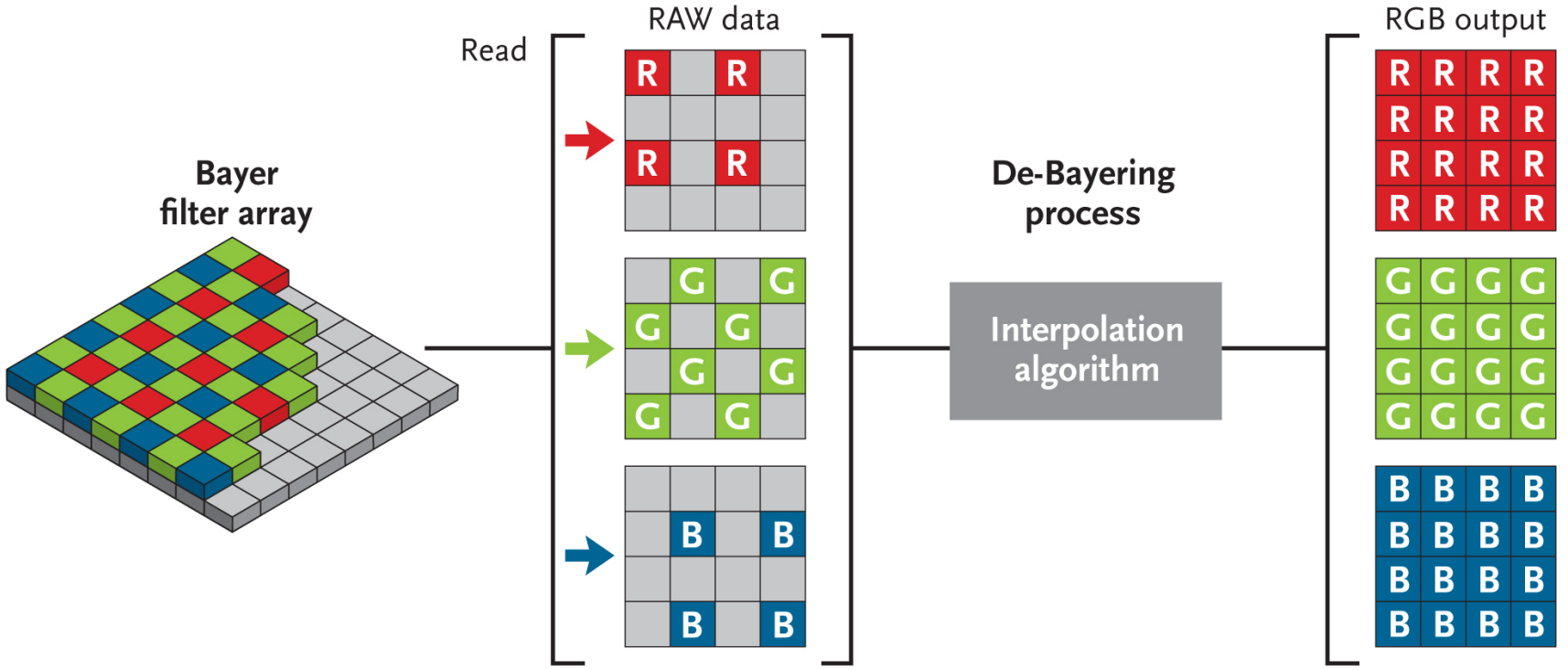
Converting Images to Black & White

What does a digital camera capture?

- Individual pixels sensitive to Red, Green, or Blue
  - Bayer filter array (Bayer mosaic)
  - Goal → Red, Green, and Blue for every image pixel
    - Interpolation algorithm "estimates" values for missing information

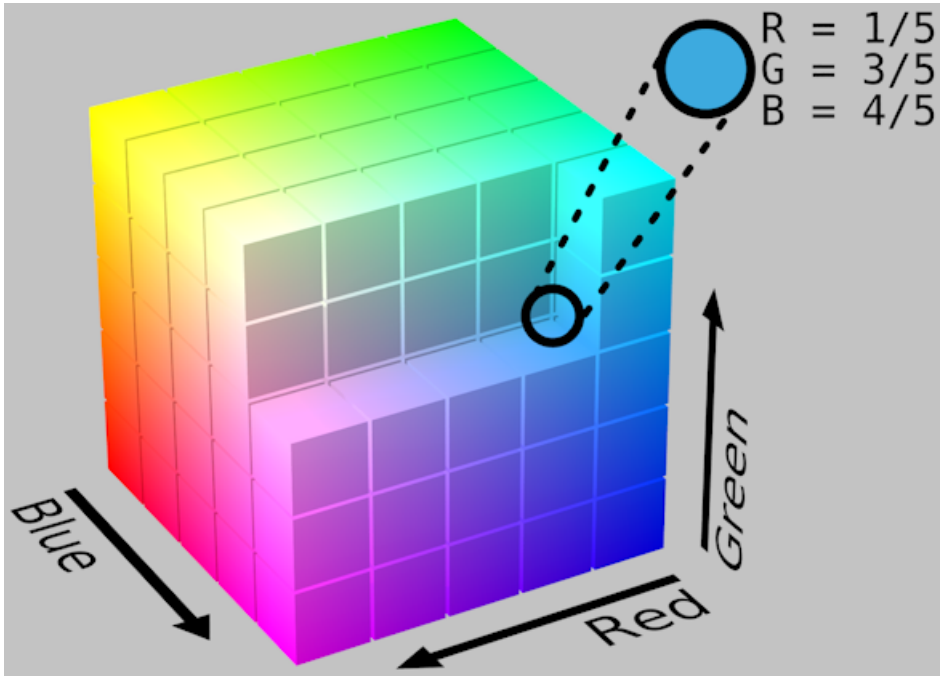


Converting Images to Black & White

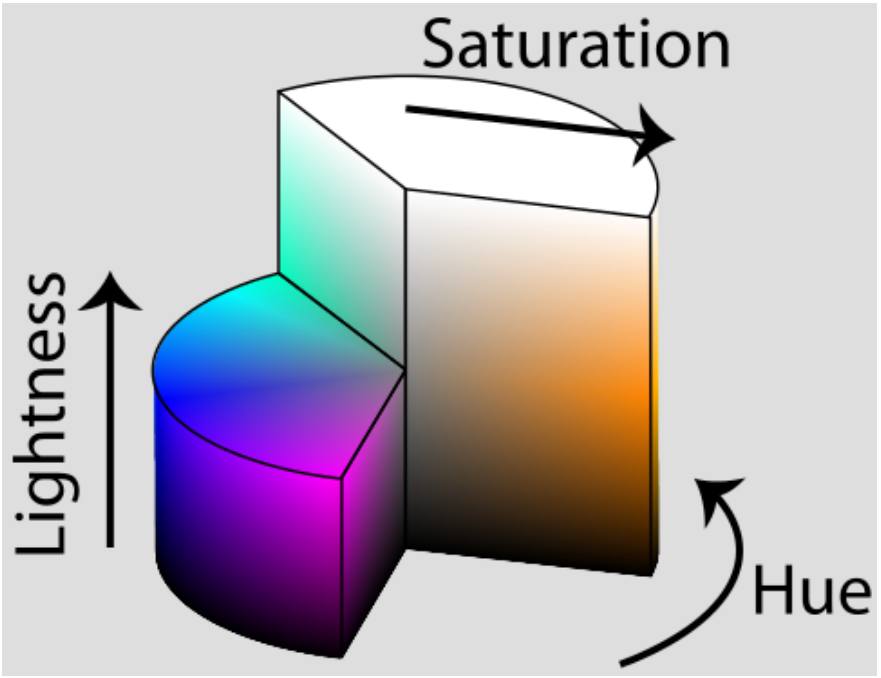
Color vs. Black & White

- Color is expressed with 3 variables in different ways
  - RGB → Red, Green, and Blue (usually values from 0 to 255)
  - HSL → Hue, Saturation, and Luminance

RGB



HSL



Converting Images to Black & White

Color vs. Black & White

- Color is expressed with 3 variables in different ways
  - RGB → Red, Green, and Blue (usually values from 0 to 255)
  - HSL → Hue, Saturation, and Luminance
- Black & White has 1 variable
  - Luminance → light intensity (brightness)
    - Luminance we want may not be the same as HSL luminance
  - RGB to B&W conversions
    - HSL: L = (max(R, G, B) + min(R, G, B)) / 2
    - Average: L = (R + G + B) / 3
    - Perceptual: L = .30R + .59G + .11B
    - RGB color space luminance: L = 0.2126R + 0.7152G + 0.0722B
  - No "correct" conversion → personal preference

Converting Images to Black & White

Conversion options

- Greyscale option in camera
  - Possibly a custom conversion chosen by the manufacturer
    - No control over conversion
- Image editor plugins
  - Plugin: application that operates inside an image editor
    - Started by Photoshop, some other editors can use PS plugins
  - Lots of options for different "looks"
    - May offer different "film" options → Tri-X, T-Max, Neopan, HP5
    - May allow grain control
    - May present a set of examples to choose from
  - Different films respond to colors differently
    - Panchromatic → sensitive to all wavelengths of light
    - Orthochromatic → sensitive to blue and green light only

Converting Images to Black & White

Conversion options

- Greyscale menu selection in image editor
  - Possibly a custom conversion chosen by developers
    - May be some control over conversion

PaintShop Pro greyscale conversion

Converting Images to Black & White

Conversion options

- Desaturate image
  - May not be the same as greyscale menu selection
    - Not the same in PaintShop Pro

PSP greyscale conversion

PSP desaturation conversion

Converting Images to Black & White

Conversion issues

- Contrast
  - Converted images can look “flat” due to insufficient contrast
    - Increasing contrast can give the image more “pop”

PSP greyscale conversion

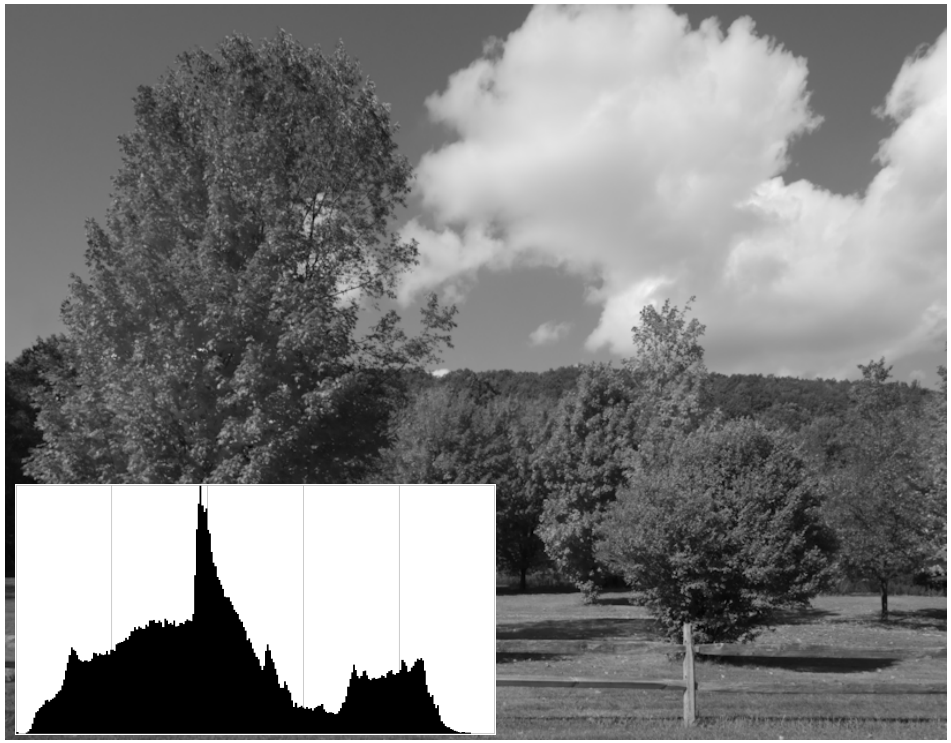
+12 contrast, +7 brightness

Converting Images to Black & White

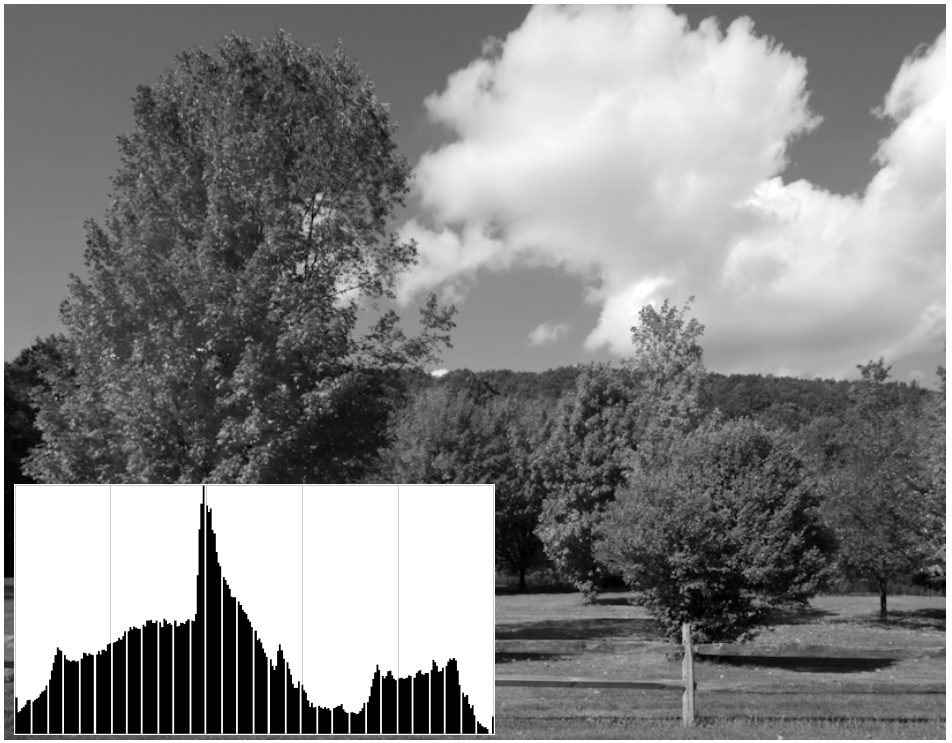
Conversion issues

Note: Histogram clipping is normally avoided, but it may be acceptable for some B&W images, which benefit from the extra contrast—however, not all B&W images need to be high contrast

- Contrast
  - Converted images can look "flat" due to insufficient contrast
    - Increasing contrast can give the image more "pop"



PSP greyscale conversion



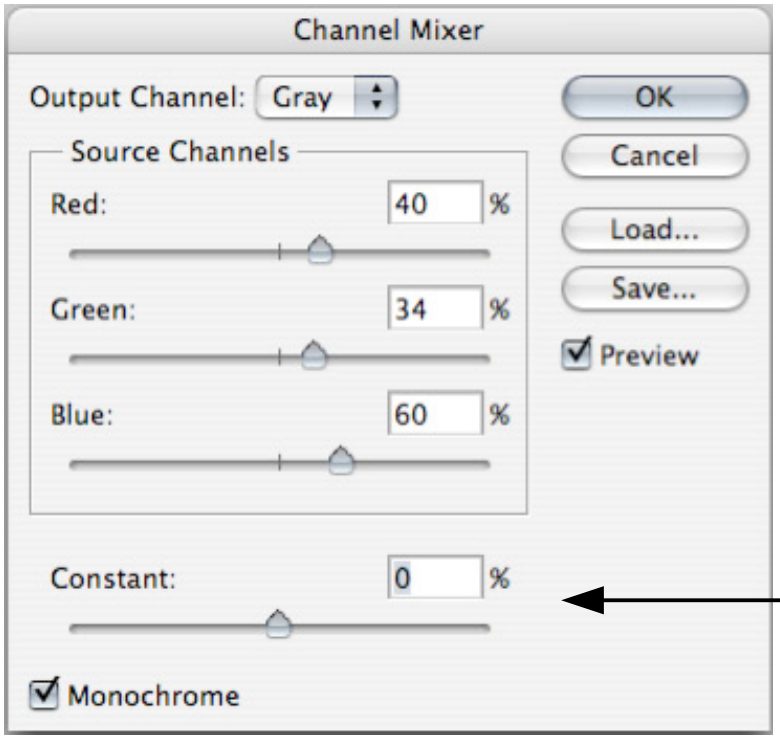
+12 contrast, +7 brightness

Converting Images to Black & White

Conversion options

- Channel mixer
  - Individual control of RGB “channels”
    - May only be available in advanced editors
    - Available in Photoshop, Paint Shop Pro, GIMP (free!)

Note: There is a plugin for GIMP which allows it to use Photoshop plugins (some may not work)



must be selected for B&W

affects all channels

Converting Images to Black & White

Channel mixer

100
0
0

0
100
0

0
0
100

Converting Images to Black & White

Channel mixer

editor
greyscale

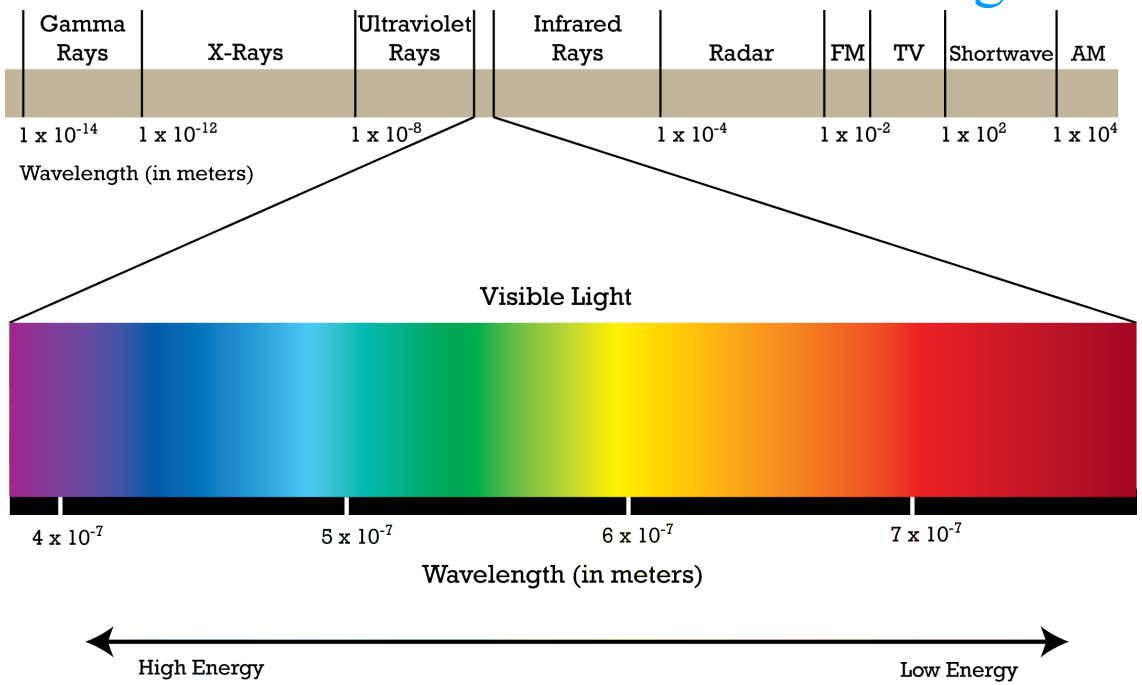
55
30
15

70
45
-10

Converting Images to Black & White

Infrared photography

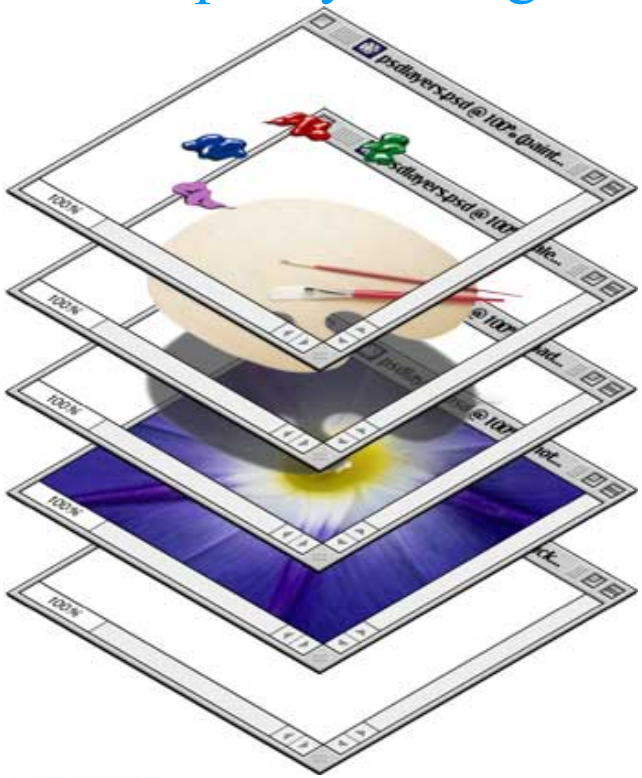
- Infrared: invisible light at the red end of the spectrum
  - Infrared film used for film cameras
  - Digital cameras have a sensor filter to block infrared light
  - Sensor filter can be removed by specialist camera shops
    - Use lens filter to block visible light

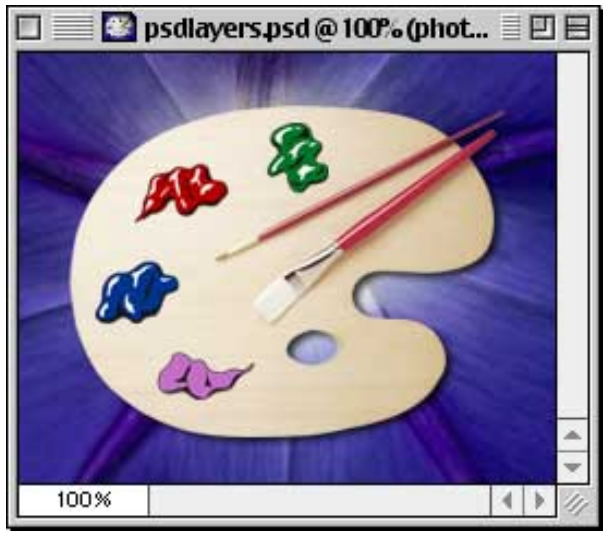


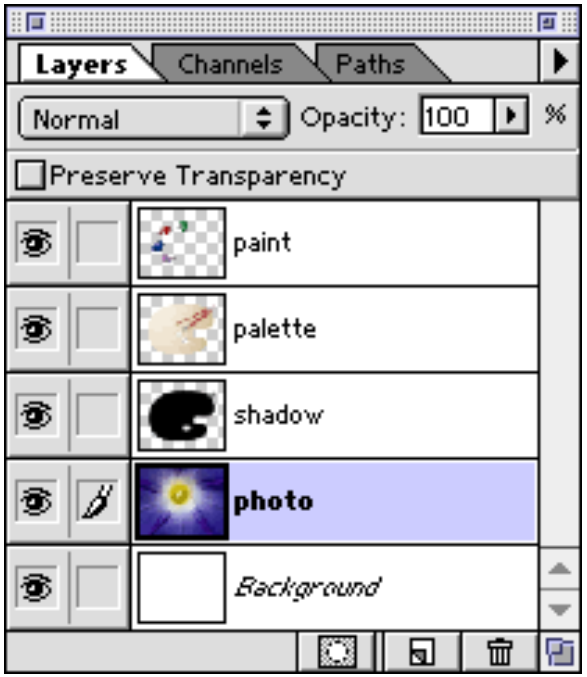
Converting Images to Black & White

Infrared simulation

- Channel mixer can be used to give infrared "look"
  - Requires an image editor which supports layers
    - Layers → stack of "slides" that compose an image
    - Opacity setting → 0% is invisible, 100% blocks layers below







Converting Images to Black & White

Infrared simulation

110
45
-80

duplicate layer

gaussian blur, 8 pixels (anything from 5 to 15)

set blur layer opacity to 33% to add infrared "glow" (amount to suit)

infrared focus mark

more diffraction and high scattering – esp. for zooms

IR "glow" is result of imperfect focusing of IR light (not the same as visible light)

Converting Images to Black & White

Infrared simulation

110
45
-80

duplicate layer

gaussian blur, 8 pixels (anything from 5 to 15)

set blur layer opacity to 33% to add infrared “glow” (amount to suit)

adjust brightness and contrast to suit (blur lowers contrast)

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