Night Photography

Choose the dark side you must

What is it?

- Like day photography, just less light!
- Scenes look very different
- Much higher contrast
  - Shadows lose detail
  - Bright things lose detail
- Moving things get blurry
  - Lights make interesting patterns and lines

Cell Phone Cameras

- They are getting better and better, but…
- Still lack some essentials for high quality night images
  - Fast lenses to gather more light
  - Really wide angle lens for sky shots
  - Slow shutter speeds, seconds to minutes
  - Small sensors, image noise

DSLR's

- Fast lenses to gather more light
- Wide angle lenses
- Long shutter times when needed
- Large sensors that collect more light
- Less digital noise

Shadows, Silhouettes and Stars

- Shapes become more important
- Stars in the sky form a backdrop
- Lights in the city can dominate
- Car lights make streaks of red, white and orange

Digitals Major Advantages

- Digital cameras let you see the image immediately and make corrections
  - Film took much more experience and knowledge
- Exposures are free

Light Painting – A Growing Specialty

- Painting with light
  - Use light to illuminate objects
- Drawing with light
  - The light is the subject
- These terms are sometimes used interchangeably
- Do some web searching, lots of fun stuff

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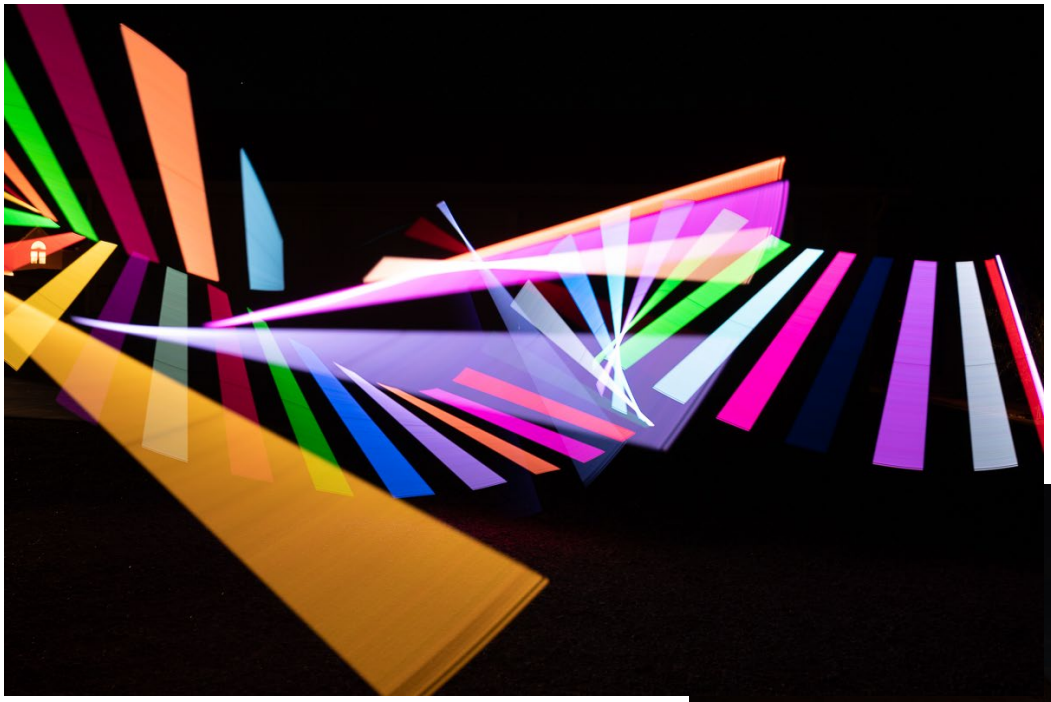
LED Wand Painting



3

Note how the checkers are reflected on the car's paint.

She walked to display MAGIC, then stopped. The flash was set to fire at the end of the exposure.

Covid attack!

This was shot in the camera.
Photoshop was not used.

My friend Thomas Quinn made this with my Magic Image Wand. He built one using my plans.

versiontwo
photography

Night Photo Experiences

- You see a great scene, you whip out your camera, take the photo, and what you see is often disappointing
- Sunset, night scenes
- Dark pictures, add flash and it just gets worse!
- Stars and the moon don't look the way we remember

- Solutions
- Learn how to control the camera to get the image you expect
  - Most of the time the images can be vastly improved when you know how your camera works

Goals – Understand Fundamentals

- Lens
  - How to choose the right lens
- Exposure
  - Controlling the right amount of light
- Focus
  - How to focus at night
- White balance
  - Not super important, mostly artistic

Important Things to Learn

- Manual focus mode
- Manual exposure Mode
- F-stop/shutter/ISO for correct exposure
  - And how these settings affect the image
- Use Raw file format instead of jpg
- Use a tripod, shutter speeds are slow
- post-processing in image editor

Get your finger off that button!

- Touching the camera can blur the image
  - Use self-timer
  - Cable release
  - Phone app
  - Remote control
  - Mirror lockup
    - not really important for long exposure times

Equipment You'll Need

- Tripod
- Large aperture lens, prefer F2.8 or better
- Small flashlight (red or amber light)
- Bug repellant depending on location
- Appropriate clothing, depends on weather
- Camera manual, operations aren't always obvious!

Camera Requirements

- Raw image file format, better than jpg
- Manual focus mode
- Manual exposure settings
- LiveView is useful
- Bulb (B) or time (T) setting on shutter
- Cable or wireless remote for shutter
  - Phone app or self-timer can be used
  - Mirror lock-up can be useful on DSLR
  - Intervalometer is also useful

Intervalometer

- Built-in on some cameras
- Available as accessory
  - Can also be used as cable release
  - Get one that works with your camera model

Night Considerations

- It will be dark, exercise caution
- I’ve found snakes, spiders and scorpions
  - I don’t recommend sandals in the dark
- If you are uncomfortable, bring a friend or two or three or more
- Be aware of your surroundings
- Note that security people don’t always sympathize with night photography

Useful Phone Apps

- LunaSolCal
  - Figures out where the sun and moon are
- Photopills ($9.99, but is a great app)
  - Shows sun, moon, and milky way, lots more
  - Augmented reality
  - Lens and camera tools
- The Photographers Ephemeris

Websites

- www.thenocturnes.com
- digital-photography-school.com/ultimate-guide-night-photography/
- www.canva.com/learn/9-night-photography-techniques-capture-detailed-scenes-limited-lighting/
- https://expertphotography.com/mastering-creative-night-photography/
- https://www.capturelandscapes.com/beginners-guide-to-night-photography/
- There are many others, google is your friend!

Light Painting Websites

- https://www.dariustwin.com/
- https://lightpaintingphotography.com/light-painting-artist/featured-artist-2/dennis-calvert/
- http://www.hannuhuhtamo.com/
- http://lightpainting.org.uk/
- http://jannepaint.wixsite.com/jannepaint-2

More Light Painting Websites

- https://lightpaintingphotography.com/
- https://lightpaintingbrushes.com/
- http://www.diliz-light.com/60-seconds-to-find-an-exit.html
- For a fun device, look up PixelStick
- My homemade version: https://www.youtube.com/watch?v=2L3TWKf_4T8

Tutorials

- https://www.davemorrowphotography.com/welcome
- Lots of YouTube tutorials, just look
- Ask your instructor, me!
  - I don’t know all the answers, but quite a few

Main Filetypes

- JPG/JPEG
  - Quality loss, limited dynamic range
  - Use as output for email etc, do not edit! (except parametric editors like LightRoom)
- TIFF/PSD
  - Excellent for editing, no quality loss
- RAW
  - Captures all the details your camera/lens has

Why Edit Night Photos

- Improve colors, contrast, exposure
- Crop to remove extraneous “stuff”
- Straighten tilted images
- Blur and sharpen elements
- Reduce sensor noise
- Combine images with different exposures for more detail or to make star trails

Dynamic Range

- The range of dark to light that can be recorded without losing:
  - Highlights (blown out)
  - Shadows (blocked)
- Eye sees about 16 stops (doublings)
- Some digital sensors up to 14+ stops
  - Jpg is limited to 8 stops

This is what the camera suggested for exposure

Overexposed by 2 stops, now we get the rock details, but lose the light details

Underexposed by 2 stops, we get the bright light details, and lose the rock details

Combining Exposures

Today

- The newer cameras now have amazing dynamic range
  - Must use raw files to take full advantage
    - Remember jpeg is only 8 bits
- If you need even more range, use exposure bracketing
  - Many cameras have settings to do this automatically

Lenses

- Focal length
  - Normal is diagonal of the squared sensor
  - Telephoto is longer than normal
  - Wide angle is shorter than normal
- F-Stop or Aperture
  - “Hole” size through lens
  - Bigger allows more light
  - (Focal length/hole size) is F-Stop number
    - Allows F numbers to always indicate light amount

Lens Properties

- Depth of Field
  - The range of distance that looks “sharp”
  - Larger F-Stop numbers make this longer
  - Longer focal lengths make it shorter
- Bokeh
  - What out of focus highlights look like
    - Halos, donuts, weird shapes…

Depth of Field

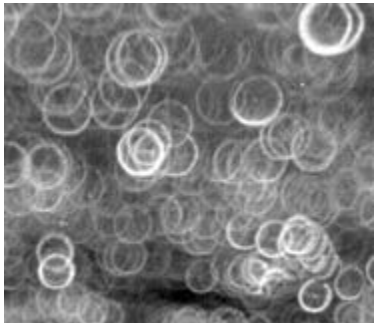
F4

F8

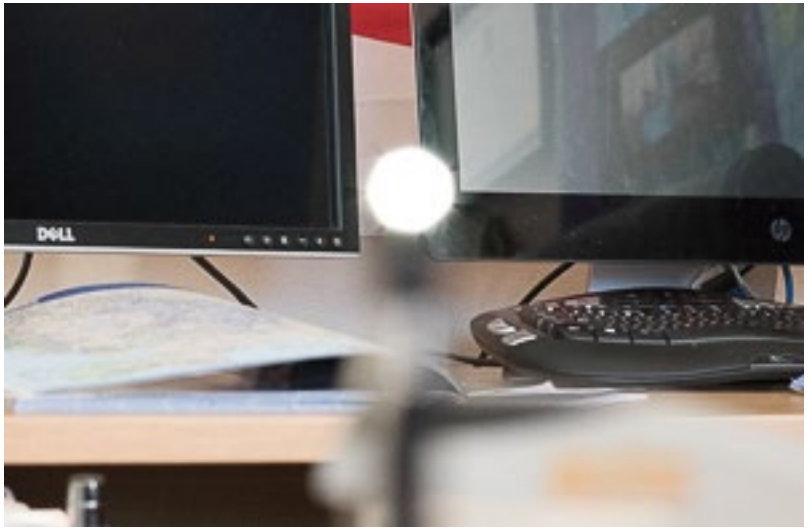
F22

Depth of field is also affected by the sensor size, which is why cell phones have a large depth of field while full frame cameras have a much shallower one.

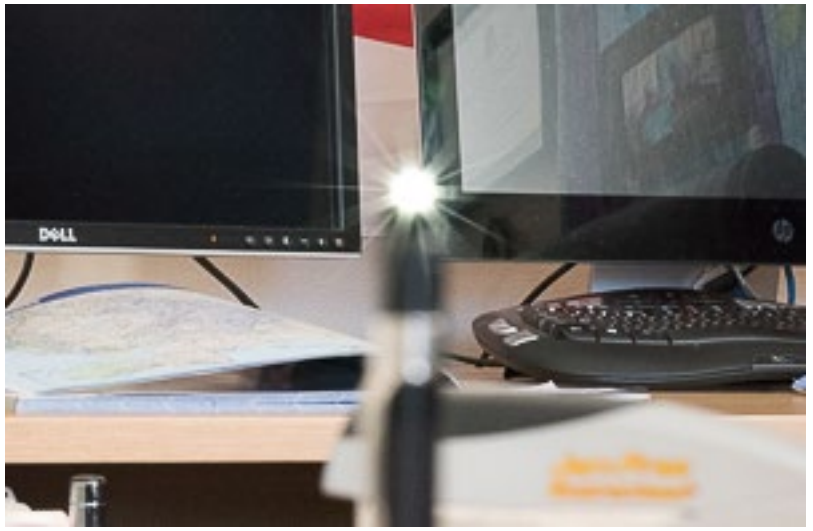
Bokeh



Soap bubble
from mirror lens



F5



F14

Smooth Round Bokeh

Lens Classifications

- Prime – Single Focal Length
- Zoom – Adjustable Range of Focal Lengths
  - Digital Zoom is phony, it just throws pixels away
- Normal
- Wide
- Fish-Eye
- Telephoto
- Macro/Micro
- Portrait
- Specialty Lenses (Lens Baby etc)

Choosing a Lens Length

	Wide Angle (short)	Normal	Telephoto (long)
Perspective	Spreads things apart	Normal	Makes things appear closer
Depth of Field	Deep (long)	Normal	Shallow
Shake sensitivity	Low	Normal	High, tripod
Size	Short and wider	Normal	Long and often heavy
Vertical lines	Tend to tilt and curve	Normal	Tend to stay straight

Night Lens Choices

- Mostly wide to really wide
  - We want to see the sky and the foreground
- Faster lenses are better
  - F2.8 is a good minimum
  - Allow use of lower ISO values (less noise)
- Prime lenses are better than zooms
  - Faster and fewer elements causing reflections

The Shutter

Open the curtains and let the sunshine in

Shutter Speed

- Sometimes shown as an inverse number
  - 125 means 1/125 of a second
- Safe handholding rule of thumb
  - 1/focal length
    - 50mm lens – about 1/60
    - 135mm lens – about 1/125
  - IS/VR makes this better by at least 2 stops
    - Note this does not help with moving objects

Effect of Shutter Speed

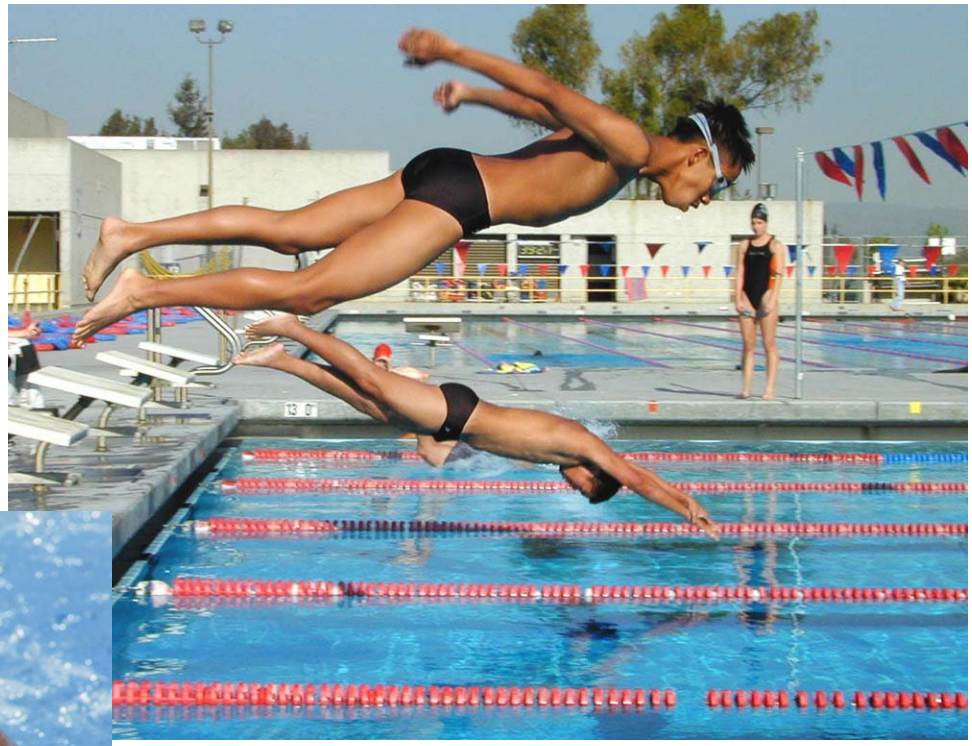
Fast

- Allows less light, use when lighter
- Stops motion
- Easy to handhold

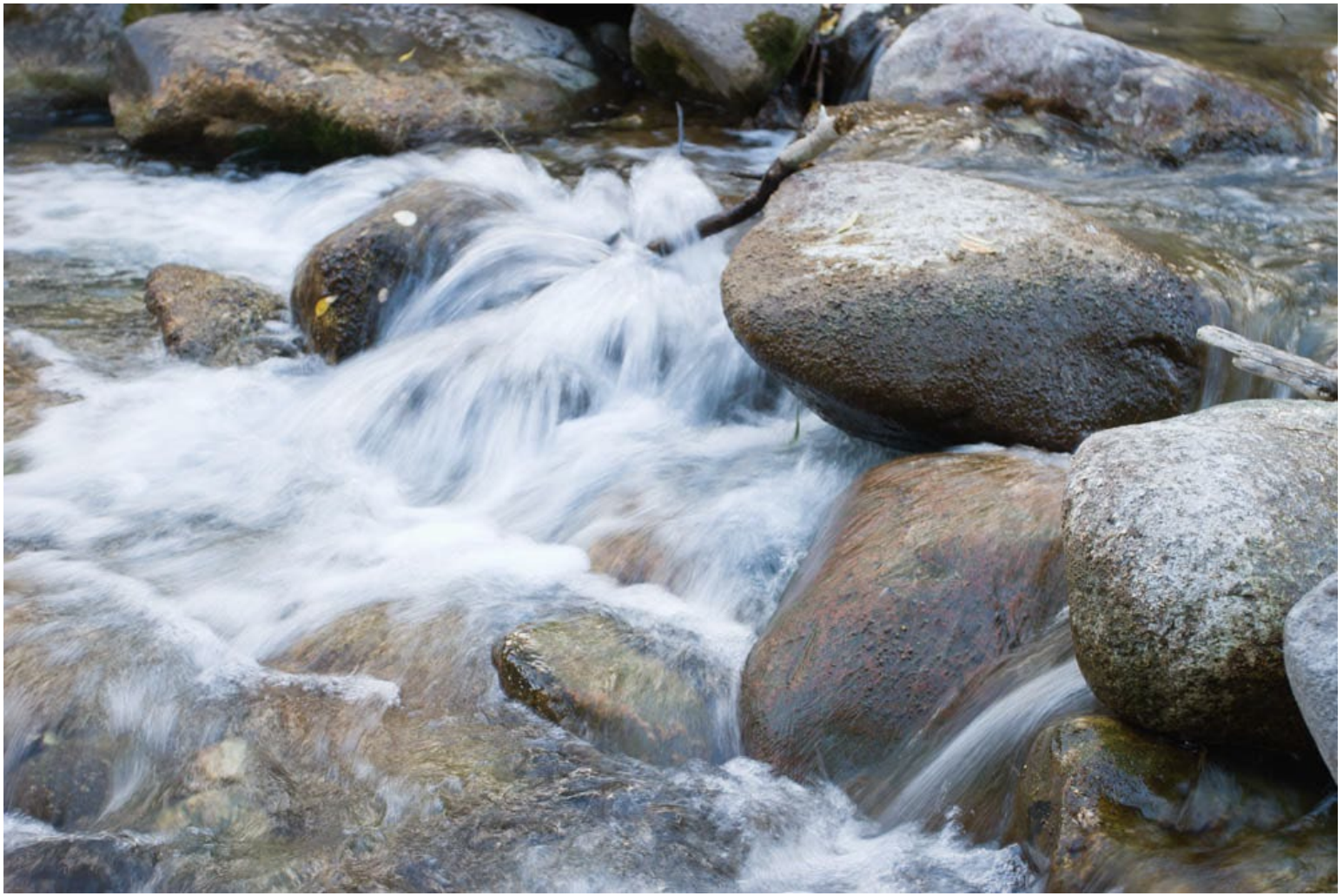
Slow

- Allows more light, use when darker
- Shows motion
- Tripod

Freeze Motion

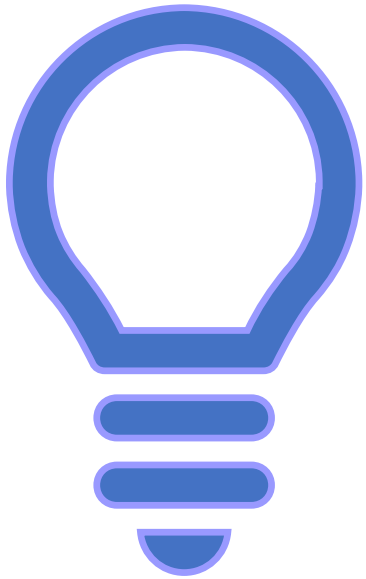


Slow Show Motion



Shutter Speed and the Sky

- The moon and the stars move
  - If you want them round, there is a limit to how long the shutter speed can be
  - Photo Pills can calculate this number for you
  - It is typically between 2 and 10 seconds depending on the lens focal length and the sensor size and pixel count



Give me light, but not too much or too little, just the right amount please, I’m sensitive, but adjustable

ISO

ISO

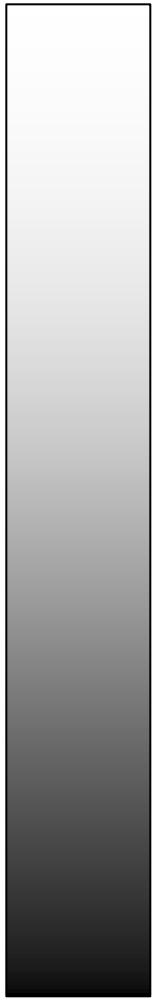
- Indicates how much light sensor needs
- In the past DIN and ASA were used, ISO is the universal standard now
- Higher values have more noise
  - Best to stay below 800, but it varies with the size and quality of the sensor
  - You will often need higher values at night

Sensor Noise

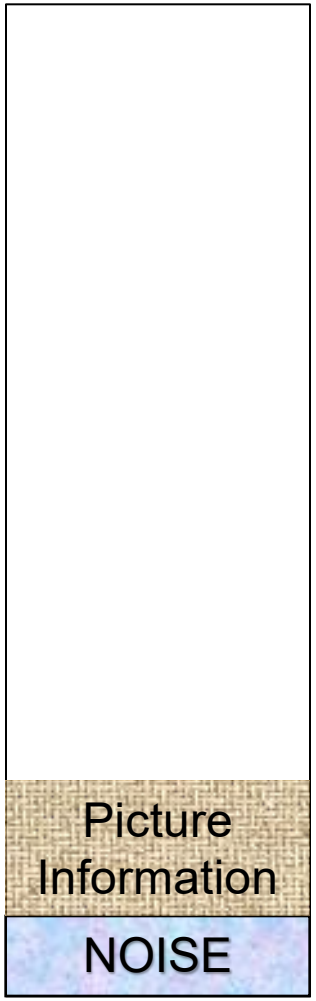
- Noise is much bigger issue at night
- Smaller sensors have more noise
- Luminance and Chrominance
- Temperature affected, cold is better
- Shooting “raw file format” gives more control and better images
- Noise is visible in the darker parts

Consider Audio Tape Hiss

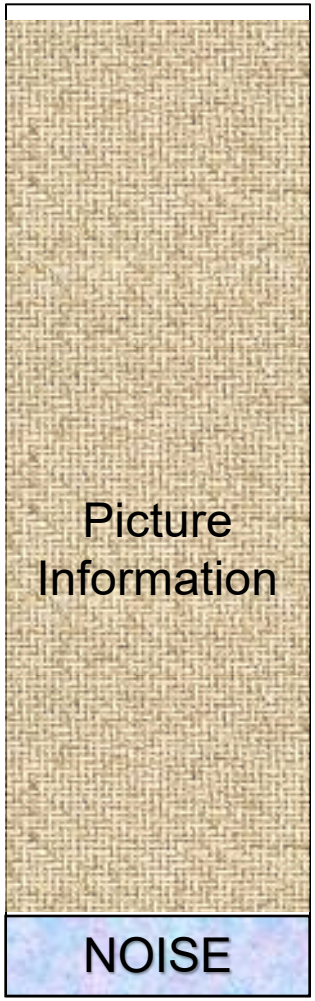
- Remember that hissing in the background of taped music?
- You could really hear it in the quiet sections of the music
- During the loud sections it wasn’t noticeable



Light Intensity



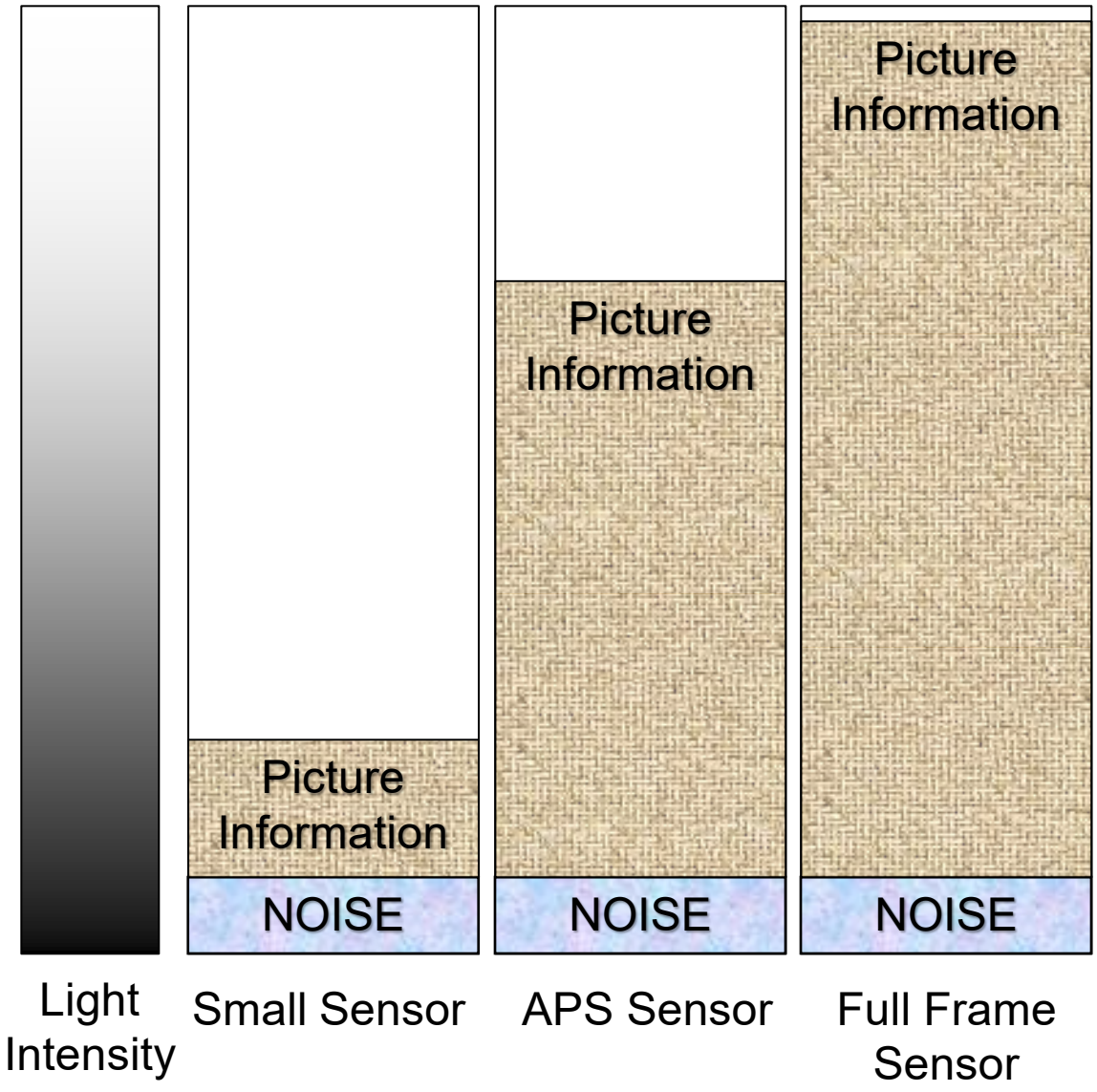
Under exposed



Normal exposure

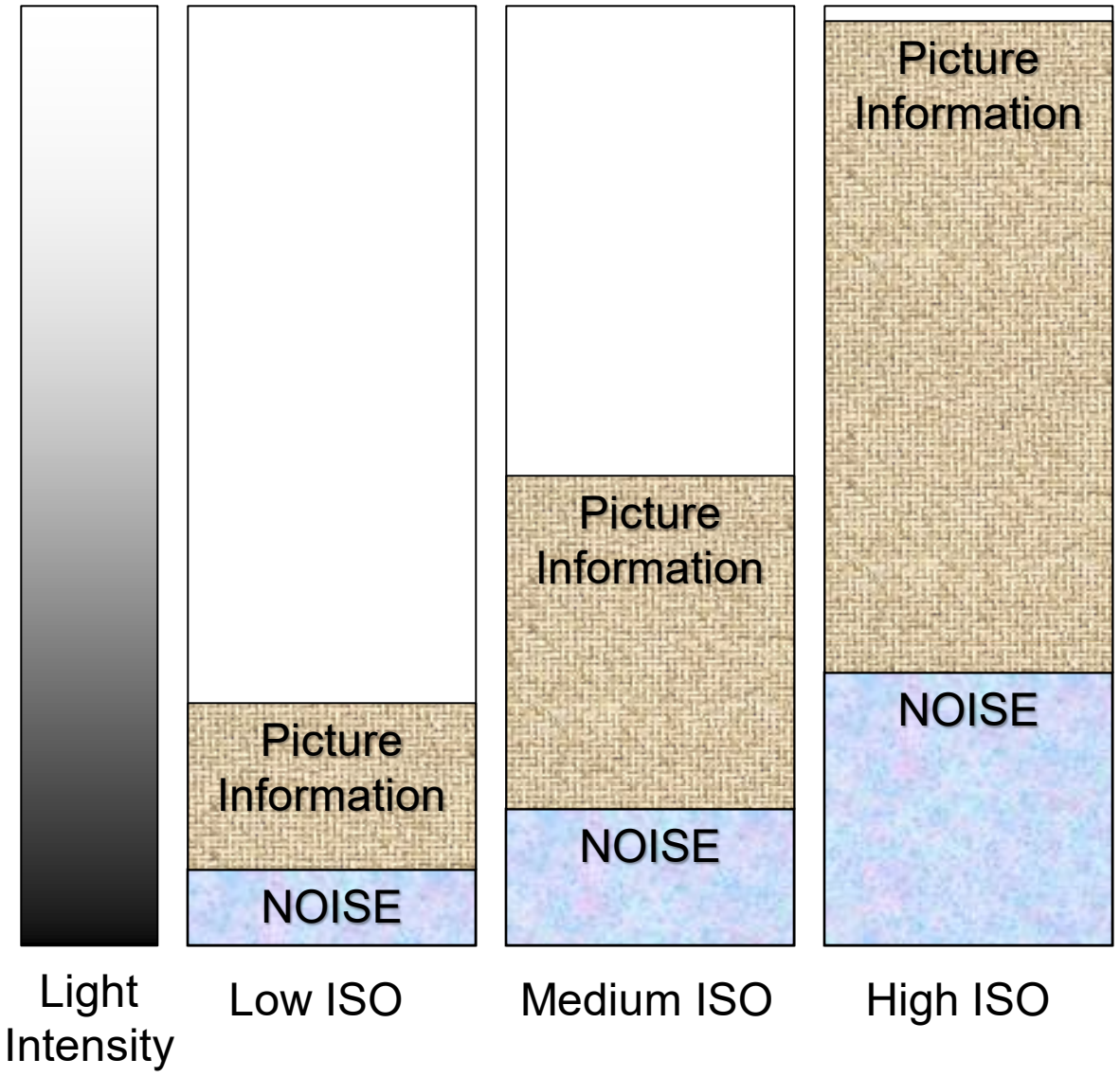
The noise is more noticeable when the sensor does not get enough light. This is the under exposed condition.

Noise is a function of the sensor design, its size, the number of mega-pixels, and the temperature.



Larger sensors “see” more light so they have a stronger signal. The noise is more or less independent of the pixel size. Larger sensors have a better SNR (signal to noise ratio).

Cell phones use software techniques to improve the noise. Of course DSLR’s can also do that! In addition you can do noise reduction on your computer later.



The ISO on the camera is raised by amplifying the signal electronically. But this also amplifies the noise!

Sensors have a base or native ISO sensitivity typically around 100, but not published.

There is also simulated ISO that is done by software in the camera attempting to get even higher ISO's with less noise.

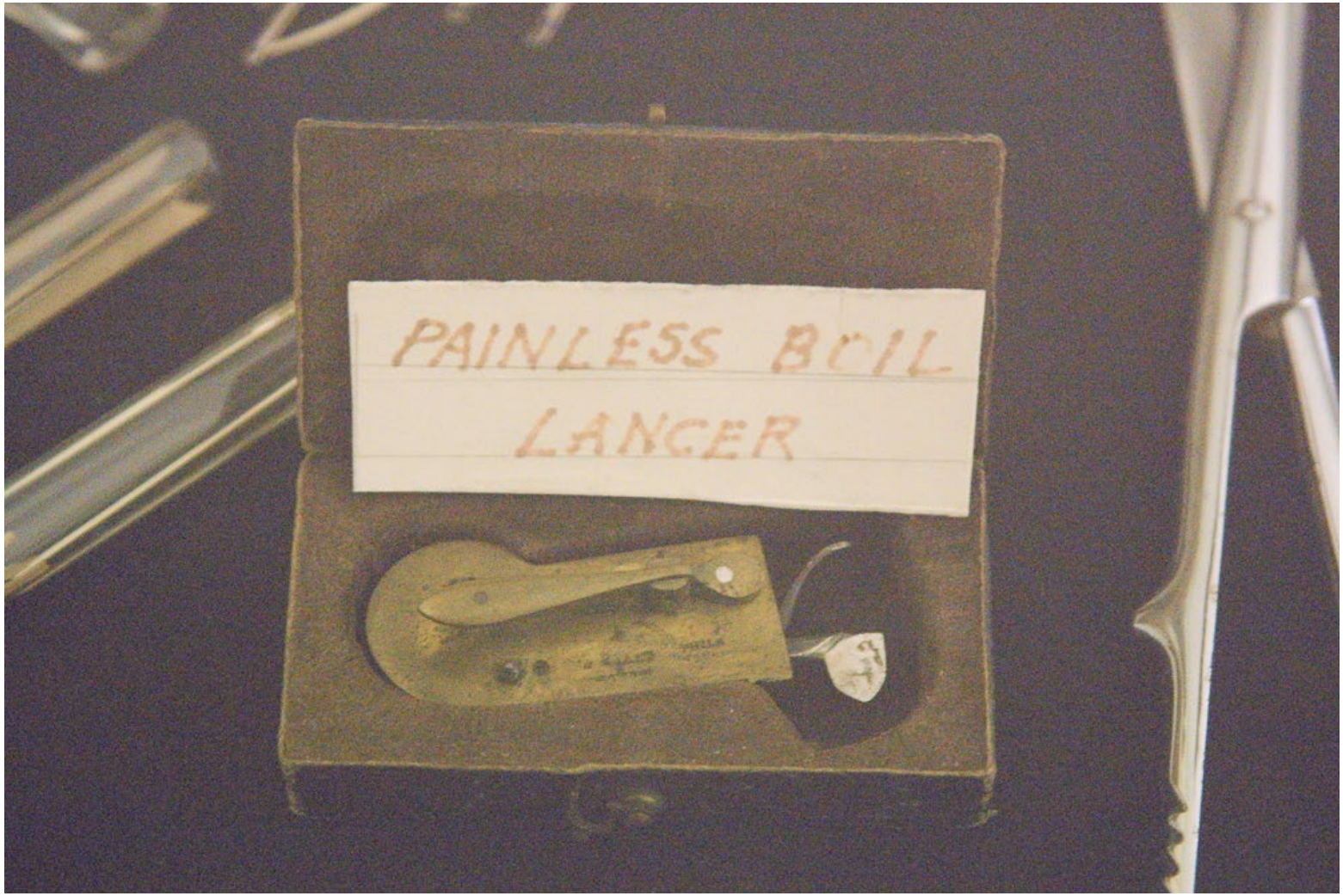
Digital Noise vs Film Grain

- Film grain was noticeable with high ISO
- It was often used creatively, it had a nice look sometimes
- I’m not convinced that digital noise looks very nice… my opinion

High ISO Noise

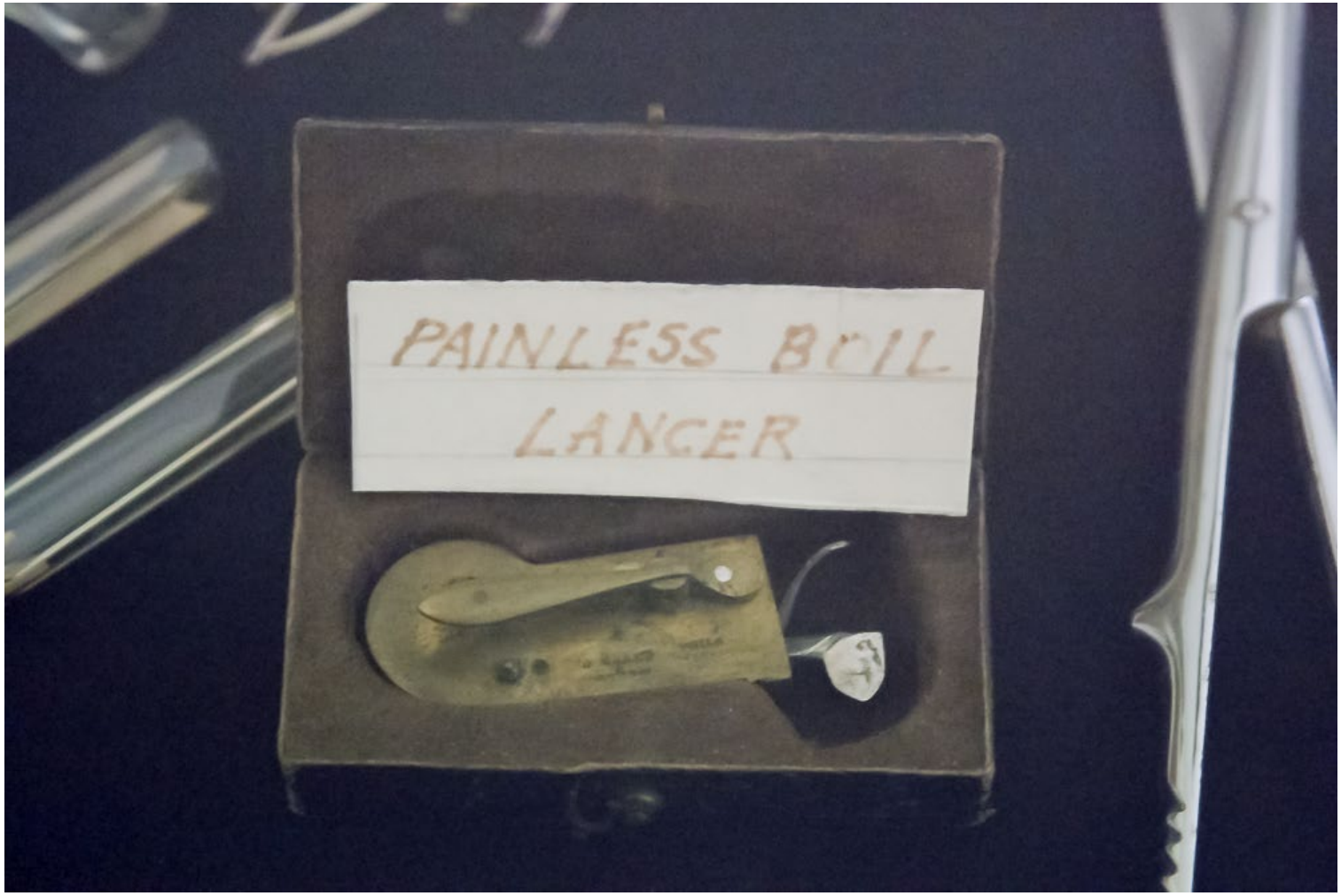
Chrominance Reduction LR

Color Noise Example



Label is wrong, this is actually a fleam.

After a Makeover in Lightroom



Minimizing Noise

- Lower ISO (makes exposure longer!)
- Shorter exposure time
  - By using larger aperture (smaller F number)
    - Note: this reduces depth of field
- Use camera noise reduction feature
- Expose as much as possible
  - I.E. move histogram to right

A Curious Thing

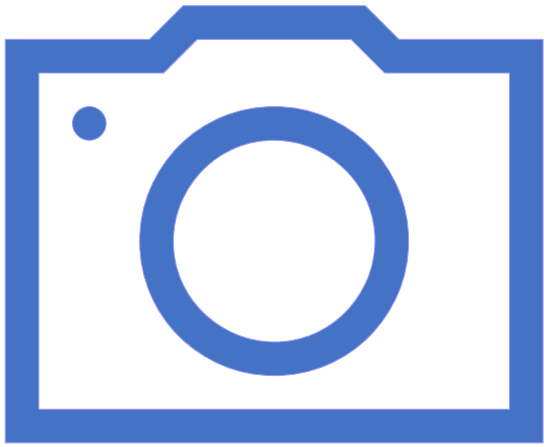
- Most noise is in the blue channel
- What is the usual sky color at dusk?

Camera Noise Reduction

1. **Long exposure noise reduction**
   - Records a “dark frame” for the same time and subtracts from real image
   - Note that this doubles image recording time, a 10 second exposure will take 20 seconds
2. **High ISO noise reduction**
   - Applies a slight amount of blur to hide noise
   - Applied only to jpg, does not affect raw files
   - Turn off and handle in LR for more control

Today

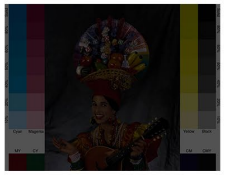
- Modern cameras have vastly decreased the amount of noise in images
- If you want the least noise, buy a new camera!
  - Full-frames are the best, but all of them are getting better
- Noise is not always objectionable



Getting the correct amount of light to the sensor

Exposure

Things Affecting Exposure



Exposure

less noise **ISO** more noise

more depth of field **F-Stop** less depth of field

stop motion **Shutter Speed** motion blur

Exposure

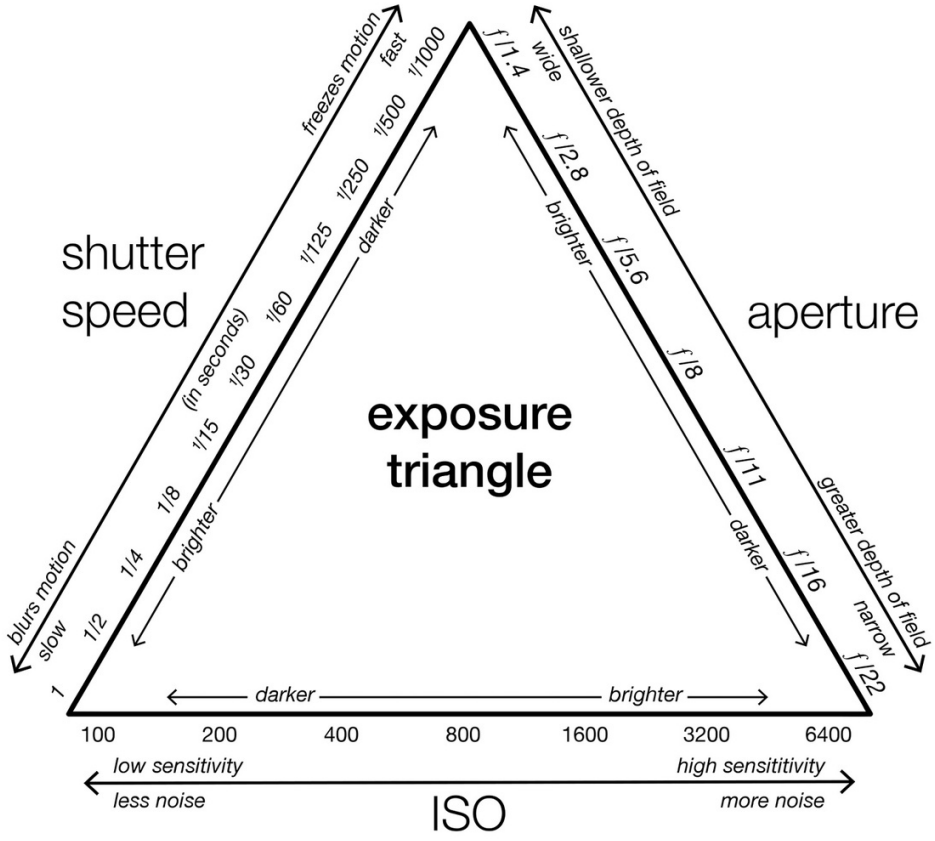
- Correct exposure is controlled by
  - ISO, how much light the sensor needs
  - Shutter speed, how long the shutter is open
  - F-Stop, how much light the lens lets through
- Kind of like a three legged stool
  - Any change means the others must change in order to stay balanced

Sensor needs right amount of light

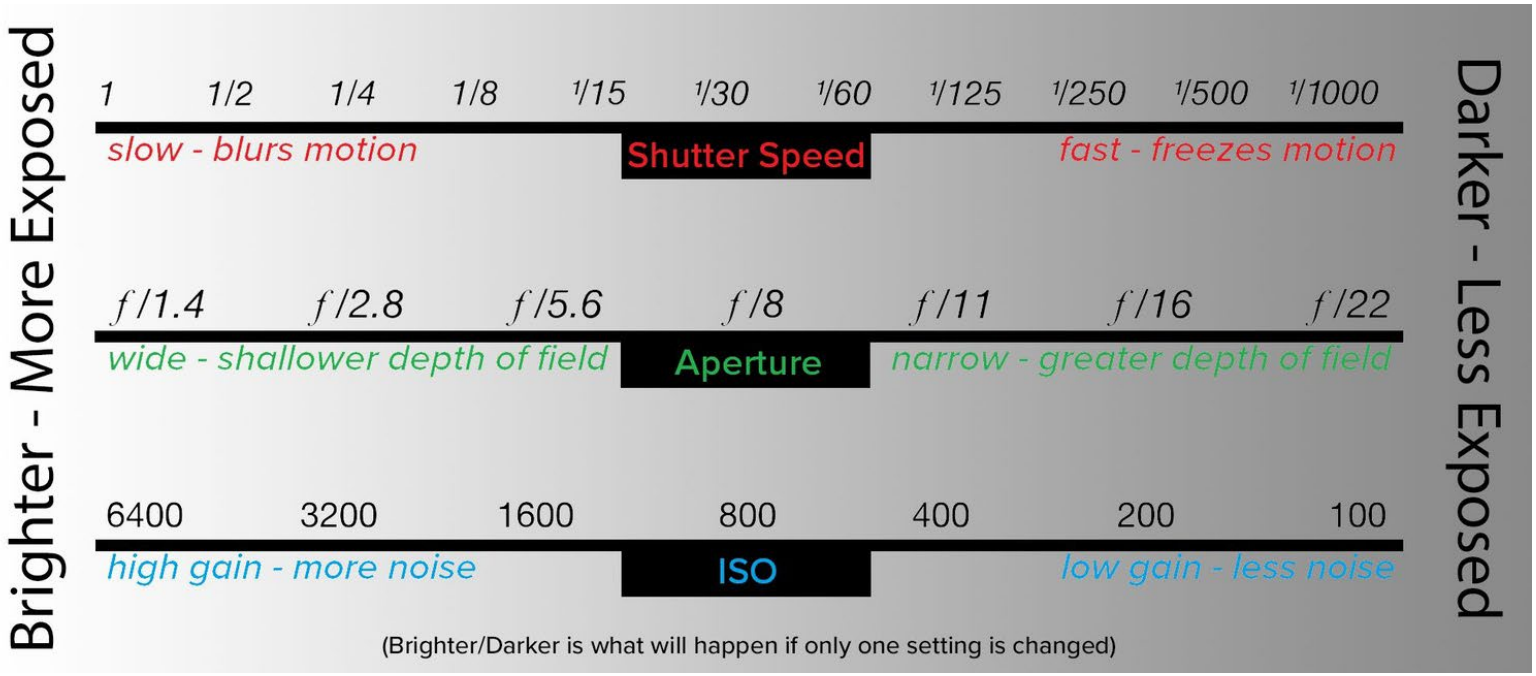
- Too much = highlight detail loss
  - And sometimes ‘blooming’
- Too little = shadow detail loss
- Sometimes you have to accept one or both of the above
  - Or take multiple images and combine

Exposure Triangle

You will find this many places. I don't like it because it doesn't really show the relationships between the 3 settings. It gives no indication of where the correct exposure is. It is just 3 things arranged in a triangle!



A Better Diagram



This shows how things get brighter one way and darker the other way. If you adjust one, then you must adjust one or both of the others to get the brightness correct again.

Credit to Mike Dixon

An Analogy – water like photons and sensors like buckets

Water

- Pressure
- Hose size
- Time on
- Bucket size
- Noise
- Blooming

Light

- Light strength
- F-stop
- Shutter speed
- ISO
- Scattered drops
- Overflow

Blooming – light spillover

Longer exposure
Look at glow around
semi-circle window

Tradeoffs and Compromises

- When you change one setting, one of the other two, or both, must change
- Example:
  - Need more depth of field
    - Bigger F-Stop number
    - But that means we need a slower shutter speed to get the right exposure
    - Slower shutter speed might not work because things are moving too much
    - So, we increase the ISO, oops, now we get more noise

Rule for Exposure

It depends on the scene!

- Expose for the most important dark or light areas
- Choosing light areas means dark ones might lose detail
- Choosing dark areas means light ones might lose detail
- That’s the way it is! But so what? We’re creating visual art to be enjoyed

F-Stop Shutter Variations

- These all give the same amount of light
- Choose the combination that is the best compromise for artistic or technical need
- Note: shutter speeds directly affect the amount of light, but F-Stop is a diameter, so the amount of light is a squared value
  - ½ shutter speed matches ~1.4 larger F-Stop

Aperture	F16	F11	F8	F5.6	F4	F2.8	F2	F1.4
Shutter	1/15	1/30	1/60	1/125	1/250	1/500	1/1000	1/2000

Summary - Choosing Settings

Setting	Effect	Comments
ISO	How much light is needed by the sensor	Higher values result in more image noise but let you use faster shutter speeds and/or slower lenses. Use 100-200 in sun and 1200+ night.
F-stop **Av or A**	The amount of light the lens allows through	Smaller numbers give a smaller depth of field. May be necessary in low light. Larger numbers create more depth of field, but require more light or a slower shutter or even higher ISO.
Shutter speed **Tv or S**	How long the shutter lets light through to the sensor	Slower speeds show motion and blur. Higher speeds can be used to stop motion.

Summary of exposure effects

- ISO
- Shutter speed
- Aperture
- Noise
- Motion blur
- Depth of field/Bokeh

What is ‘Correct’ Exposure?

- Technical intent
  - At least 6 “correct” values
    - F stop/shutter combinations
    - Camera will pick one for you in automatic
- Artistic intent
  - Depth of field to isolate subject or include all
  - Shutter speed for motion, blur or freeze

Setting Exposure

So how do I control it?

Automatic Exposure

- S/Tv = shutter speed, camera chooses A
- A/Av = aperture (F-stop), camera picks S
- P = programmed, camera picks A and S
- ISO, manual or automatic
- Note that automatic is seldom the best choice for night photography

Manual Exposure

- Usually ‘M’ on a dial or menu setting
- Usually best for night photography
- You choose the F-stop and shutter
  - If auto ISO is on then the camera will still try and get the exposure it thinks is correct, so you can’t really control the actual exposure value until the ISO is also set manually

The Histogram

Show me how I’m exposed, and don’t get hysterical

Histogram

- One of the most important tools you need to understand
- It's a bar graph showing the count of pixels at each brightness level
  - Black on left
  - Grays in between
  - White on right
- A glance will tell you much
- Keep your eye on it while editing

More Histogram

Some cameras also show the RGB values

Can see shadow and highlight issues

Can see overall exposure

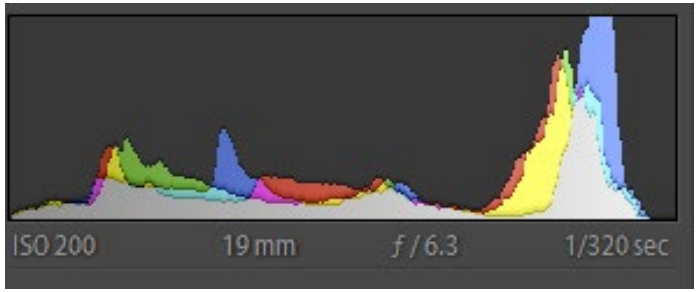
A very important tool to analyze exposure

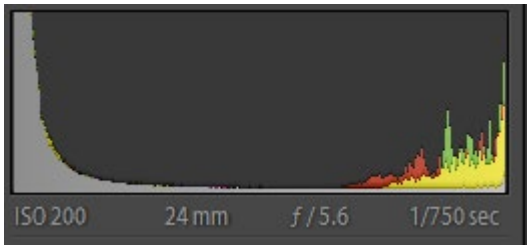
Learn how to read it!

Histogram Analysis

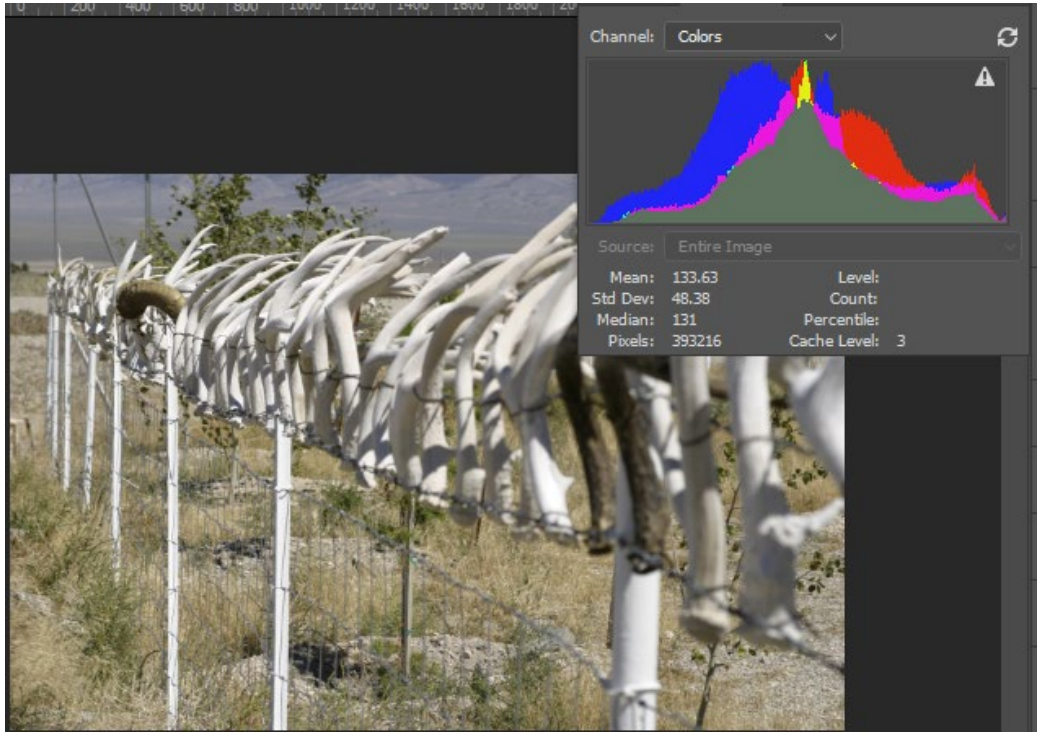
- Spikes show loss of data when adjacent pixels combined
- Holes show loss of data when pixels spread
- Crowding on black side shows poor shadow detail
- Crowding on white side shows poor highlight detail

Histogram example 1

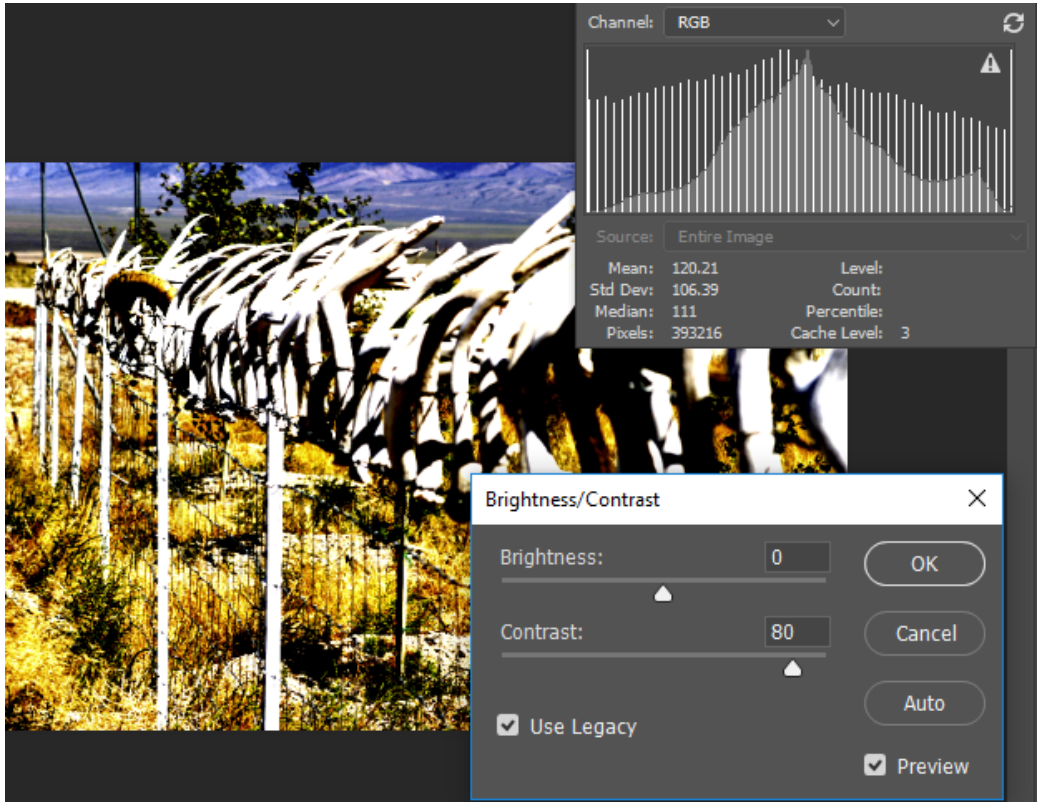




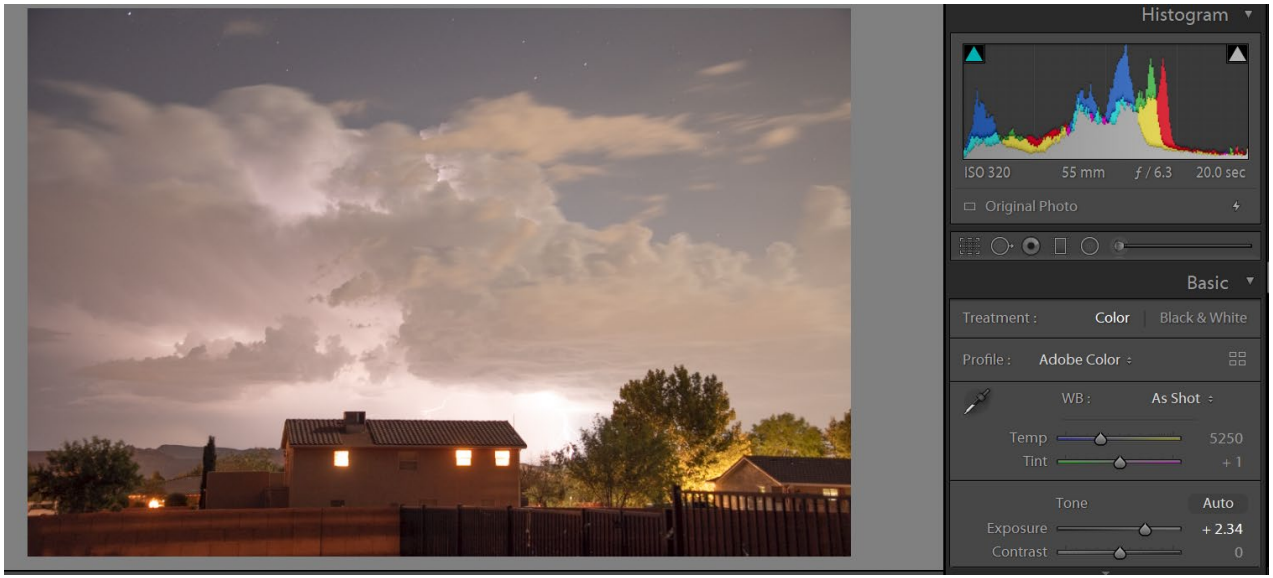
Histogram example 2



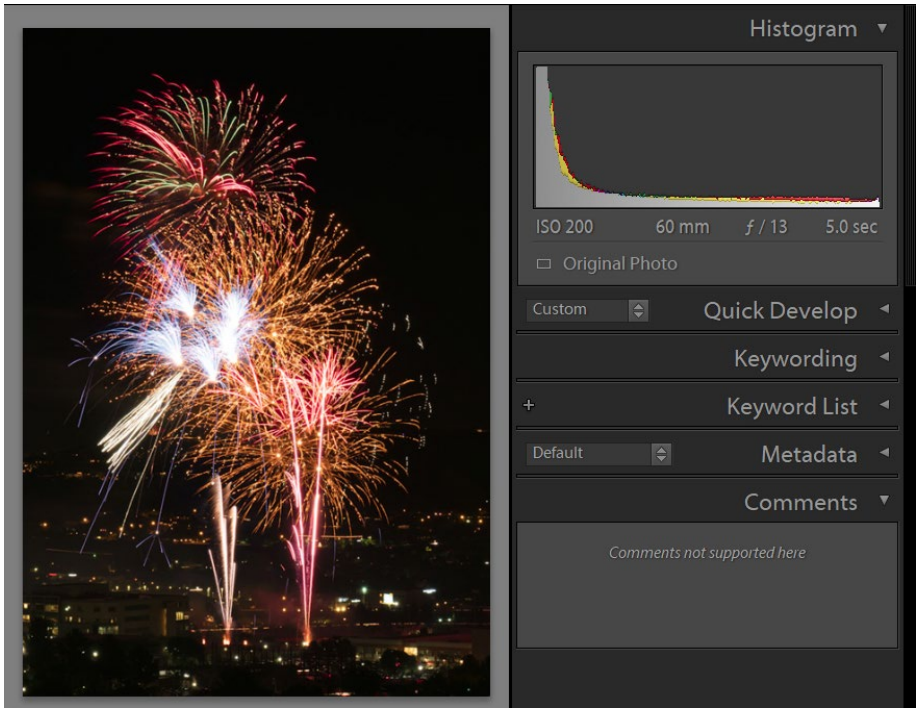
Histogram example 3



You can see the clustering on the left, lots of dark pixels.



Here the exposure is more ‘balanced’ with more details in the dark areas, but is it a better picture?



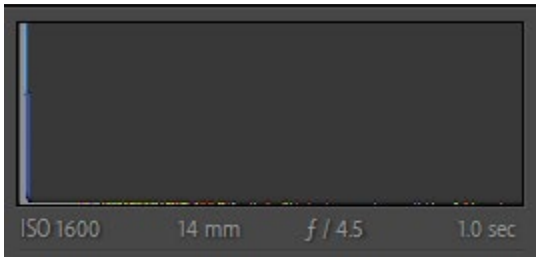
On the right, more exposed, we see clustering on both sides of the histogram, but there is also a significant loss of detail in the fireworks. There is more detail in the city below, but do we care? Maybe…

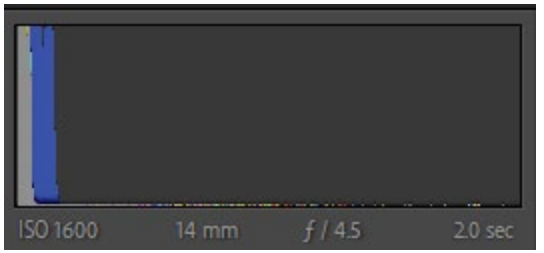
Night Histograms

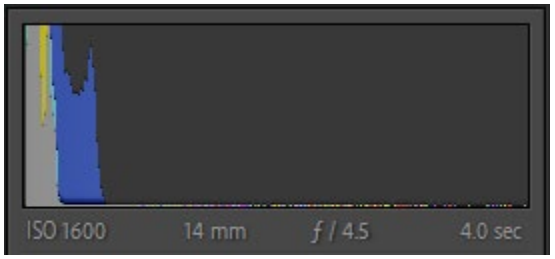
- Often show clustering of dark and light
- ETTR, expose to the right
  - Attempts to minimize noise by moving histogram away from the dark side
  - Not everybody agrees with this!
    - Sometimes you don’t care about noise and lack of details in the shadows but you want more details in the light area. I.E. expose the way you like it!

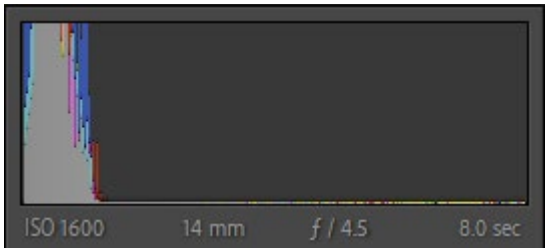
Camera Live View & Histogram

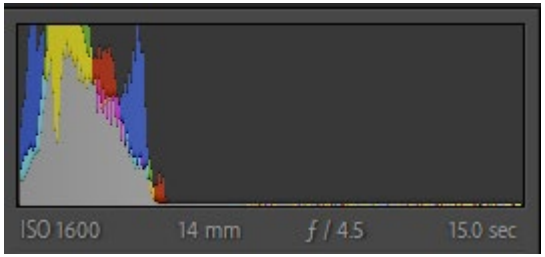
- Live View can help you see exposure
- If your camera can show a histogram it is useful to see the exposure results

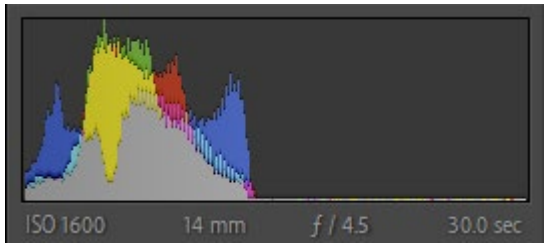

ISO 1600
14 mm
ƒ / 4.5
1.0 sec


ISO 1600
14 mm
ƒ / 4.5
2.0 sec


ISO 1600
14 mm
f / 4.5
4.0 sec


ISO 1600
14 mm
f / 4.5
8.0 sec


ISO 1600
14 mm
f / 4.5
15.0 sec


ISO 1600
14 mm
f / 4.5
30.0 sec

I feel fuzzy

Focusing

Focusing in the dark

- Most cameras don’t focus well in low light
- Manual focus must be used
  - Switch on the lens
  - Menu selection
  - Magnify focus area is very useful
  - “focus peaking” if available can help
- Tape can keep the lens focused
- Do not zoom after focus!

Focus Assist Light

- Some cameras and some flashes have a “boost” light that turns on to help the camera focus
  - These have limited range, maybe 10 feet.
- The flash duration is too short to help the camera focus

Focus Peaking

- Some cameras can show sharpness by putting colored outlines around sharp edges, this is very easy to see sharpness

Summary Night Rules

- Manual ISO, shutter and F-stop
- Pick shutter and F-stop depending on what the image needs
  - Set the ISO to get the best exposure
- Manual focus
  - There isn't often enough light, but you can use a flashlight with auto focus and then set manual focus after camera has focused

What color is that really?

White Balance

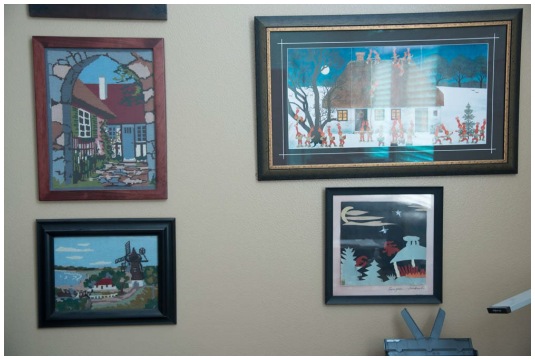
White Balance

- Light sources have some color
  - Sunlight and shade are different
  - Incandescent and fluorescent are different
- Many cameras can measure from a gray or white card: custom white balance
- Shooting “raw” images allows adjustment later
  - Can be done in jpg, but not nearly as well

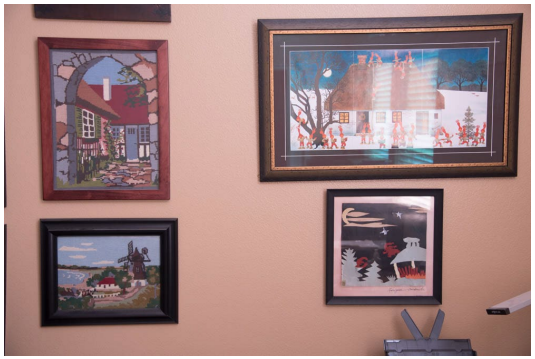
White Balance Example

- Left is original, has too much orange light, right is corrected
- Strangely our eye/brain system corrects when we are there, but not looking at a picture, that is why we must correct the images

Camera White Balance Settings



incandescent

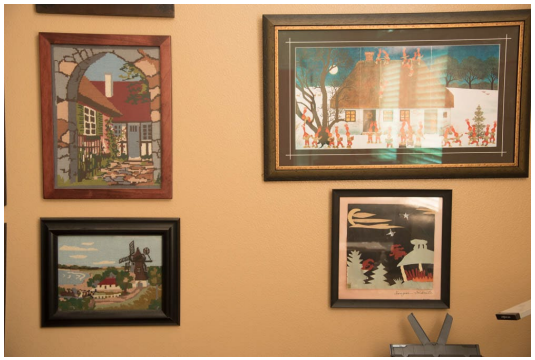


fluorescent

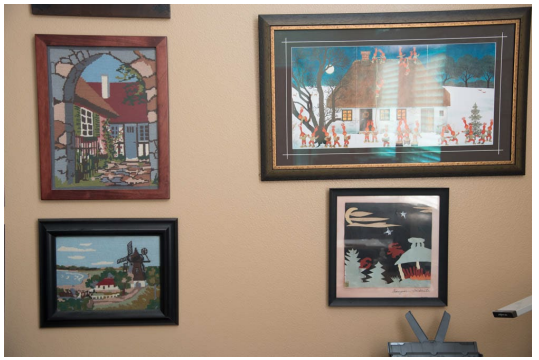
cloud

shade

Sun (this one is closest)



auto



Camera White Balance Settings

incandescent

fluorescent

cloud

shade

sun

auto

Note how auto desaturates the colors!

Night White Balance

- Not nearly as important
  - Fixed Kelvin of 3600 gives nice blue in sky
  - I often use sunlight and adjust later when shooting raw, don't use auto
- Colors at night are often subjective
  - The cones in the eye don't work in the dark
  - Sky looks green to sensor
  - Change to suit the mood

Night Photography

- Tripod
  - Use self-timer, cable release, or wireless remote to avoid shake
- Meter from sky for starting values
- Long shutter speeds
- Extreme dynamic range
- More image noise

Good Vibrations (not)

- Tripod is good but not enough
- Pushing shutter button will wiggle camera
  - Use remote control, cable release, self-timer, or phone app
- The mirror can shake camera, mirror lock
  - Matters only when less than about 2 seconds
- Important: turn off VR or IS if available

Flash

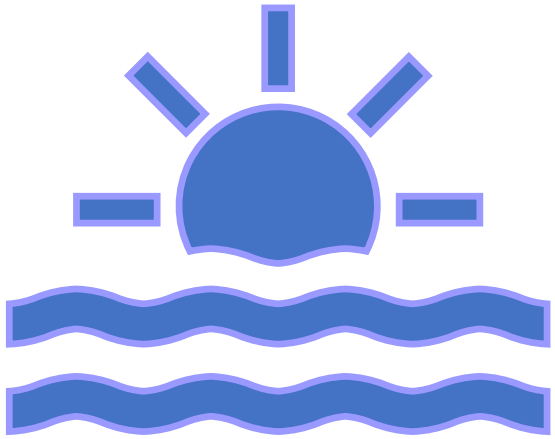
- Sometimes useful
  - Remember the distance is limited!
- Can be used to add light to closer objects
- Best balance is usually with slow exposure
  - Nikon – slow flash in A priority
  - Canon – often automatic in A priority

Flash Example

10 seconds to get sky and background, then flash for snow and train

No Flash 10 seconds

Too much flash

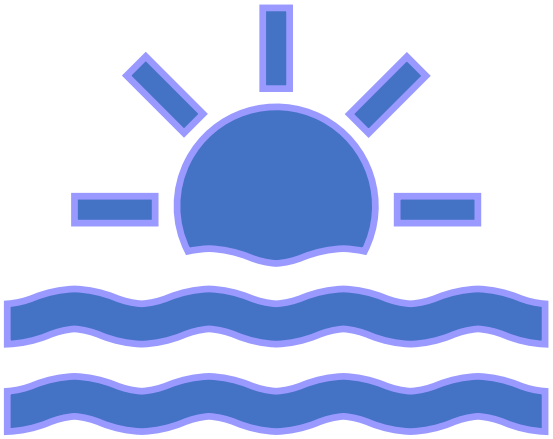


Multiple Exposures

When once is not enough

Multiple Exposures

- Some cameras have a setting for this
- You can also use bulb or time setting
  - Cover the lens between exposures
- Useful for fireworks and car light trails when the traffic is not busy enough



Night and Dusk

Examples

Dusk, almost night

Dusk and Sunset

Clipped shadows and blown-out highlights (the moon and sun)
But does this really matter?

- Notice the nice starry bokeh on the bridge lights.
- You can usually get stars by using a small aperture, (bigger number) like F16. It works better on wide angle lenses.
- You can also get “star filters” for a more dramatic effect.

Stars Move!
Well, the Earth Does

This is a 30 second exposure. You can see the stars are stretched. If you want point stars you need to do a little math to figure out the maximum exposure time that won't show the shape distortion.
Or: use PhotoPills, it has a calculator that will figure it out based on your camera and lens combination.
It is typically in the 3 to 10 second range.
Or: try different times.

Night Sky, Multiple Exposures

80 exposures 30 seconds each

Question?

- Why can’t you just take a really long time exposure, for example, 40 minutes (like the 80 shots of 30 seconds each from the last slide)

Star Trails

- For short ones use long exposure, but not too long, mostly less than 10 minutes
- Longer ones need multiple exposures
  - Any time is ok, longer means fewer images
  - Less than 1 second between exposures
    - Turn off long exposure noise reduction
  - Combine in Photoshop, lighten blend mode

Star Trackers

- https://www.moveshootmove.com
- https://www.bhphotovideo.com/c/search?Ntt=star%20tracker&N=0&InitialSearch=yes&sts=ma

Lightning

- Use long exposures and lots of luck
  - Point the camera at the most likely part of the sky and put the camera in interval shooting to assist lady luck, 1 second between shots
- Or: buy a lightning detector
  - Detects IR and light and can open the shutter quickly on your camera
- Combine multiple images for more drama

My neighbor’s house, he is an electrician!

Exposure Bracketing

- Built-in on many cameras, best with Manual (with auto ISO) or A mode
- Varies the exposure on several images depending on the camera setting
- Look in manual for exposure bracketing
- Can also be done manually but it is difficult to avoid camera motion

Exposure Stacking

- Uses bracketed exposures
- Multiple images at different exposures
  - Tripod is essential!
- Combine as layers in Photoshop
  - Using statistics or blend modes in Photoshop
- Use HDR in camera or Lightroom
  - Other programs also do HDR

Exposure Bracketing

Recommendations

Must use manual or aperture priority

Use ISO or shutter speed to vary the exposure

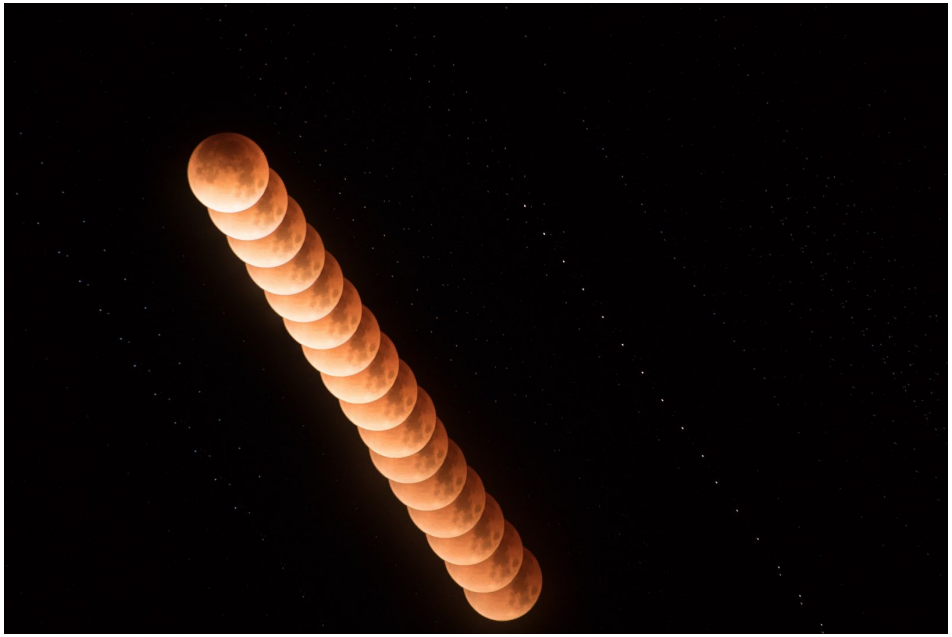
Changing aperture will affect sharpness and make it harder to blend layers

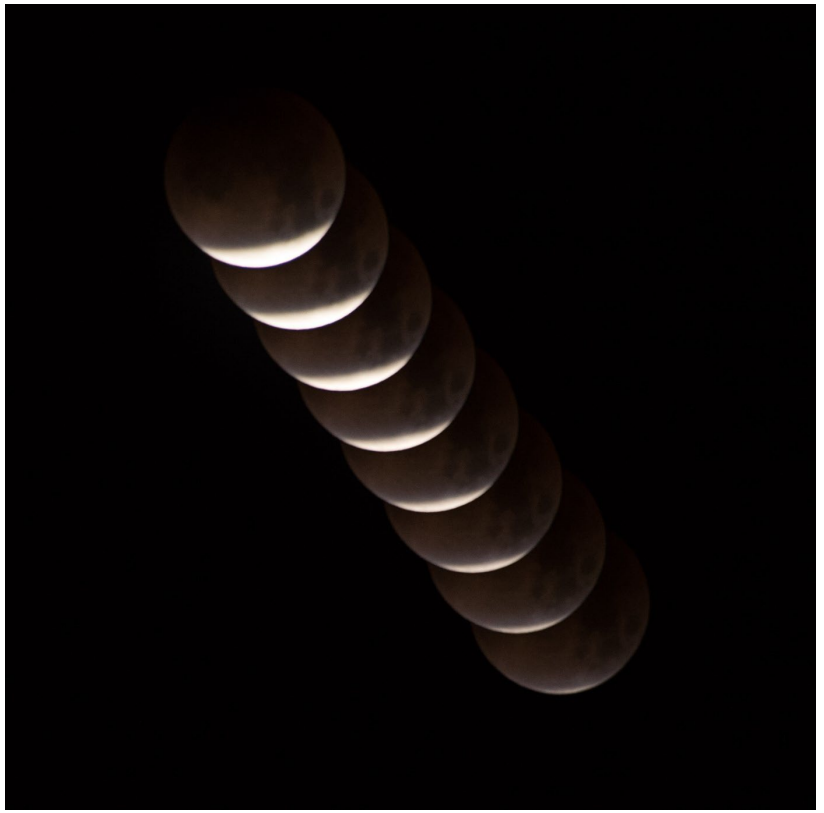
Shot with 3 exposures, +- 2 stops. Combined as HDR in Lightroom.

It is usually best to use a fixed f-stop and vary the shutter speed to keep edges the same between images.

It is also possible to change the ISO instead of the shutter speed, remember: more noise.

Moving objects can be problematic, or you can use them creatively, just be aware of things that move, and that includes the stars.





Lunar Eclipse 31JAN2018
Multiple exposures stacked
in Photoshop

Combine them and you get a much better image

Camera Tools (some cameras)

- Exposure bracketing automatically take 3, 5, or 7 different exposures
  - Combine in Photoshop or Lightroom
- Automatic HDR
- If you have a camera with 12 or more bits of resolution in raw and you want a jpg, you can simulate HDR by processing raw at different settings

Night Composition Suggestions

- City lights
  - Include car lights
- Sky/Stars/Moon
  - Must have something to anchor the image otherwise it is just like any other picture of the stars or moon in the sky
  - Silhouettes are often excellent
  - Often something dark on the bottom is good

Stars in the Sky

LED Light Stick

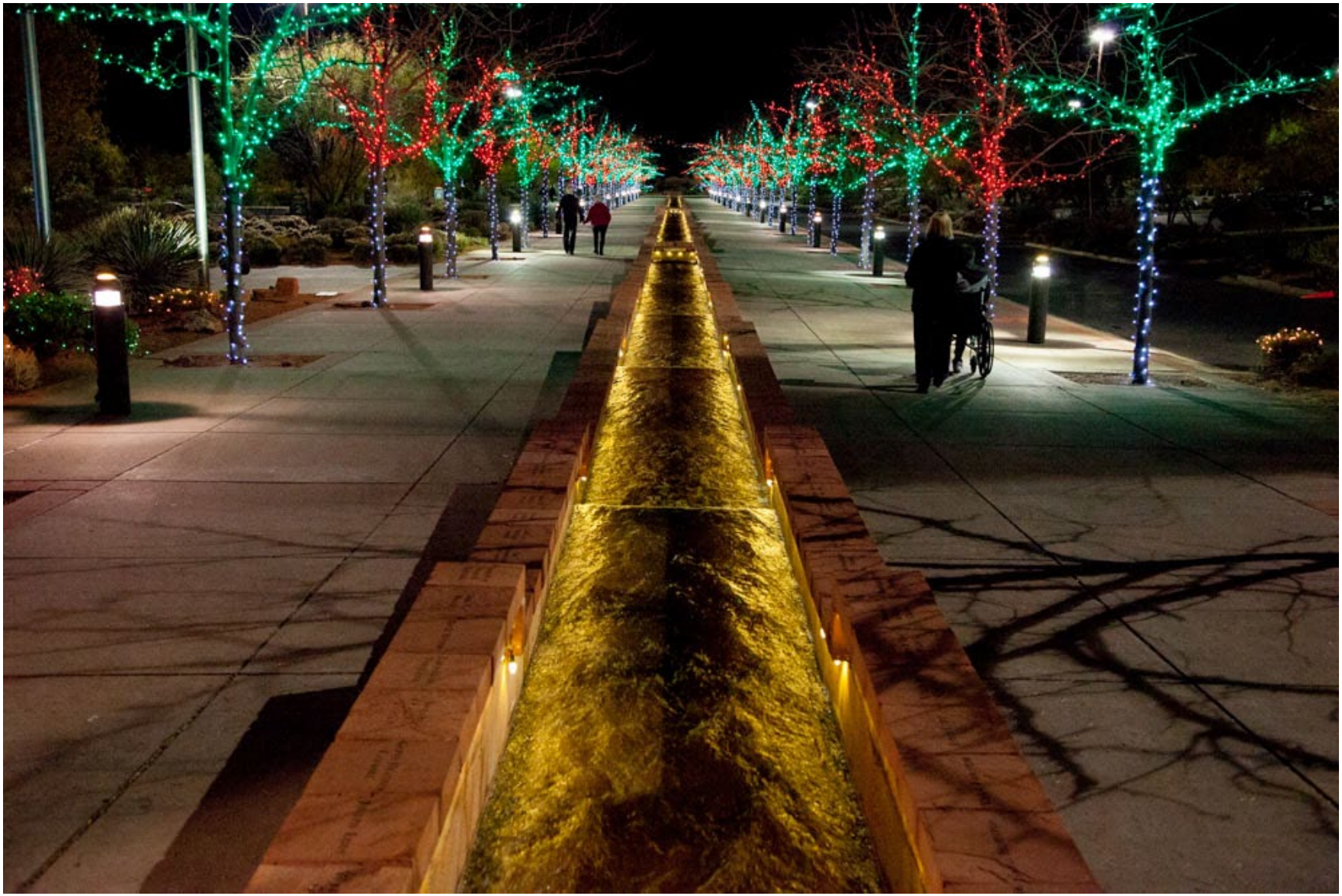
Soft Left Light

Strong Front Light

Strong Right Light

More Suggestions

- It is often easier to scout out a location in the daytime and then come back at night



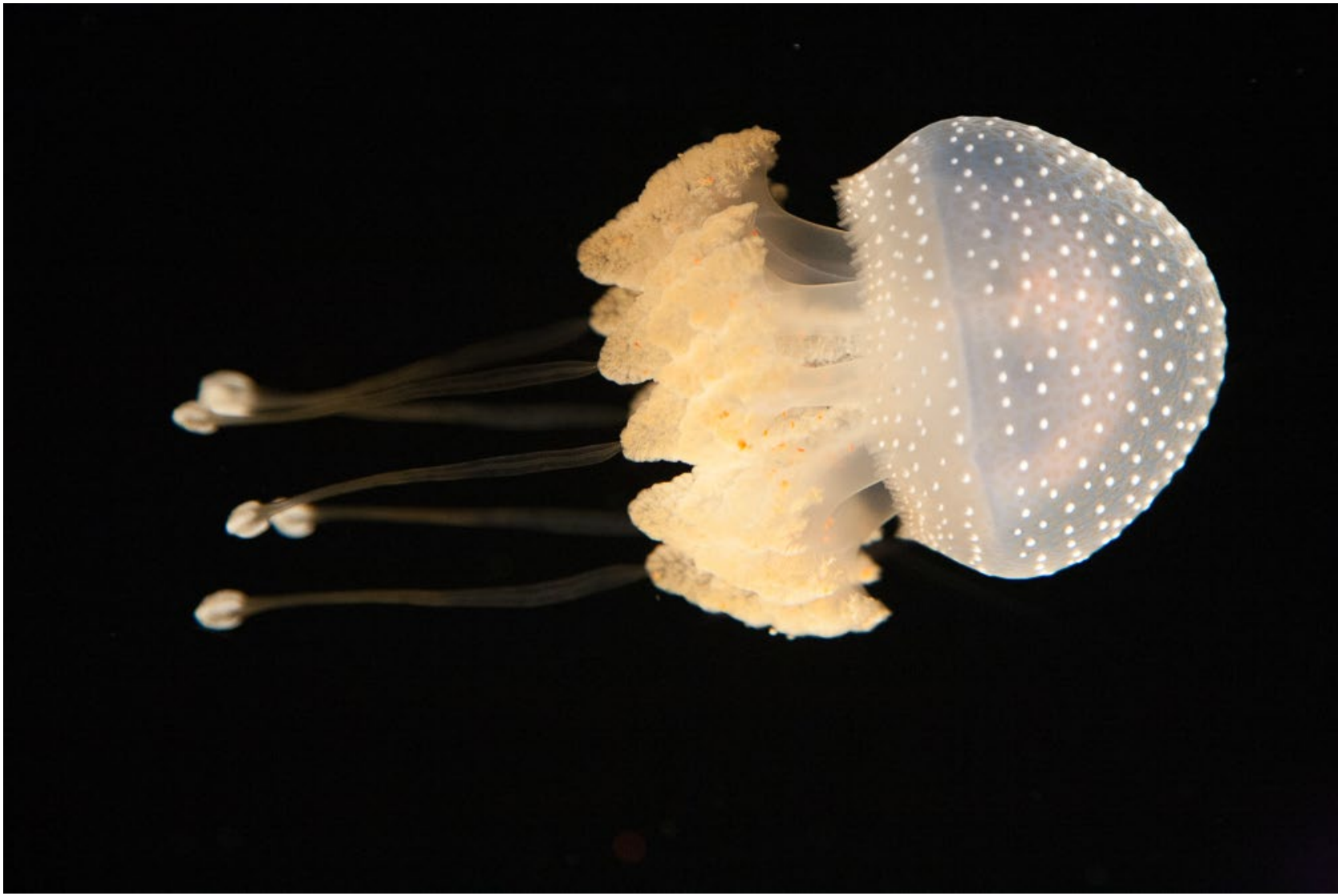
Reflections

Rain made the parking lot wet

Night water reflections are a powerful compositional tool in night photography

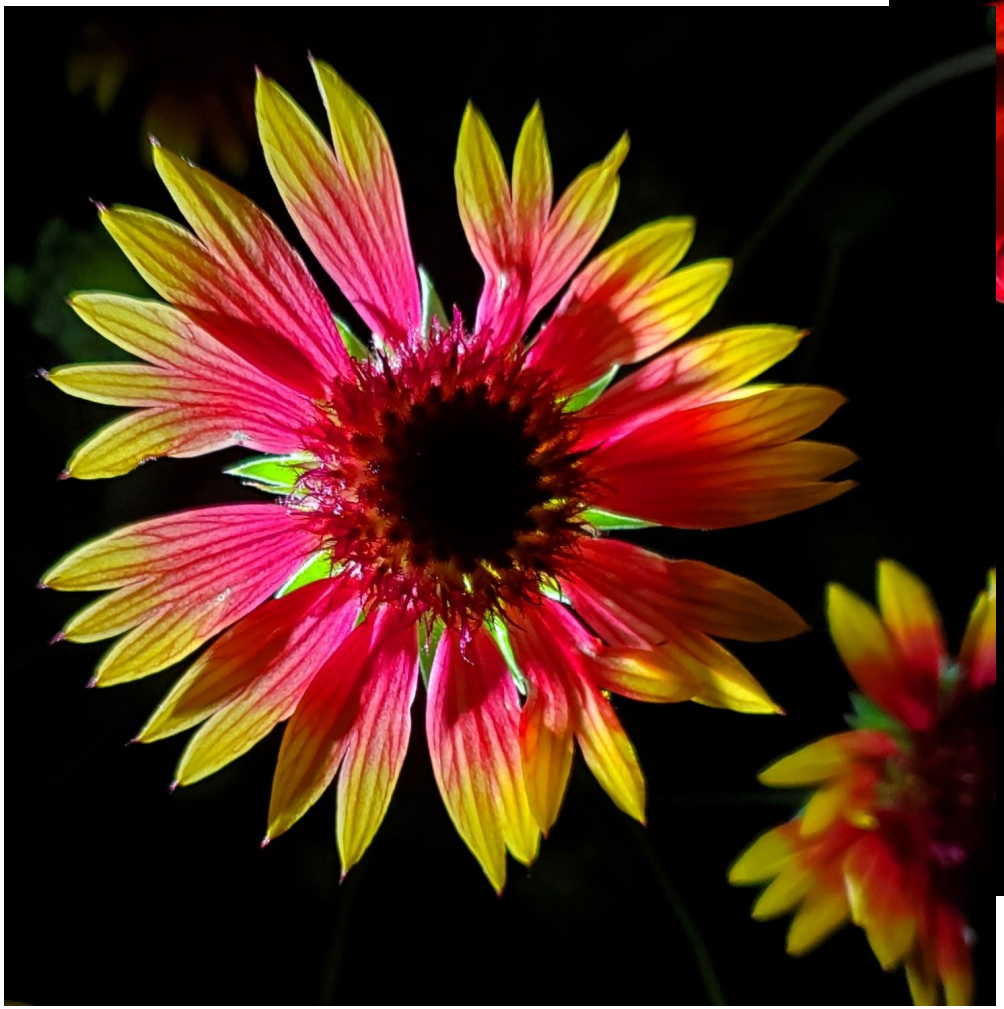
Twist the zoom ring with the shutter open

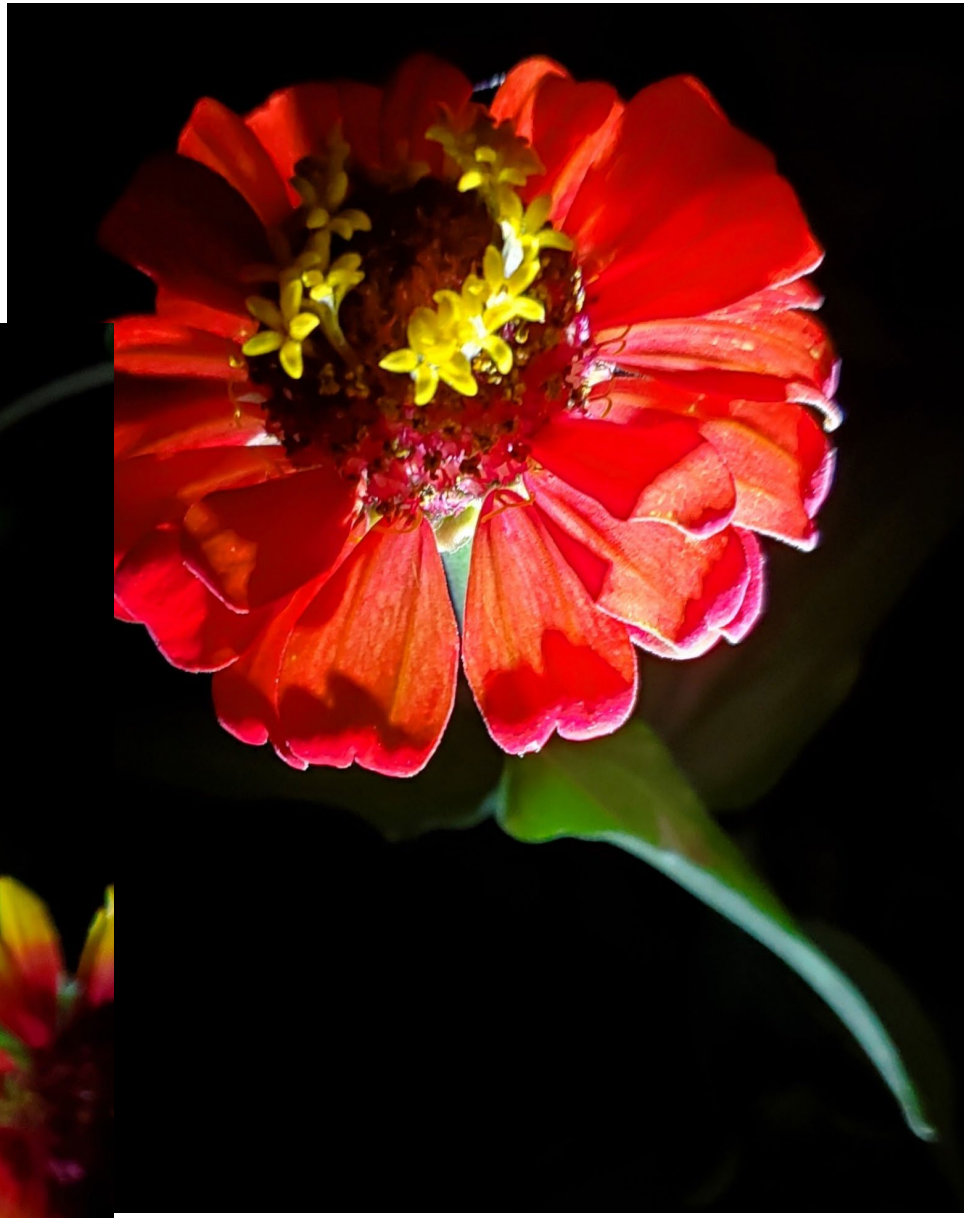
- Manual exposure
- Tripod
- Phone app or cable release or self-timer
- Layers in Photoshop using blend mode “lighter”

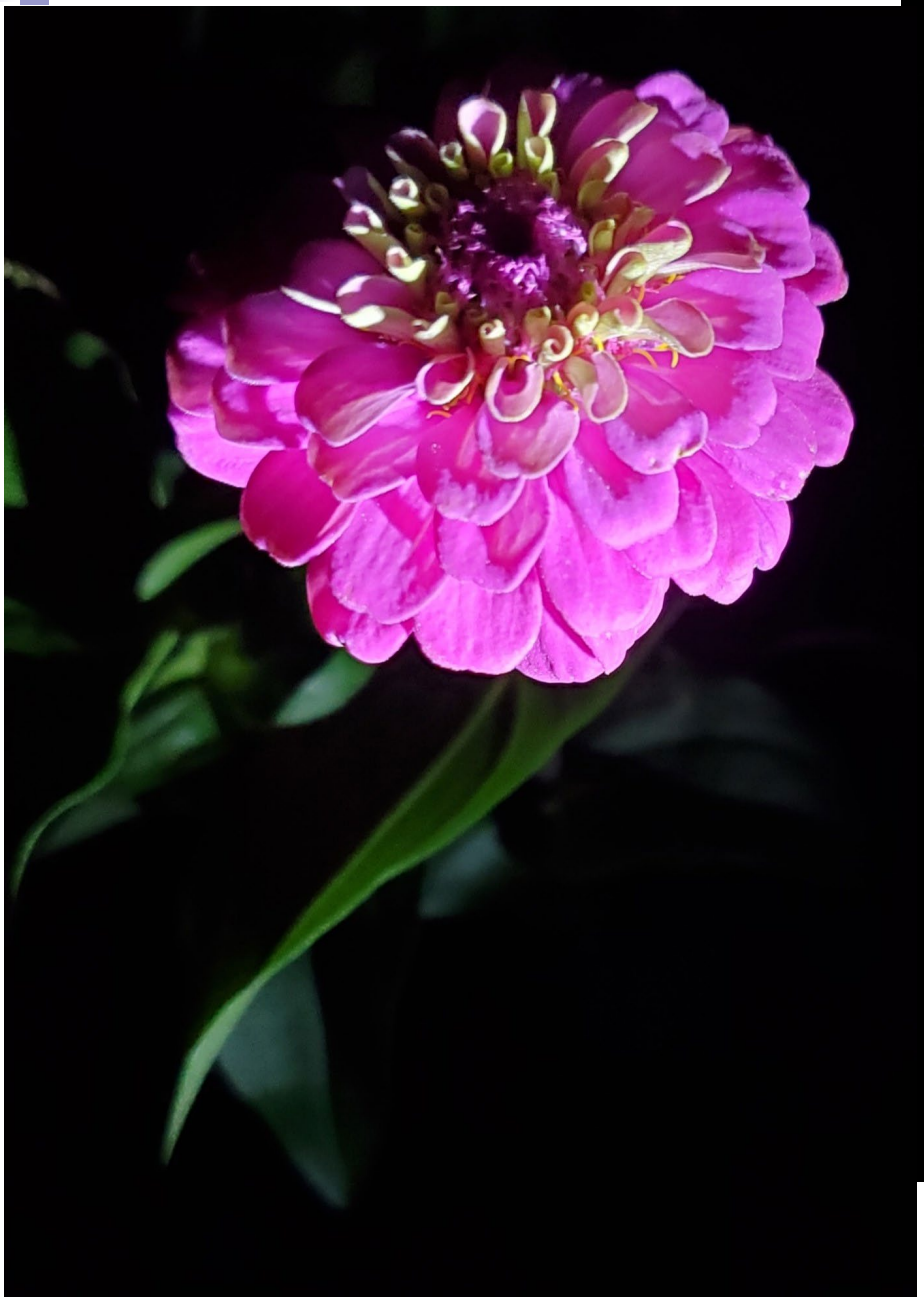


FRIED DOUGH

Fun Night Flowers







Light Painting

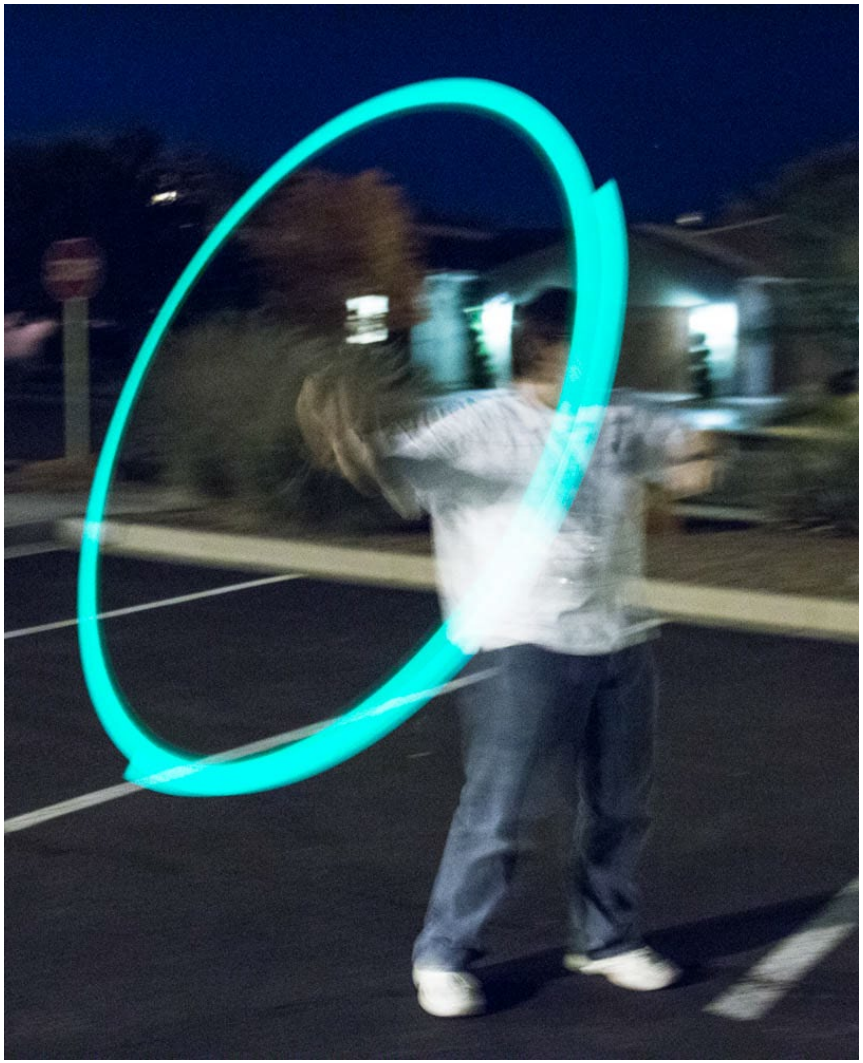
- Light used to illuminate subject
  - Small flashlight, can use gels for colors
- Long exposure time
- Shine the light to illuminate scene parts

Used a small flashlight during the exposure

Light Painting a Tree

Light Drawing

- Using the light to create the image instead of illuminating existing objects.
- Use flashlights (or any kind of light) pointed at the camera during the exposure
  - Can draw shapes



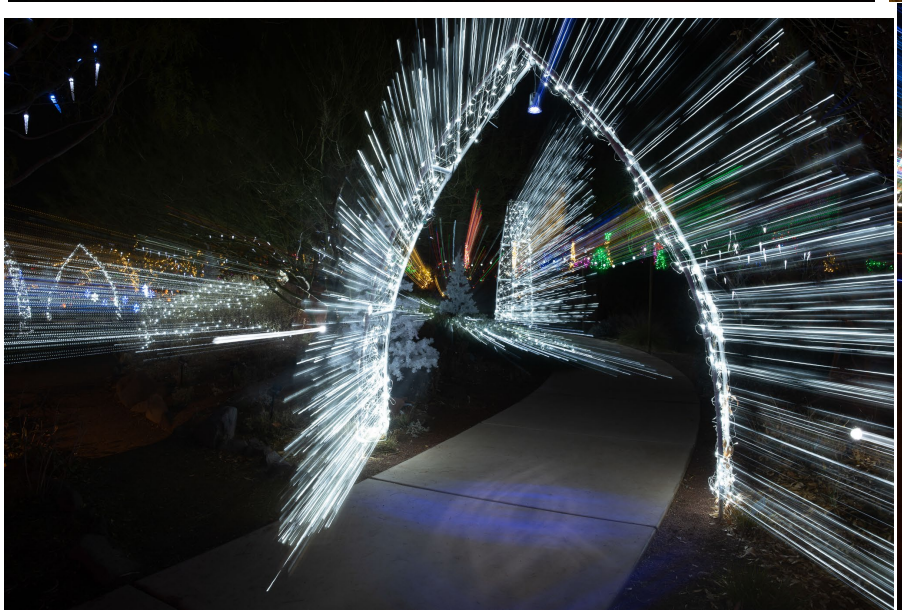
In automatic mode the camera won't let you do things like this.
It will try to pop up the flash because there isn't enough light!

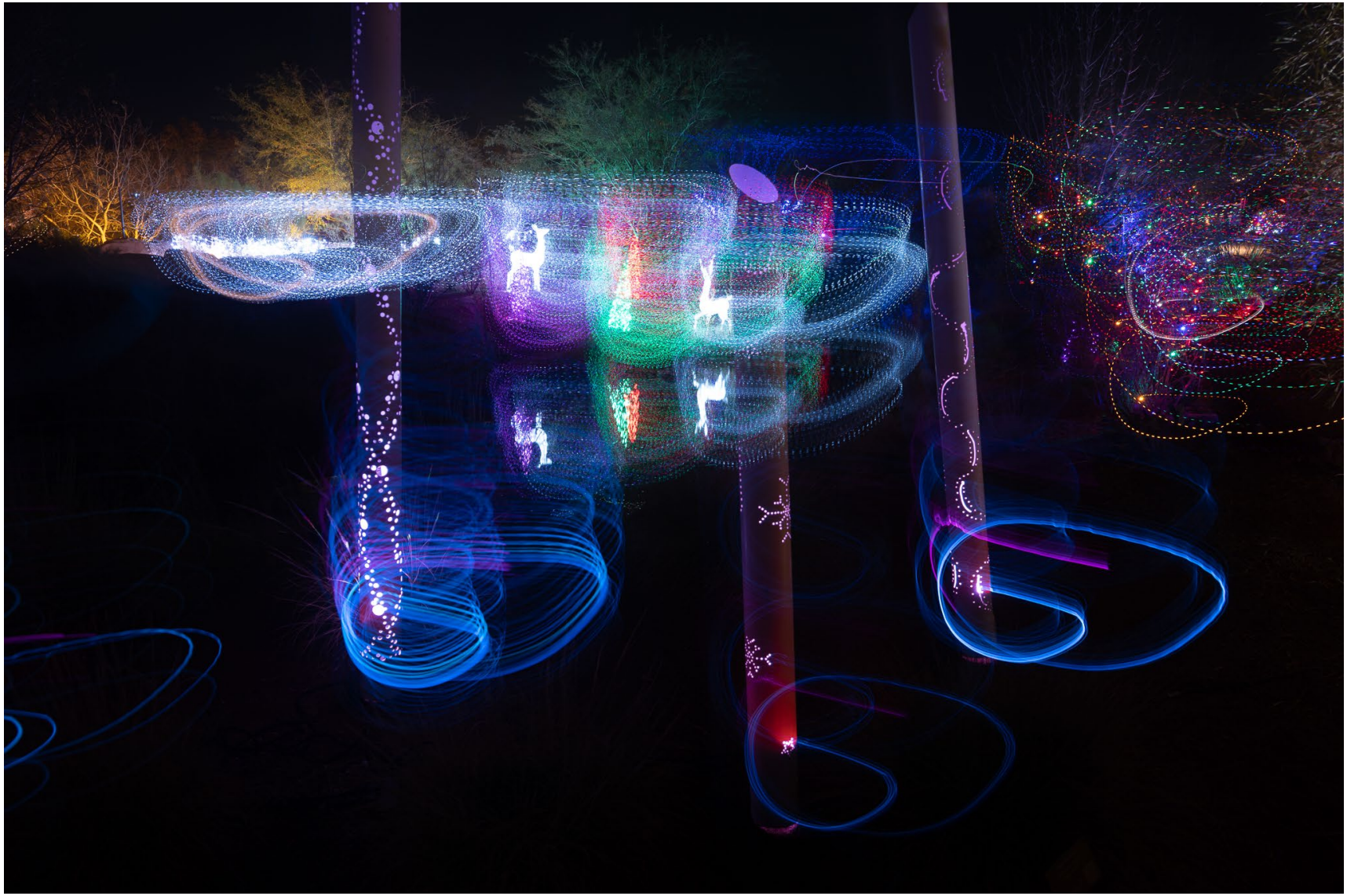
Light Drawing/Painting Sites

- www.dariustwin.com
- https://petapixel.com/2016/07/25/basic-guide-light-painting-photography/
- https://digital-photography-school.com/light-painting-part-one-the-photography/

Combining Tripod and Handheld

- On a long exposure, say 10 seconds or more, expose part of it on the tripod and rest while moving the camera
- Or, after the tripod part, move the zoom ring for the remainder of the exposure time





6 second time exposure. 4 seconds on tripod to establish the base image and then picked up and swung the tripod to create the swirly lights.

RED CLIFF GALLERY
of
SOUTHERN UTAH ART GUILD
presents
Martin Nohr
with the Certificate of Excellence
for "Splash of Color"
1st Place in Photography
Congratulations!
May 5, 2023
Date
Susan B Plowgo
Signature

#156 Tunnel of lights by Martin Bohr (Photograph)

Neon & Nebulary
by Marissa Alvarez

night becomes neon
hot pink yucca
rock ablaze in fuchsia & violet neon
& a limitless ceiling of wild night
no rest for the vibrant at heart

let the foliage of ochre shadows fall away
impression of chartreuse dreams at the corners
divine shimmer of arctic icicle-lit branches
like selenite-hued tentacles of a crystal jellyfish
brushed themselves across night

prickly branches spindled in fluorite blue
& magenta aura
a tunnel ringed in sorbet spectrum,
ultramarine,
& luminescent lime
kaleidoscopic dragon dance in galactic verdigris
beads of light echo across your vision
an undulated ribbon of neon rainbow
electrons in their elemental radiance name moonbeams

magenta wishes glowing at your feet
lure you onto iridescent path
your soul was enchanted by stardust
it is time to fluoresce

jettison all thoughts that hold you back
unleash your cosmic mind from the liminal
dance in the ionosphere
in a festival of fluorescent fireflies
let your heart be neon
let your heart be nebulary

This was written by a poet about my previous picture (also shown below) when it was displayed in February 2023 at the Red Cliffs Gallery art show. They invited some poets to write poems about some of the art.

Managing/Editing Photos

- I use Adobe Lightroom Classic
  - And Photoshop for some operations
- There are others, like ACDSee, Luminar, google photos, ON1, Exposure X5 etc.
- Apple dropped support for Aperture (~2017), so it is no longer available

Photoshop Plugins

- Astro Panel
  - Automates much of the work
  - Landscape, milky way, deep sky
  - $50
- https://nikcollection.dxo.com/dfine/
  - Excellent noise reduction
  - Nik has other tools and works in LRC also

Image Managing Software

- ACDSee, Lightroom Classic CC
- Google Photos (replaced Picasa)
- Cyberlink PhotoDirector, Corel Paintshop
- Zoner, Luminar, On1, Capture One, etc.
- Look for the features you need
  - Easy searching and browsing
  - Editing and printing

Google Photos (replaced Picasa)

- Automatic tagging
  - Works amazingly well
  - Matches faces
- Non-destructive image editing
- Excellent price! Free, but photos must be on Google drive, you may need to buy space eventually

Example Prices (sometimes on sale)

- On1, $99.99 license, or $129.99/year
- Capture One, $300 license, or $20/month
- Lightroom/Photoshop bundle, $9.99/month
- Luminar, $70 license
- Cyberlink PhotoDirector, $69.99 license
- ACDSee, $59.99 license
- Zoner, $49.99/year

Two Lightrooms

- Classic is the original full featured desktop application
- Lightroom is now the new web-based simplified editing version for phones and tablets
- They work together, changes in one show up in the other with shared folders

Adobe Photography Plan

- 20GB of cloud storage
- Photoshop (full version)
- Lightroom
- Lightroom Classic
- Bridge
- $9.99/month, 1 year terms
- 30 day free trial