Night & Long Exposure Photography
Equipment & Basic Settings

Take only photos, leave only foot prints

**Equipment**

**Camera**
- Camera with ability for manual exposure (aperture, ISO, exposure time, white balance)
- Remove the strap or tie it down to prevent movement by wind (blurs long exposure images)

**Tripod**
- **Sturdy tripod**; individual leg adjustments, **ball-heads** are more flexible than 3-way heads.
- Velcro strips are useful to hold the timer, camera strap etc.

**Lenses**
- Best range is below 100 mm full frame (70 mm crop sensor). **Wide angles** are often used.
- You will rarely zoom in, as lens motion is amplified. Remove any filters (reflections!)
- Important: bring your lens hoods! They avoid flares from street lights.

**Intervalometer or Timer**
- Many night exposures are >>30 s, most camera’s (and internal intervalometer’s) limit
- Intervalometers are more powerful than remote on/off control. Must-have for star trails

**Flashlights (no head lights!)**
- Bring a VERY DIM light (pen light or key chain light) for camera or lens adjustments
- Brighter or colored flashlights for light painting.
- Be considerate of others when using flashlights! Minimize the use, do not blind yourself.

**Other stuff**
- Hiking boots; Water, snacks; suitable clothing (it’s cooler at night and you are standing around, not moving much); microfiber cloth, spare batteries (and charge the one in the camera!).

**Camera Settings**
- It’s more difficult to see in the dark: Learn to use your controls blindly (less flashlight use!)
  - Practice this on your living room couch! Turn off the lights and play with your camera.
- Shoot RAW image format! Much more latitude in recovering highlights and shadows
- Learn to use LiveView and zooming in with +/- controls.
- Turn autofocus off, the camera can’t focus well in the dark
- Turn auto-ISO off, we want to control the ISO setting.
- Turn motion compensation (VR/VC/OS/IBIS…) off, it blurs images when on a tripod
- Turn off LENS = Long Exposure Noise Reduction (default: ON)
- Shutter speeds are 15 seconds and 30 minutes. Set camera to BULB and use intervalometer.
- White balance: set it to “K” (Kelvin temperature): 5500 is daylight, twilight is 6000-9000. At night, white balance temperature drops quickly to 3450. Use cloudy (civil), shade (nautical)
- Set your LCD screen brightness to -2 to -3 (darker), it is too bright at night.
- Image review: turn on highlight clipping indicator and RGB (not just the white) histograms

**Consideration**
- You’re not alone
  - Be considerate of residents, workers, fellow citizens and other photographers
  - Don’t shine your lights around you, keep it down and spot on your equipment
  - Ask to make sure you don’t ruin somebody’s 8-minute light painting
  - Be friendly to people and law enforcement approaching you, but know your rights, too.
  - If in doubt, walk away, it’s just a photo.

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- Your LCD shows up in other’s shots: shade it with your body, turn it off, it drains the battery.
- Your tripod is larger than you think, don’t turn around and knock someone out!
  - You may be watched, be friendly to people and law enforcement approaching you
  - But know your rights, too. If in doubt, walk away, it’s just a photo.

**Exposure Settings**

**ISO**
- No auto-ISO, it doesn’t work at night!
- Set camera to lowest native ISO (most common: 100, some are 64 or 200)
  - Exceptions: want longer exposure or even less noise: ISO 50
  - Not enough light, don’t want to expose for 20 minutes: go up to ISO 200 or 400
  - Star dots and Milky Way: 800 to 6400; try to minimize ISO, shoot wider aperture.

**Aperture**
- Choose aperture for creative reasons
  - Shallow DOF: low f/-stop: 2.8 - 4
  - All in focus: high f/-stop: 8-16 (also gives you nice starbursts from lights)
  - Startrails? Balance light and DOF: f/5.6-6.3, Milky Way and star points: f/1.8-2.8

**Exposure time / shutter speed**
- With ISO set to lowest and aperture chosen for creative reasons, exposure time is defined
- All you need to do is figure out exactly how long you need to expose
- For star dots (no trails): \(400/f\text{-focal length (sec)}\) for full frame; \(300/fl\) for crop sensor cameras

**High ISO Preview (be HIP, save time)**
- Don’t waste 10 minutes just to figure out that it wasn’t enough or too much.
- Choose your aperture and don’t change it.
- Set ISO 6 stops higher, which gives you exposure time 6 stops shorter
- Example: your native ISO is 100
  - 6 stops higher is: \(200 \rightarrow 400 \rightarrow 800 \rightarrow 1600 \rightarrow 3200 \rightarrow 6400\)
  - An exposure time of 1 second at ISO 6400 is as bright as 1 minute at ISO 100 (60" \(\rightarrow 30" \rightarrow 15" \rightarrow 8" \rightarrow 4" \rightarrow 2" \rightarrow 1"\)).
  - With camera at ISO 6400, figure out how many seconds you need for the right exposure (histogram!). Let’s say you determined 3” exposure time at ISO 6400.
  - Set your camera back to ISO 100 and the seconds become minutes (in this example: 3 minutes). 1 second at ISO 6400 becomes 1 minute at ISO 100!
- My camera’s lowest ISO is 200! 6 stops up: ISO 12800. 1" at 12800 is the same as 1 minute at ISO 200.
- My camera’s lowest ISO is 50 (or: I want to shoot at ISO 50 for noise and longer time) 6 stops up: ISO 3200. 1” at 3200 is the same as 1 minute at ISO 50.
- I changed my mind, instead of f/11, I want to shoot at f/8 (or f/16) 11 to 8 is +1 stop of light (more light): select half the exposure time (double for f/16)

Practice this! Make it second nature, especially if you shoot outside the city in darker environments

**Focusing**
- Compose, use flashlight to illuminate scenery, then use LiveView, zoom in with +/- controls, focus on the object
- Focus on a small light (use your flashlight pointing at the camera), focus on stars for star trails.


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