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THE MISADVENTURES OF A BUSY ASTROPHOTOGRAPHER

Isaac Newton

“If I have seen far, it is because
I have stood on the shoulders of
giants.”

Equipment

- ◎ Canon 1000D (Digital Rebel XS)
 - 18-55mm lens (body + lens = \$500)
 - Canon Zoom Telephoto EF 75-300mm f/4.0-5.6 III Autofocus Lens (\$150)
- ◎ Normal Tripod



Why this camera?

- ⦿ What Kind of Pictures Do You Want to Take?
What's the Best Camera to Take Them With?
 - Scenics - DSC or DSLR
 - ~~Planetary – Webcam~~
 - ~~Deep-sky – CCD or DSLR~~
- ⦿ Canon DSLR's are standard, then Nikon in second
- ⦿ Good points about the Canon 1000D
 - Low noise (Canon is typically better)
 - High sensitivity
 - Good signal to noise ratio
 - Live-view focusing
 - Dust-reduction
 - Single-Cable operation

Targets for DSLR

- ◉ Sunsets
- ◉ Moon
- ◉ Moon & Planet close encounters
- ◉ Constellations
- ◉ Star Trails
- ◉ Lunar Eclipses

What to think about...

- ⦿ Exposure length
- ⦿ ISO
- ⦿ f-stop

Lessons learned

⦿ Exposure

- Length of time the shutter is open
 - Longer exposures let in more light, but are susceptible to motion/star trailing/overexposure
 - Shorter exposures don't let in as much light, but there is less star trailing

Moon – Different Exposure Times



Zoom Lens (300mm) Exp: 1s ISO100 f5.6



Zoom Lens (300mm) Exp: 4s ISO100 f5.6

Lessons learned

◎ ISO

- Speed of the “film”
- ISO 100
 - means no amplification
 - Longer exposure needed
- ISO 1600
 - means a lot of amplification
 - Shorter exposure needed (16x “faster”)
 - Produces more noise
 - Black sky is “not-so-black”

Moon & Pleiades – Different ISO



Zoom Lens (300mm) Exp: 1s ISO200 f5.6



Zoom Lens (300mm) Exp: 1s ISO400 f5.6

Lessons learned

◎ f-stop

- Aperture or size of the “iris”
- Lower f-ratios (f1, f3)
 - Bigger “iris”
 - More light coming in
 - Need shorter exposure
- Higher f-ratios (f9, f11)
 - Smaller “iris”
 - Less light coming in
 - For longer exposures of star trails
- General Rule: Keep f as low as possible unless you're doing long exposures

Different F-ratios

Standard Lens (20mm) Exp: 180s ISO100 f3.5

Different F-ratios

Standard Lens (20mm) Exp: 1800s ISO100 f10

Targets for DSLR

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Sunset & Close Encounter – Moon & Venus



Standard Lens (34mm) Exp: 0.25s ISO100 f5.0

Close Encounters – Moon & Venus



Zoom Lens (140mm) Exp: 1s ISO100 f5.0

Close Encounters – Saturn, Mars, Venus



Standard Lens (37mm) Exp: 15s ISO800 f4.5

Moon

Zoom Lens (300mm) Exp: 3.2s ISO100 f5.6

Moon



Zoom Lens (300mm) Exp: 1s ISO400 f5.6

Constellations – Sagittarius, Scorpius

Standard Lens (18mm) Exp: 81s ISO100 f5.0

Constellations w/ Star Trails – Sagittarius, Scorpius



Standard Lens (18mm) Exp: 360s ISO100 f5.0

Constellations - Hercules



Standard Lens (18mm) Exp: 30s ISO1600 f/3.5

Constellation w/ Star Trails - Hercules



Standard Lens (18mm) Exp: 592s ISO100 f3.5

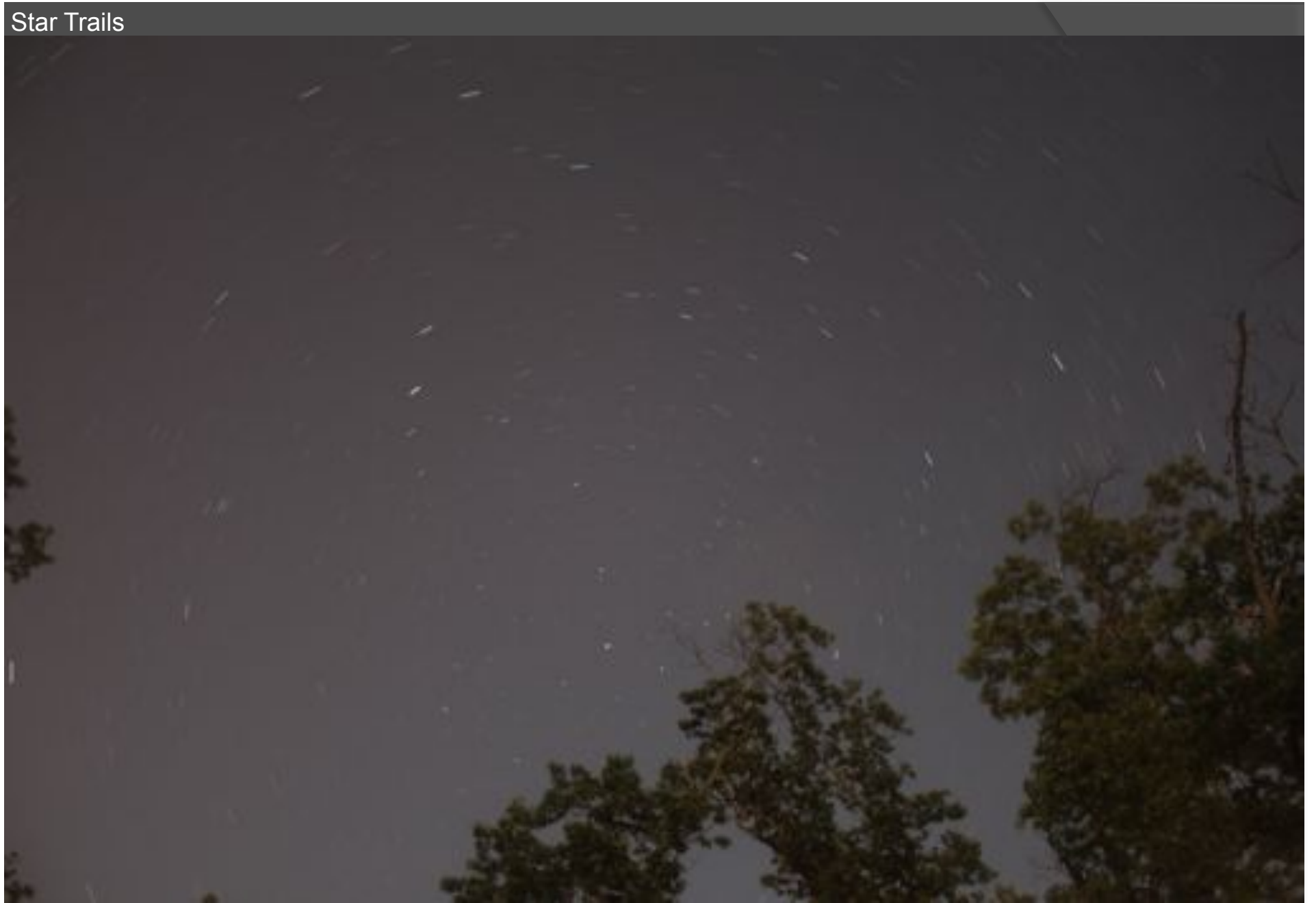
Constellations – Big Dipper



Standard Lens (25mm) Exp: 10s ISO1600 f4.0

Star Trails

Standard Lens (18mm) Exp: 480s ISO100 f3.5



Lunar Eclipse & Orion



Standard Lens (27mm) Exp: 30s ISO400 f4.0

Lunar Eclipse & Orion



Standard Lens (27mm) Exp: 10s ISO1600 f4.0

Lunar Eclipse & Orion



Standard Lens (27mm) Exp: 360s ISO100 f4.0

Lunar Eclipse & Gemini



Standard Lens (27mm) Exp: 10s ISO1600 f4.0

Lunar Eclipse & Gemini



Standard Lens (27mm) Exp: 330s ISO100 f4.0

Lunar Eclipse



Zoom Lens (300mm) Exp: 1/25s ISO100 f5.6



Zoom Lens (75mm) Exp: 1/15s ISO1600 f4.0

Other



Standard Lens (18mm) Exp: 20s ISO1600 f3.5

Light Pollution (Ephrata)



Standard Lens (18mm) Exp: 15s ISO1600 f3.5

Light Pollution (Indiana Dunes State Park)



Standard Lens (18mm) Exp: 16s ISO1600 f3.5

Light Pollution (Mauna Kea, HI)



Standard Lens (18mm) Exp: 15s ISO1600 f5.6

Light Pollution (Mauna Kea, HI)

Standard Lens (18mm) Exp: 30s ISO1600 f5.6

Light Pollution (Mauna Kea, HI)

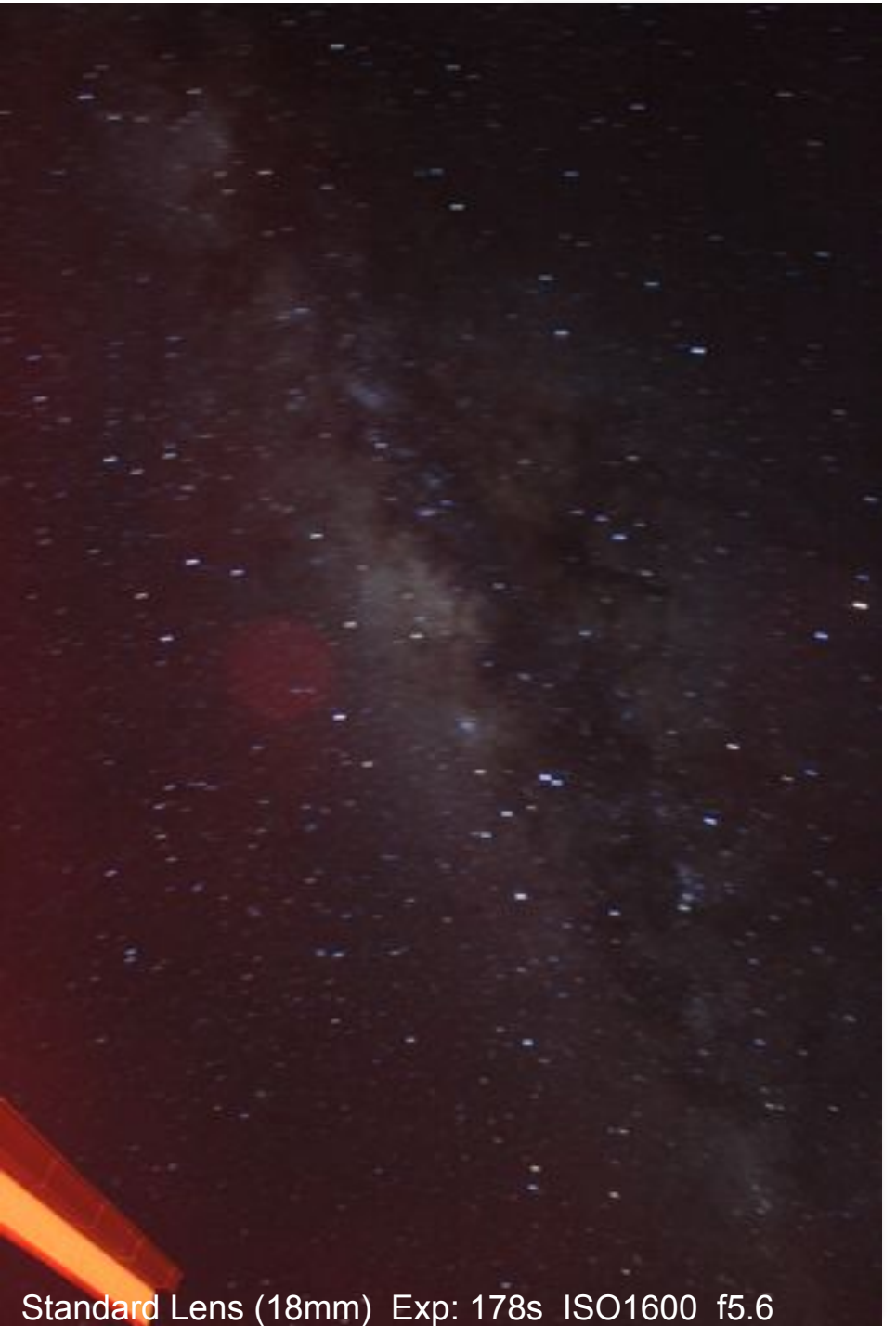


Standard Lens (18mm) Exp: 120s ISO1600 f5.6

Other – Milky Way (Mauna Kea)



Standard Lens (18mm) Exp: 120s ISO1600 f5.6



Standard Lens (18mm) Exp: 178s ISO1600 f5.6

Other things...

- ⦿ Noise Reduction “on”
- ⦿ Stable mount
- ⦿ Remote Shutter Release
- ⦿ Shoot in Large when practicing/playing
- ⦿ Shoot in Large & RAW if you plan to process
- ⦿ Can control camera using your computer

Now What???

DSLR + Telescope

- Canon 1000D (Digital Rebel XS)
 - Canon EOS Camera T-ring
 - 1.25" Universal Camera Adapter
- Orion Sirius EON 120ED EQ-G GoTo Refractor
 - Orion Dynamo Pro 12 Rechargeable Power Station



Now What???

DSLR + Telescope

- ⦿ Saturn
- ⦿ The Moon
- ⦿ The Moon during Eclipse

Saturn

Through Refractor Exp: 1s ISO100 f0.0

Saturn



Through Refractor w/ eyepiece projection Exp: 5s ISO100 f0.0

Saturn



Through Refractor w/ eyepiece projection, cropped Exp: 5s ISO100 f0.0

Moon



Through Refractor Exp: 1/125s ISO100 f0.0

Moon



Through Refractor w/ eyepiece projection Exp: 1/10s ISO100 f0.0

Moon



Through Refractor w/ eyepiece projection Exp: 1/40s ISO100 f0.0

Moon during eclipse



Through Refractor Exp: 1/125s ISO100 f0.0

Moon during eclipse



Through Refractor Exp: 1/200s ISO100 f0.0

Moon during eclipse



Through Refractor Exp: 1/200s ISO100 f0.0

Moon during eclipse



Through Refractor Exp: 1/40s ISO100 f0.0

Moon during eclipse



Through Refractor Exp: 1/40s, 1s, 1.6s ISO100 f0.0

Moon during eclipse



Through Refractor Exp: 1/40s ISO100 f0.0

Moon during eclipse



Through Refractor Exp: 3.2s ISO400 f0.0

Future lessons to stumble through by trial and error...

- ◎ More use of Refractor for
 - Planets
 - Clusters?
 - Moon
- ◎ Focusing better
- ◎ Processing of images
- ◎ Using a CCD Camera

Resources

- ◎ Tom Lugar
- ◎ The Backyard Astronomer's Guide
 - Dickinson & Dyer
- ◎ [My Adventure Through Astrophotography Blog](#)
- ◎ [My Picasa Web Albums](#)
- ◎ [My Monthly Astronomy Podcast & email](#)
- ◎ [Various Sites](#)

Questions? Advice? Praise???