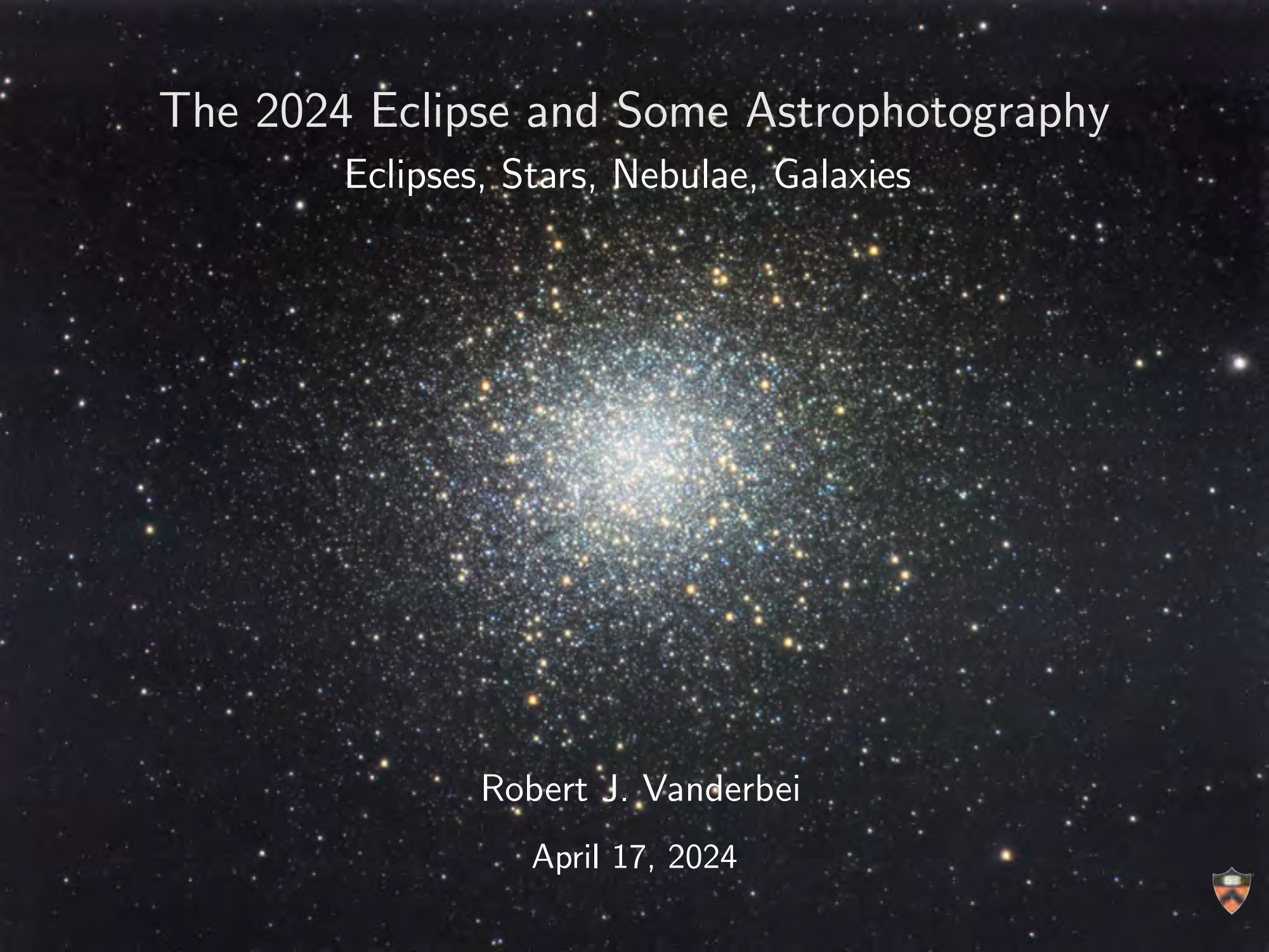


The 2024 Eclipse and Some Astrophotography

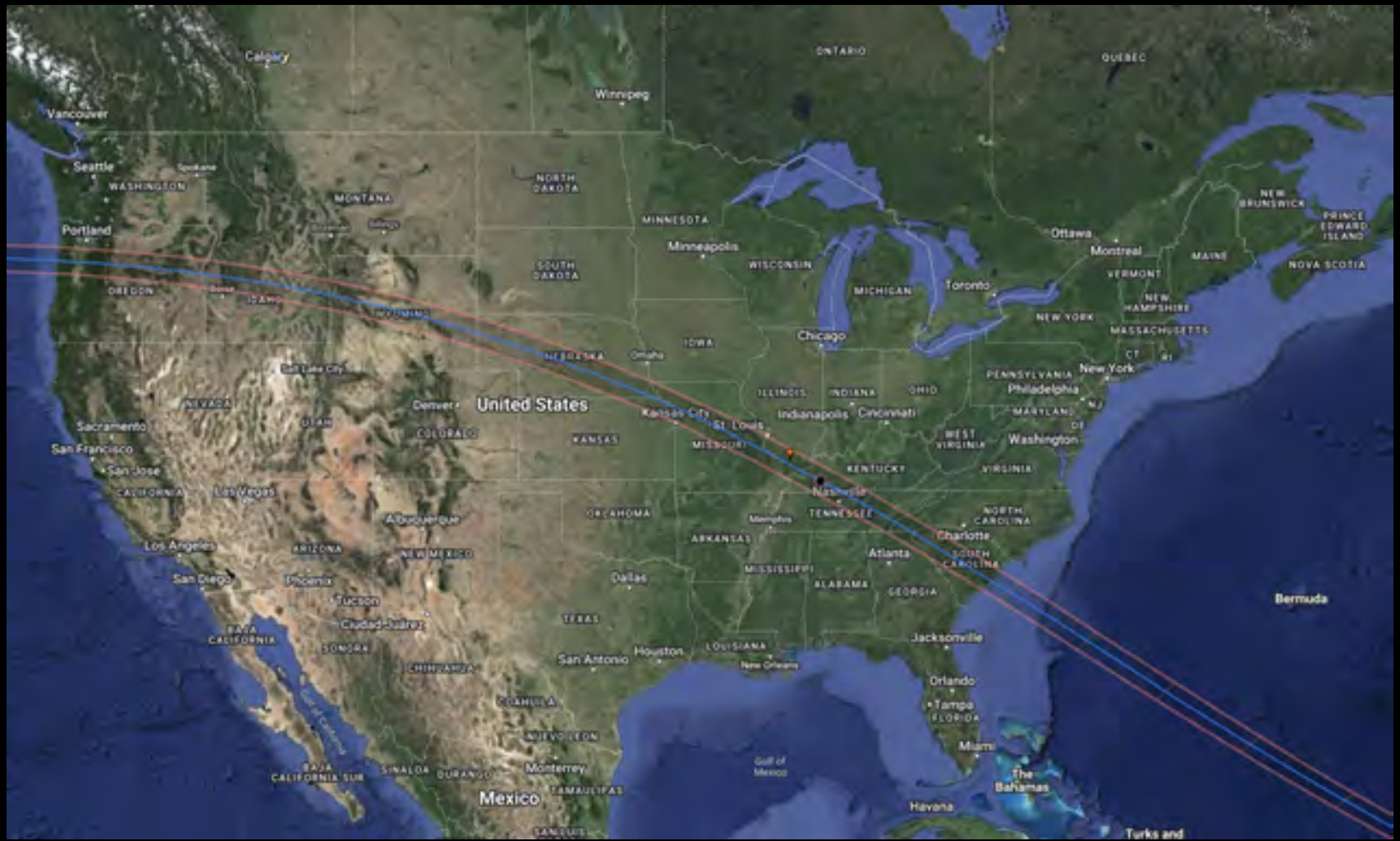
Eclipses, Stars, Nebulae, Galaxies

Robert J. Vanderbei

April 17, 2024

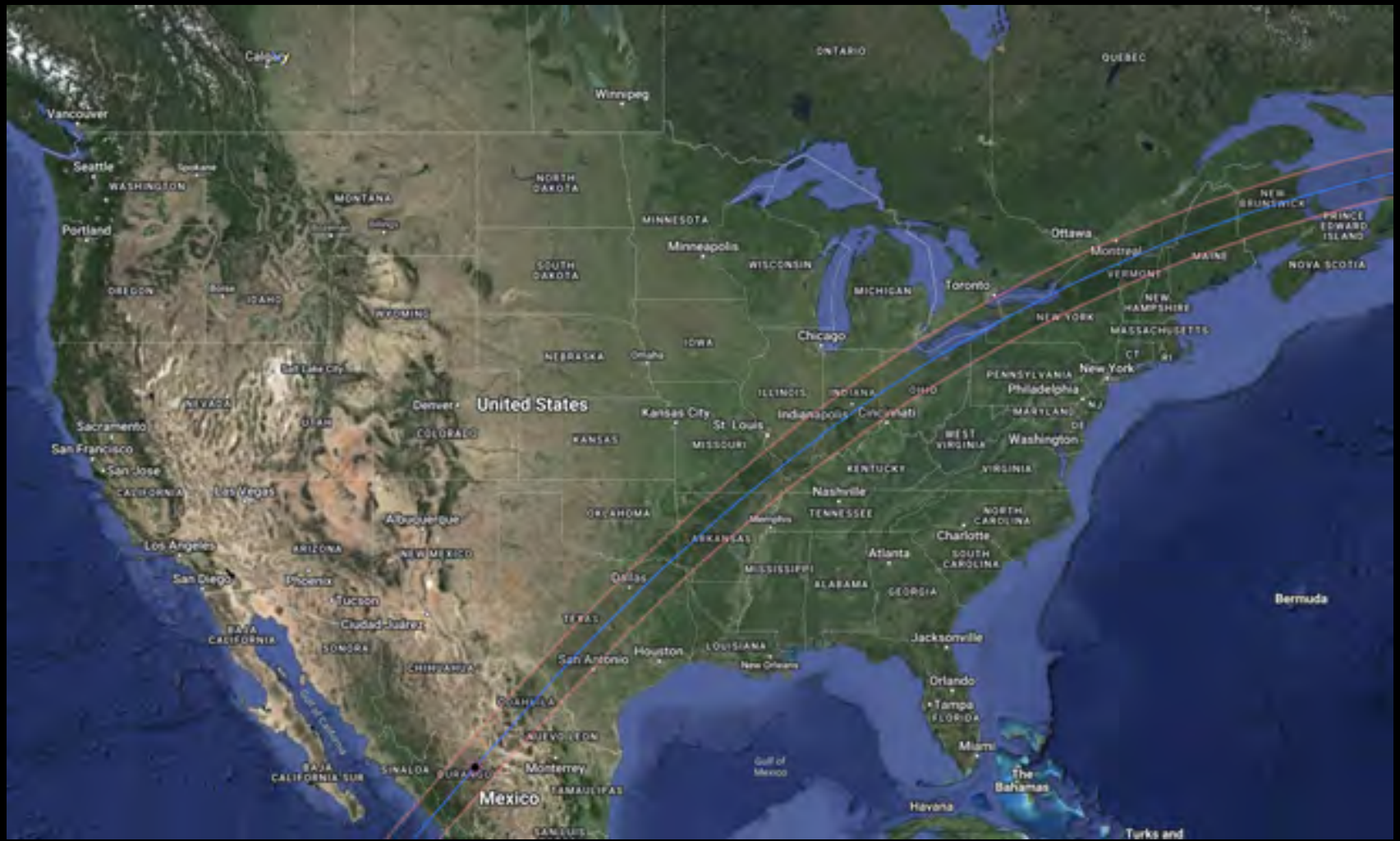
The Path of Totality on August 21, 2017

Viewed from Salem Oregon



The Path of Totality on April 8, 2024

Viewed from Plattsburgh New York

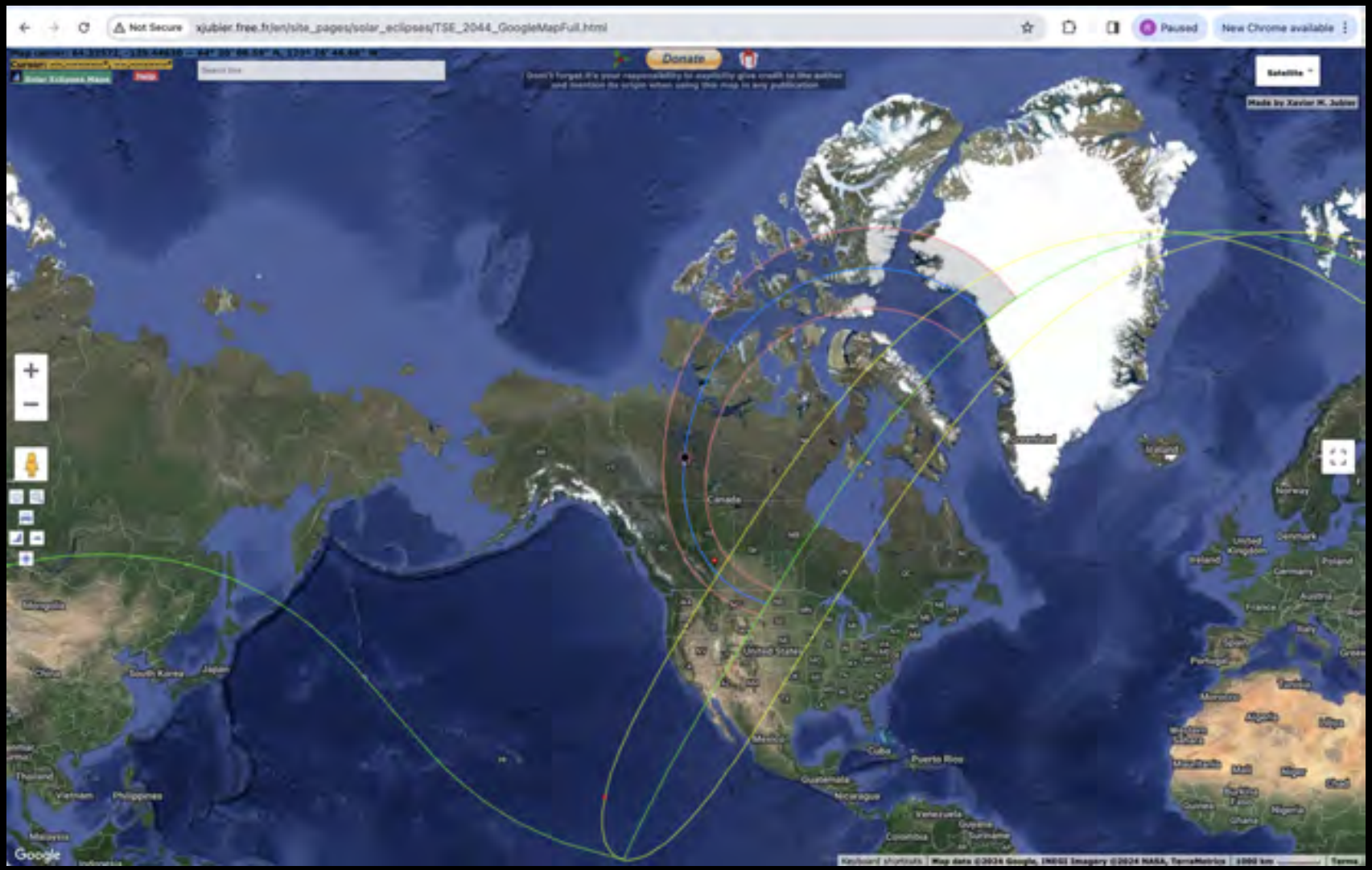


The Path of Totality on August 22, 2044

To be Viewed from Somewhere in America

http://xjubier.free.fr/en/site_pages/solar_eclipses/TSE_2044_GoogleMapFull.html

The Full Path of Totality on August 22, 2044



http://xjubier.free.fr/en/site_pages/solar_eclipses/TSE_2044_GoogleMapFull.html

Equipment

Equipment...

Telescope: 3.5” Questar

Equipment...

Telescope: 3.5” Questar

Filter: Thousand Oaks Solar Filter

Equipment...

Telescope: 3.5” Questar

Filter: Thousand Oaks Solar Filter

Camera: ZWO ASI2400MC Pro (CMOS Astro camera)

Equipment...

Telescope: 3.5” Questar

Filter: Thousand Oaks Solar Filter

Camera: ZWO ASI2400MC Pro (CMOS Astro camera)

Computer: MacBook Pro

Equipment...

Telescope: 3.5” Questar

Filter: Thousand Oaks Solar Filter

Camera: ZWO ASI2400MC Pro (CMOS Astro camera)

Computer: MacBook Pro

Operating System: Windows 10 (via VMware)

Equipment...

Telescope: 3.5” Questar

Filter: Thousand Oaks Solar Filter

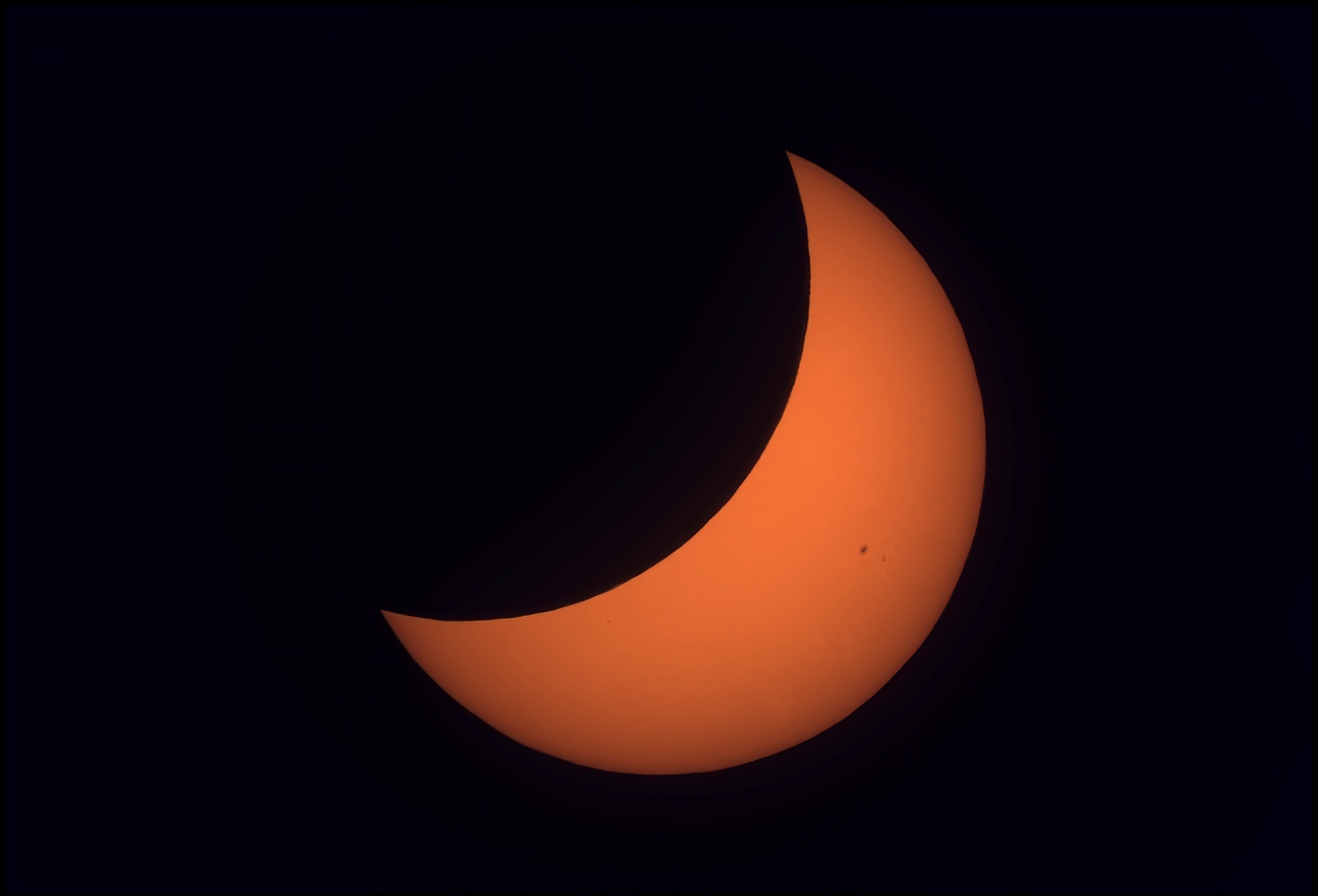
Camera: ZWO ASI2400MC Pro (CMOS Astro camera)

Computer: MacBook Pro

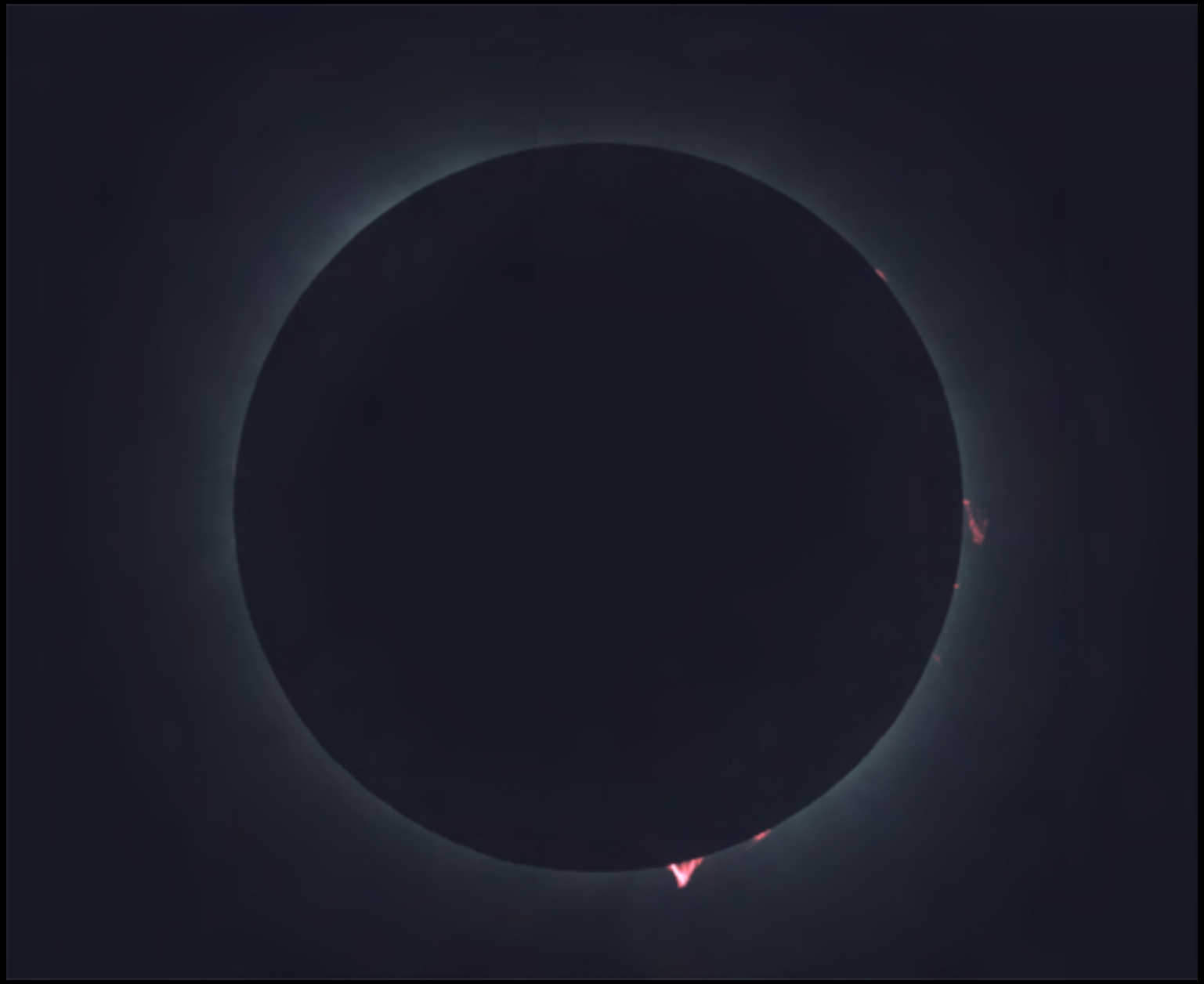
Operating System: Windows 10 (via VMware)

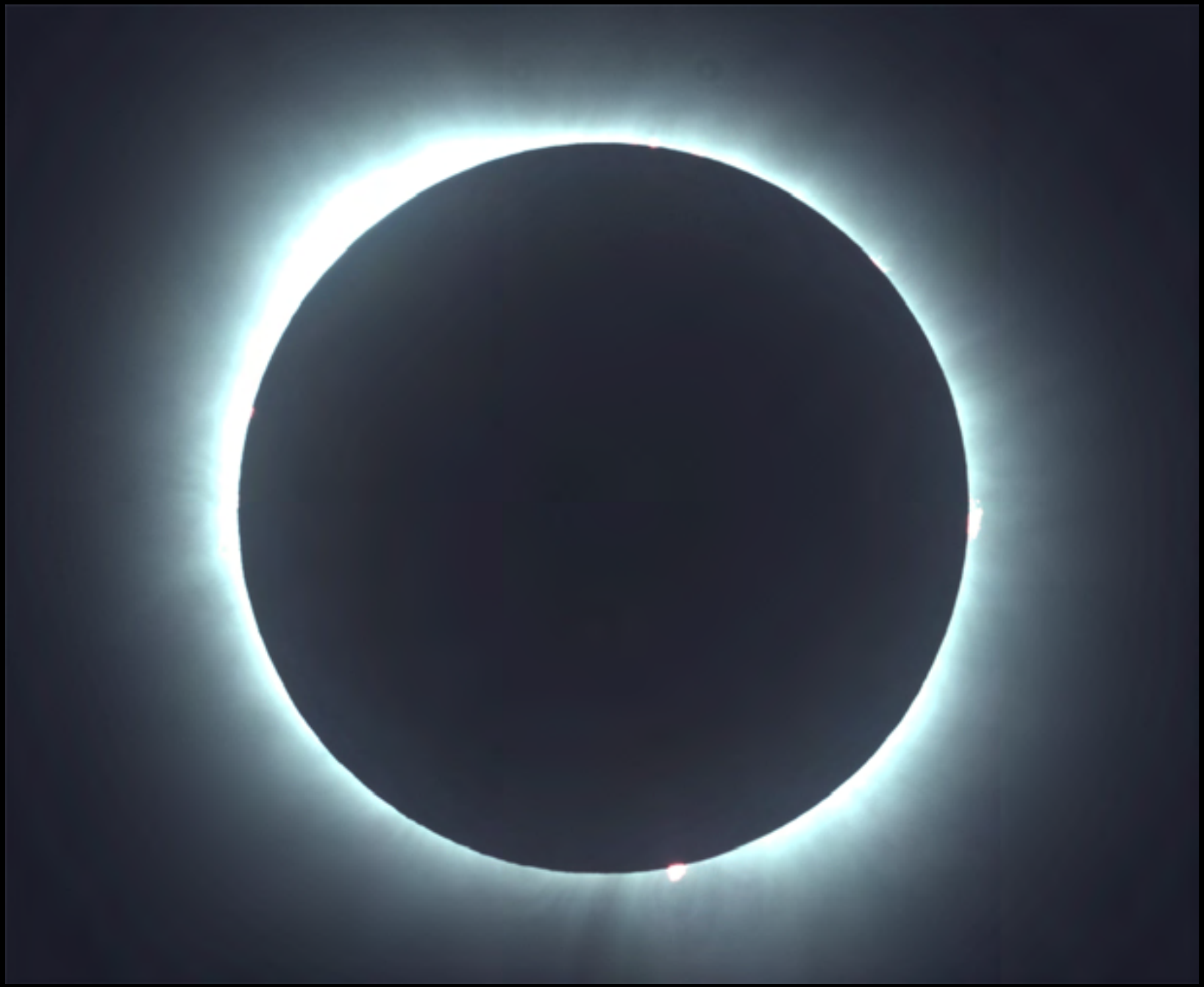
Software: SharpCap using Sequence Script

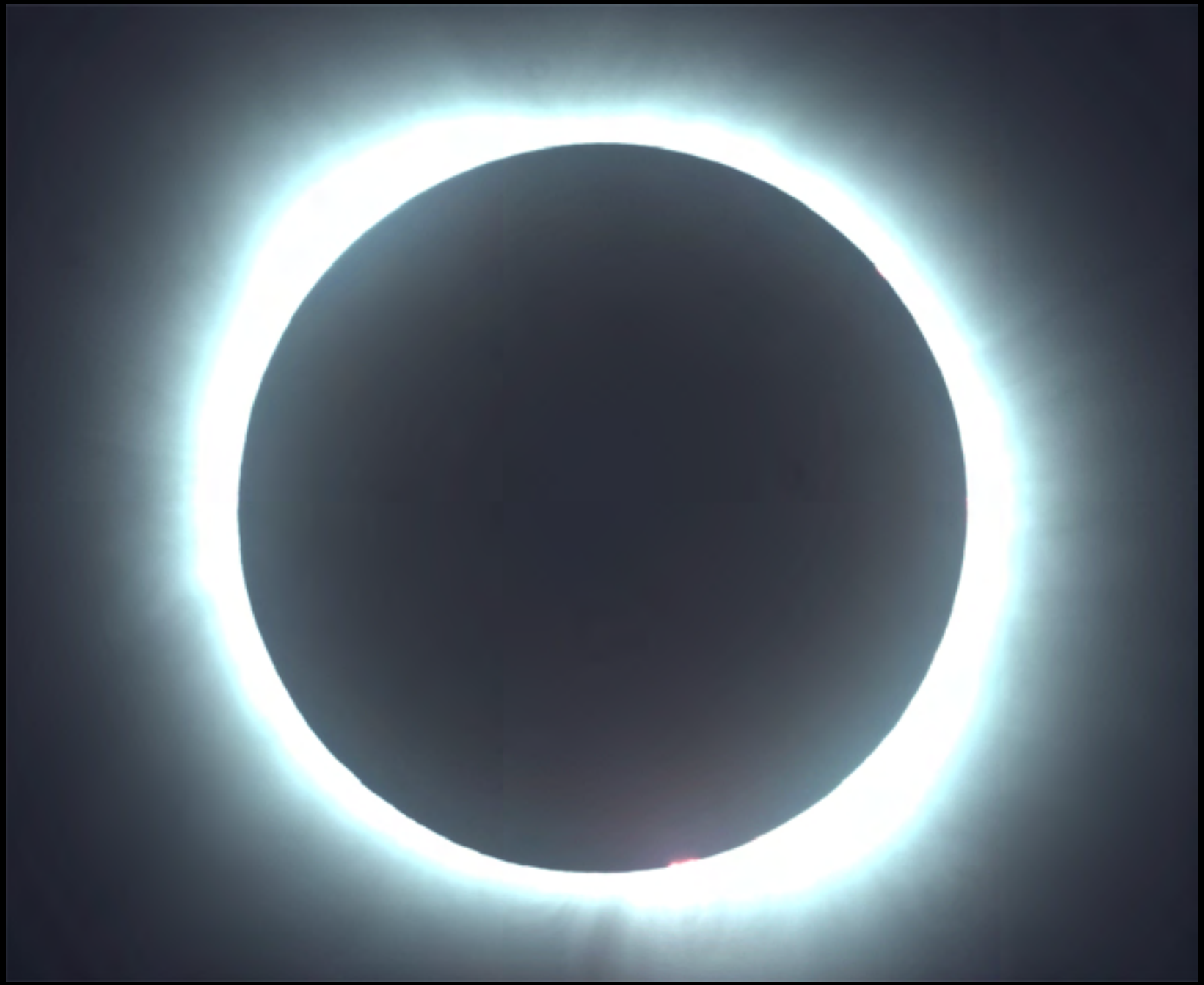
Partial Phases – 2024

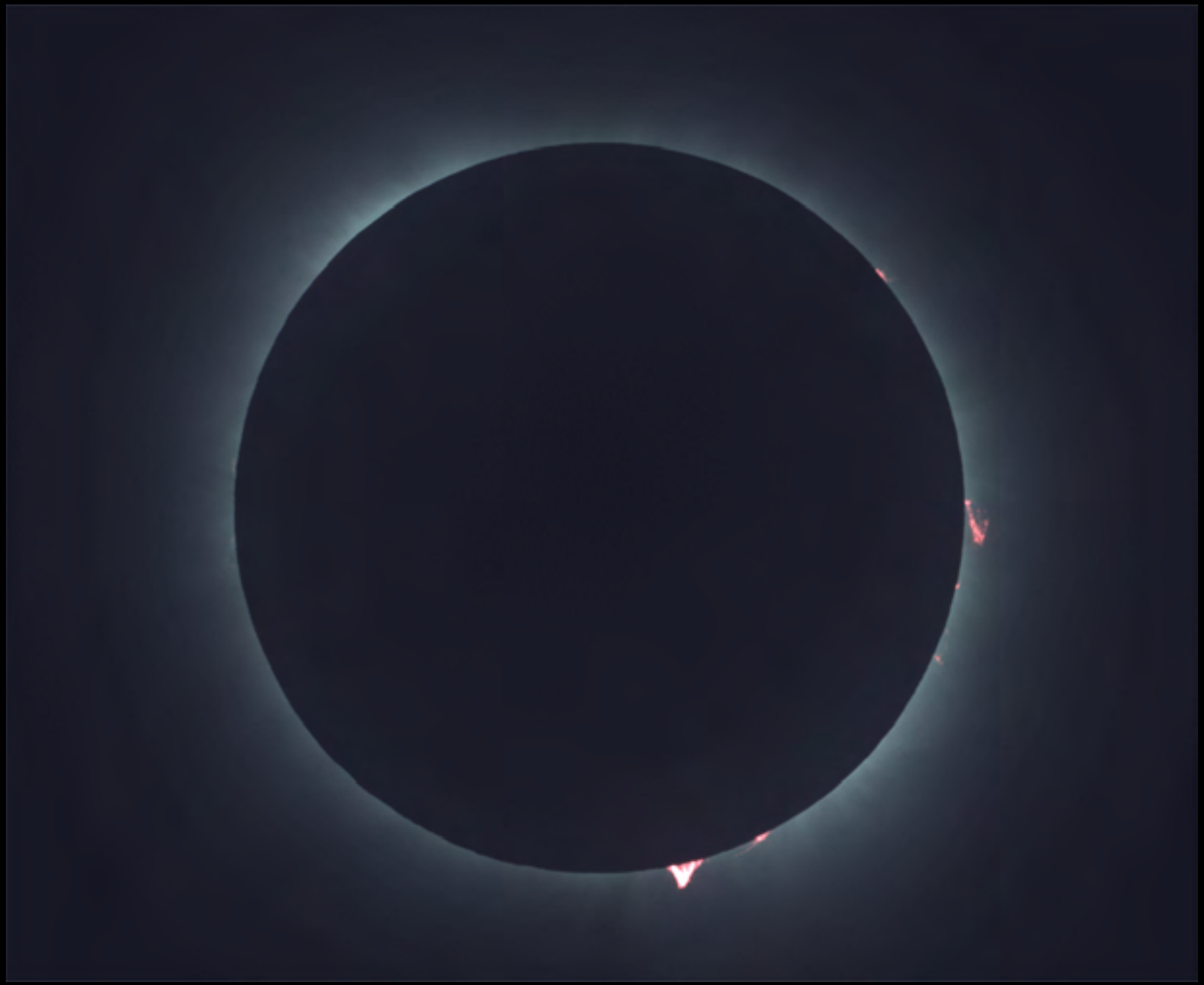


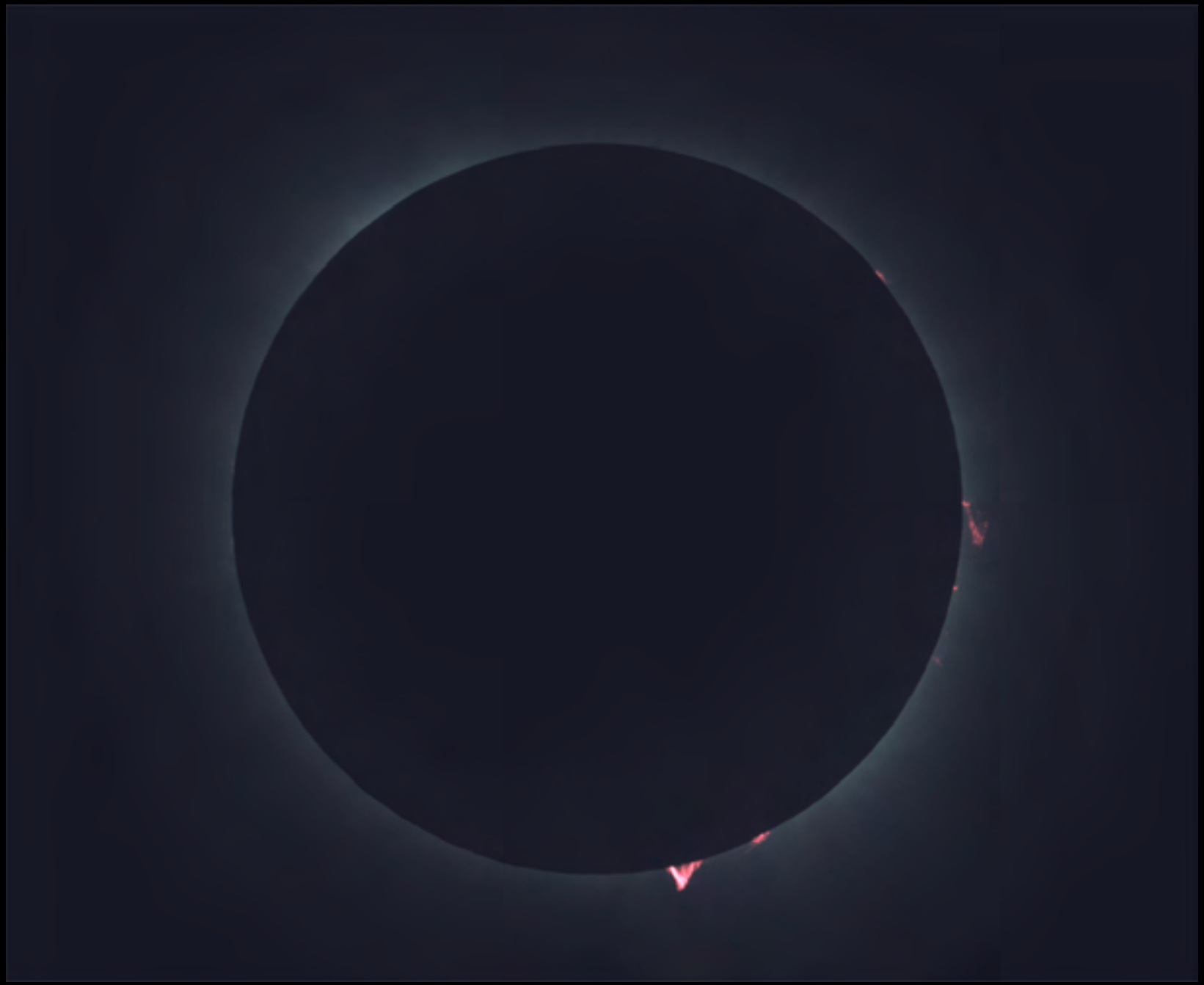
Time Lapse – 2024











Time Lapse – 2017


1/2000 sec
ISO=200


1/4000 sec
ISO=100

1/4000 sec ISO=100


1/125 sec
ISO=100

1/2000 sec ISO=100

1/4000 sec ISO=200

1/1000 sec ISO=200

1/1000 sec ISO=200


1/250 sec
ISO=200


1/250 sec
ISO=200


1/60 sec
ISO=200


1/15 sec
ISO=200


1/8 sec
ISO=200


1/30 sec
ISO=200


1/30 sec
ISO=200


1/125 sec
ISO=200


1/125 sec
ISO=200


1/500 sec
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1/500 sec
ISO=200


1/2000 sec
ISO=200

1/2000 sec ISO=200

1/4000 sec ISO=200


1/4000 sec
ISO=200


1/125 sec
ISO=100

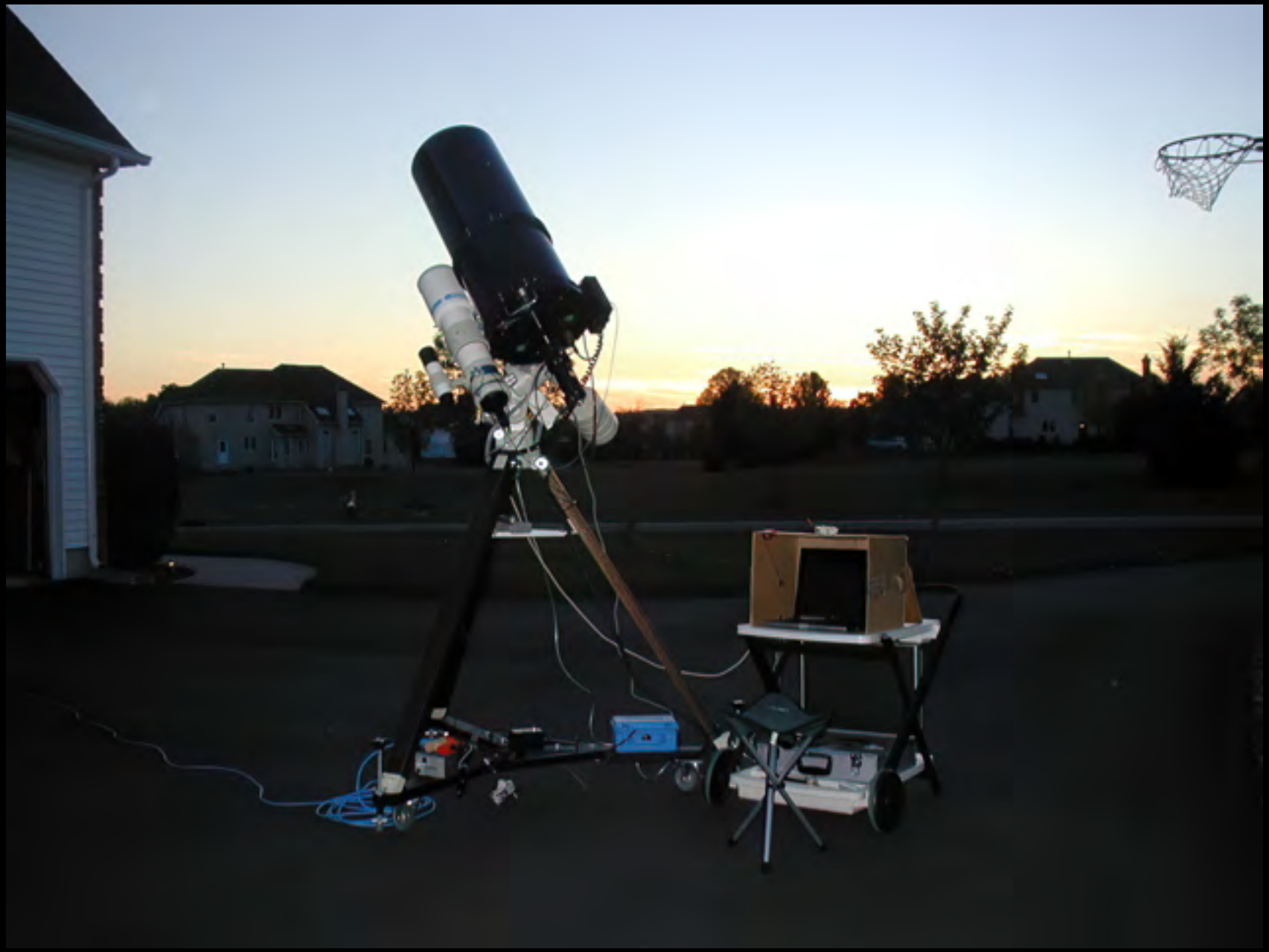

1/4000 sec
ISO=100


1/4000 sec
ISO=100


1/2000 sec
ISO=200

Astrophotography from Home in NJ.

Ready To Go...



Jupiter

M1 – Crab Nebula

M13 – Great Globular Cluster in Hercules

M16 – The Eagle Nebula (aka Pillars of Creation)

M27 – Dumbbell Nebula

M31 – The Andromeda Galaxy

M42 – Great Orion Nebula

M45 – Pleiades (aka Subaru)

Western Veil Nebula

Eastern Veil Nebula

Veil Nebula

IC434 – The Horsehead Nebula

Bubble Nebula

Helix Nebula

Elephant Trunk

Running Man Nebula

Rosette Nebula

Pelican Nebula

Questions?

A Little About Me

- Born/Raised: Grand Rapids, MI
- Undergrad: Chemistry, 1976, Rensselaer Polytechnic Institute (RPI)
- Grad: Applied Math, 1981, Cornell
- Postdocs:
  - NSF Fellow, Math, NYU
  - Visiting Lecturer, Math, Univ. of Illinois Urbana/Champaign
- Industry:
  - AT&T Bell Labs, Math Research Center
- Academia: Princeton, 1990-present
- Hobbies/Passions:
  - Soaring
  - Tennis
  - Astronomy
  - Photography
  - Math/Computation
  - Local Warming, Purple America, etc.

M1 – Crab Nebula

- *What:* Supernova remnant
- *When:* Oct. 27, 2006
- *Where:* Driveway
- *Telescope:* 10" Ritchey-Chretien
- *Camera:* Starlight Xpress SXV-H9
- *Exposure:* Luminance=60min, Hα=140min, O-III=20min
- *Sub-Exposures:* 20-minutes, guided

- *Distance:* 6500 ± 1600 lightyears
- *Diameter:* 11 lightyears

M13 – Great Globular Cluster in Hercules

- *What:* Gravitationally bound cluster of stars
- *When:* Oct. 27, 2006
- *Where:* Driveway
- *Telescope:* 10" Ritchey-Chretien
- *Camera:* Starlight Xpress Trius SX-694
- *Exposure:* Luminance=6min, Red=8min, Green=6min, Blue=6min
- *Sub-Exposures:* 20-second, unguided

- *Distance:* 22,000 lightyears
- *Diameter:* 168 lightyears

M16 – The Eagle Nebula (aka Pillars of Creation)

- *What:* Young star cluster and diffuse emission nebula
- *When:* June 26 2005, July 17 2006, July 8 2007
- *Where:* Driveway
- *Telescope:* 10" Ritchey-Chretien
- *Camera:* Starlight Xpress SXV-H9
- *Exposure:* Hα=266min, O-III=66min
- *Sub-Exposures:* 4-minute, 6-minute, 10-minute, guided

- *Distance:* $5,700 \pm 400$ lightyears
- *Pillar Height:* 9.5 lightyears

M27 – Dumbbell Nebula

- *What:* Planetary nebula
- *When:* Aug. 6, 2016
- *Where:* Driveway
- *Telescope:* 10" Ritchey-Chretien
- *Camera:* Starlight Xpress Trius SX-694
- *Exposure:* Hα=90min, O-III=80min
- *Sub-Exposures:* 10-minute, guided

- *Distance:* 1360 ± 200 lightyears
- *Diameter:* 1.4 lightyears

M31 – The Andromeda Galaxy

- *What:* Nearby galaxy
- *When:* Oct. 26, 2008
- *Where:* Driveway
- *Telescope:* 4" Takahashi FSQ refractor
- *Camera:* Starlight Xpress SXV-H9
- *Exposure:* Luminance=80min, Red=40min, Green=40min, Blue=40min
- *Sub-Exposures:* 2-minute, unguided

- *Distance:* $2,500,000$ lightyears
- *Diameter:* $220,000$ lightyears

M42 – Great Orion Nebula

- *What:* Young star cluster and diffuse emission nebula
- *When:* Nov. 25, 2006
- *Where:* Driveway
- *Telescope:* 10" Ritchey-Chretien
- *Camera:* Starlight Xpress SXV-H9
- *Exposure:* Hα=32min, O-III=35min
- *Sub-Exposures:* 1-minute, guided

- *Distance:* $1,344 \pm 20$ lightyears
- *Diameter:* 24 lightyears

M45 – Pleiades (aka Subaru)

- *What:* Open star cluster
- *When:* Jan. 3, 2008
- *Where:* Driveway
- *Telescope:* 4" Takahashi FSQ refractor
- *Camera:* Starlight Xpress SXV-H9
- *Exposure:* Red=16min, Green=20min, Blue=122min
- *Sub-Exposures:* 2-minute, unguided

- *Distance:* 444 lightyears

Veil Nebula

- *What:* Supernova remnant
- *When:* July 25 2008, July 24 2008
- *Where:* Driveway
- *Telescope:* 4" Takahashi FSQ refractor
- *Camera:* Starlight Xpress SXV-H9
- *Exposure:* Hα=60min, O-III=60min. *Exposure:* Hα=52min, O-III=24min
- *Sub-Exposures:* 2-minute, 4-minute, unguided

- *Distance:* 1470 lightyears
- *Diameter:* 70 lightyears

Bubble Nebula

- *What:* Emission nebula w/ stellar wind
- *When:* Oct. 21 2006, Sept. 7 2016
- *Where:* Driveway
- *Telescope:* 10" Ritchey-Chretien
- *Camera:* Starlight Xpress SXV-H9 and Trius SX-694
- *Exposure:* Hα=350min, O-III=230min
- *Sub-Exposures:* 10-minute, 20-minute, guided

- *Distance:* $9,100 \pm 2000$ lightyears
- *Diameter:* 8 ± 2 lightyears

Helix Nebula

- *What:* Planetary nebula
- *When:* Oct. 2, 2008
- *Where:* Driveway
- *Telescope:* 4" Takahashi FSQ
- *Camera:* Starlight Xpress SXV-H9
- *Exposure:* Hα=86min, O-III=54min
- *Sub-Exposures:* 2-minute, guided

- *Distance:* 714 ± 70 lightyears
- *Diameter:* 5.7 lightyears

Elephant Trunk

- *What:* Star birth area in interstellar medium
- *When:* Aug. 29, 2016
- *Where:* Driveway
- *Telescope:* 10" Ritchey-Chretien
- *Camera:* Starlight Xpress Trius SX-694
- *Exposure:* Hα=156min
- *Sub-Exposures:* 6-minute, guided

- *Distance:* 22,000 lightyears
- *Diameter:* 168 lightyears

IC434 – The Horsehead Nebula

- *What:* Dark nebula (dust cloud)
- *When:* Feb. 5, 2024
- *Where:* Driveway
- *Telescope:* 10" Ritchey-Chretien
- *Camera:* ZWO ASI2400MC-Pro
- *Exposure:* L-Extreme = 102 minutes
- *Sub-Exposures:* 30-seconds, unguided

- *Distance:* $1,400$ lightyears

Running Man Nebula

- *What:* Bright reflection nebula
- *When:* Jan. 28, 2008
- *Where:* Driveway
- *Telescope:* 4" Takahashi FSQ refractor
- *Camera:* Starlight Xpress SXV-H9
- *Exposure:* Red=24min, Blue=100min
- *Sub-Exposures:* 2-minute, unguided

- *Distance:* 1,500 lightyears
- *Diameter:* 15 lightyears