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IC 1396 BY STEPHEN GARRETSON

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Next LAS Meeting Thursday October 16 at 7 pm

“Lucy: The First Mission to the Trojan Asteroids” by Dr. John Spencer, SWR

Summary

The Trojan asteroids share Jupiter’s orbit in two vast swarms, one ahead of Jupiter and one behind. They are nearly as numerous as the main-belt asteroids between Mars and Jupiter, but appear to be different in composition, having formed further from the sun. They have yet to be explored by spacecraft, but NASA’s Lucy mission is about to change that. Launched in 2021, Lucy will fly by five Trojan asteroids and their moons between 2027 and 2033, returning high-resolution images and compositional data. The talk will provide a preview of what the mission will accomplish, and describe results from Lucy’s “practice” flybys of the main belt asteroids Dinkinesh and Donaldjohnson, in November 2023 and April 2025.

Bio

John Spencer is an Institute Scientist at the Southwest Research Institute in Boulder, and is the Deputy Project Scientist on the Lucy Mission. He specializes in studies of small bodies in the outer solar system using ground-based telescopes, the Hubble Space Telescope, and interplanetary spacecraft. He is also a member of the science team on the Europa Clipper mission, and has worked on the science teams for the Galileo, Cassini, and New Horizons missions. His work has included the first observations and composition measurements of Io’s volcanic plumes with Hubble, discovery that Io’s atmosphere is asymmetrical and varies seasonally, and co-discovery of cryovolcanic activity on Saturn’s moon Enceladus.

Location

The meeting will be at 7pm in the First Evangelical Lutheran Church, 803 Third Avenue, Longmont, CO 80501.

About LAS

The Longmont Astronomical Society Newsletter ISSN 2641-8886 (web) and ISSN 2641-8908 (print) is published monthly by the Longmont Astronomical Society, P. O. Box 806, Longmont, Colorado. Newsletter Editor is Vern Raben. Our website URL is <https://www.longmontastro.org> and the webmaster is Mike Hotka. The Longmont Astronomical Society is a 501 c(3), non-profit corporation which was established in 1987.



The Longmont Astronomical Society is affiliated with the Astronomical League (<https://www.astroleague.org>). The Astronomical League is an umbrella organization of amateur astronomy societies in the United States.



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LAS Officers

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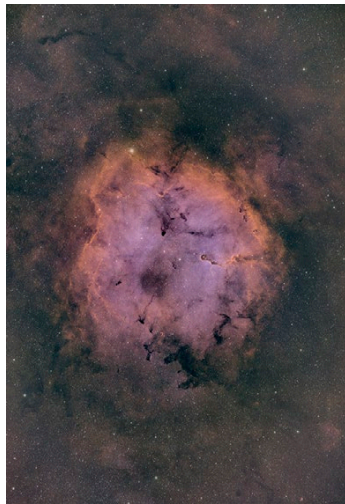
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Webmaster: Mike Hotka
 Library Telescope Coord: Bruce Lamoreaux
 Pubic Outreach Coord.: Aref Nammari
 Newsletter: Vern Raben and Eileen Hall-McKim

Front Cover: IC 1396 by Stephen Garretson

A couple years ago I posted the HOO version, as well as a deep dive in Ha of the Elephant Trunk, but never collected SII. Now that I have settled on a formula/process for a modified HOS, I wanted to go back to some images and add SII. I collected 2 hours of SII last night and worked with the previous master Ha and OIII images to create this rendition. Still want to work on the OIII colorization, but this is where I am at present. Looking at the number of subs it's



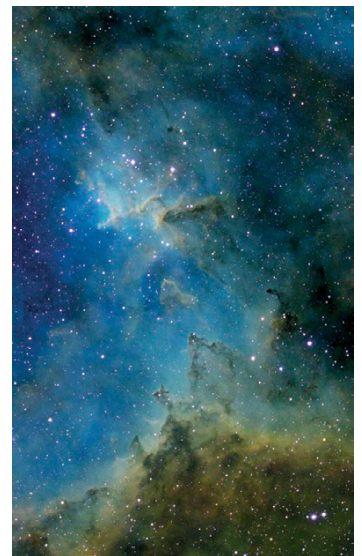
obvious I underrepresented the SII data; I could go back for more and see how it impacts the final image.



[97] 600s guided Ha subs; [60] 300 guided OIII subs;
[12] guided 600 SII subs
total integration: 21 hours, 30 minutes

Ha and OIII data collected summer 2023; dual Borg 55FL/ASI 2600MM/Chroma 3nm filters.
SII data collected summer 2025, triple Borg 55FL/ASI 2600MM/Chroma 3nm filters

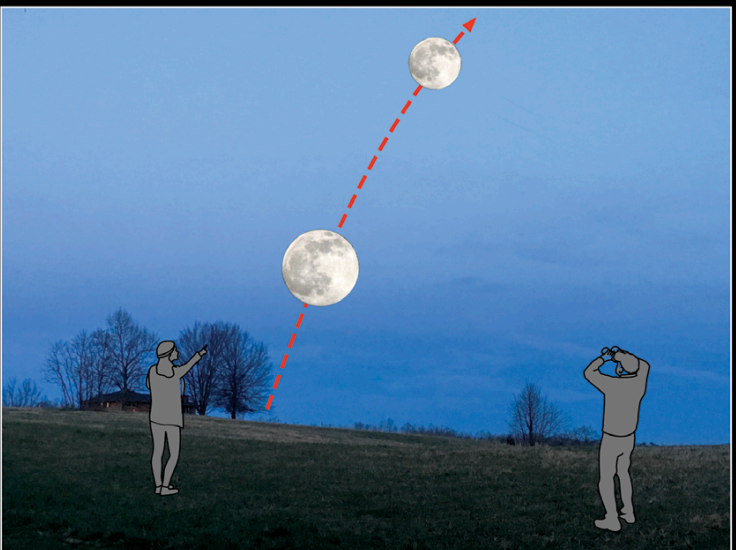
Back Cover: Sh 2-190 by Tally O'Donnell

This image is the center of Sh2-190 aka The Heart Nebula in SHO from New Mexico. This is constructed from one hour each of Ha, OIII, and SII.





Big Moon Rising: Is it real?



When the full moon rises, it seems to be unusually large. Later, when it has climbed higher in the sky, it returns to its expected apparent size. Why is this the case?

A. When the moon is close to the horizon, its apparent size can be compared to those of distant landscape objects. So, it seems larger than it is.
B. When it is near the horizon, it is closer to us than when it is overhead. So, it appears bigger.
C. It is an unconscious psychological effect. The same effect occurs over a featureless sea.

Look at the moon through a drinking straw when it is rising, and later, when it has climbed a good distance above the horizon. Does the apparent size of the moon through the straw appear to change?

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Planets in October

Mercury

Mercury is not visible

Venus

Venus is visible low in the East before sunrise. It is magnitude -3.9 in brightness and the disk is around 11 arc sec across

Mars

Mars is not visible

Jupiter

Jupiter is visible in the eastern morning sky in constellation Gemini. It is nearly straight before dawn so good time to image. The disk increases from 37 to 41 arc sec across this month and it is around -2.4 magnitude in brightness. The following are good GRS transit times this month:.

Date	Time	Altitude	Date	Time	Altitude
Oct 2	3:39 am	35°	Oct 19	2:44 am	36°
Oct 4	5:18 am	55°	Oct 21	4:22 am	56°
Oct 7	2:48 am	29°	Oct 23	6:01 am	71°
Oct 9	4:27 am	49°	Oct 24	1:52 am	29°
Oct 11	6:05 am	67°	Oct 26	3:30 am	50°
Oct 12	1:57 am	22°	Oct 28	5:09 am	67°
Oct 14	3:35 am	42°	Oct 29	1:00 am	23°
Oct 16	5:14 am	62°	Oct 30	6:47 am	71°
Oct 18	6:52 am	73°	Oct 31	2:39 am	43°

Saturn

Best time to view Saturn is around midnight; it is in constellation Aquarius. It is magnitude +0.7 in brightness and its disk is 19 arc sec across.

Uranus

Uranus may be seen in the morning sky in constellation Taurus. It is 5.6 magnitude in brightness and the disk is 3.7 arc sec across.

Neptune

Neptune is in constellation Pisces; it is magnitude +7.8 in brightness and the disk is 2.3 arc sec across.

Lunar Phases in October

- Full Moon is October 6 at 9:49 pm
- Third Quarter is October 13 at 12:14 pm
- New Moon is on October 21 at 6:12 am
- First Quarter is on October 29 at 10:22 am

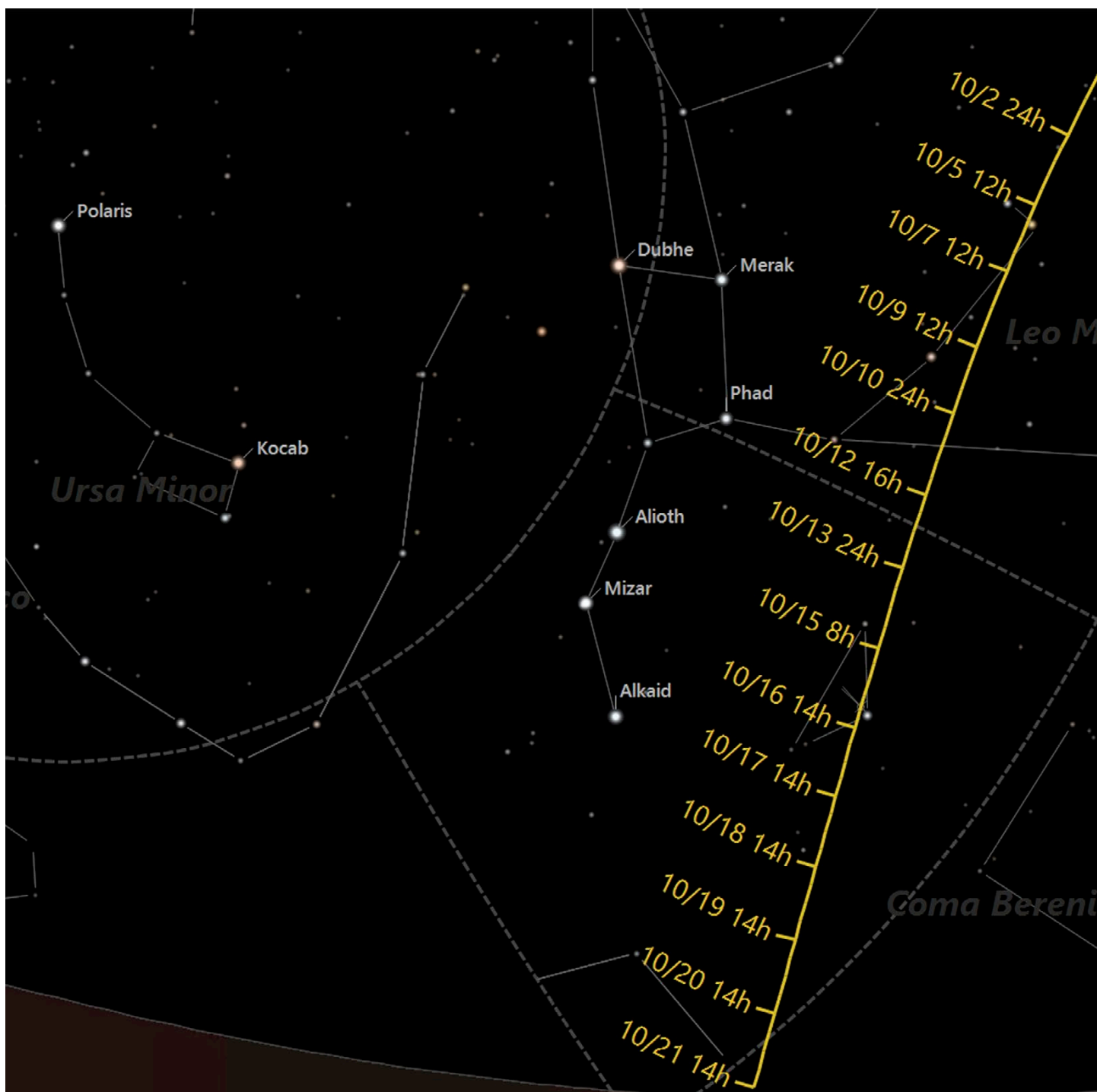
Meteor Showers in October

The Orionids meteor shower is on the night of Oct 20/21. The Orionids are caused by debris from comet Halley. Near new moon so get to dark location. Expect to see 10 to 20 per hour.

Early evening objects for October

Catalogue	Name	Constellation	Mag
NGC 7293	Helix Nebula	Aquarius	6.3
NGC 6543	Cat's Eye Nebula	Draco	8.3
NGC 6572	Blue Racquetball Nebula	Ophiuchus	8.0
NGC 6826	Blinking Planetary Nebula	Cygnus	8.8
NGC 6888	Crescent Nebula	Cygnus	10.0
NGC 6960	Veil Nebula West	Cygnus	7.0
NGC 6992	Veil Nebula East	Cygnus	7.0
vdB 139	Iris Nebula	Cepheus	
IC 5070	Pelican Nebula	Cygnus	8.0
NGC 7331	Spiral galaxy	Pegasus	10.2
NGC 4946	Spiral Galaxy	Cygnus	9.8
M57	Ring Nebula	Lyra	9.4
M27	Dumbbell Nebula	Vulpecula	7.3
NGC 765	Galaxy pair	Aquila	12.0
NGC 281	PacMan Nebula	Cassiopeia	7.5
NGC 7000	North America Nebula	Cygnus	4.0
NGC 7635	Bubble Nebula	Cassiopeia	11.0
IC 1396	Elephant Trunk Nebula	Cepheus	
NGC 7027	Planetary Nebula	Cygnus	9.6
NGC 7331	Spiral Galaxy	Pegasus	10.2

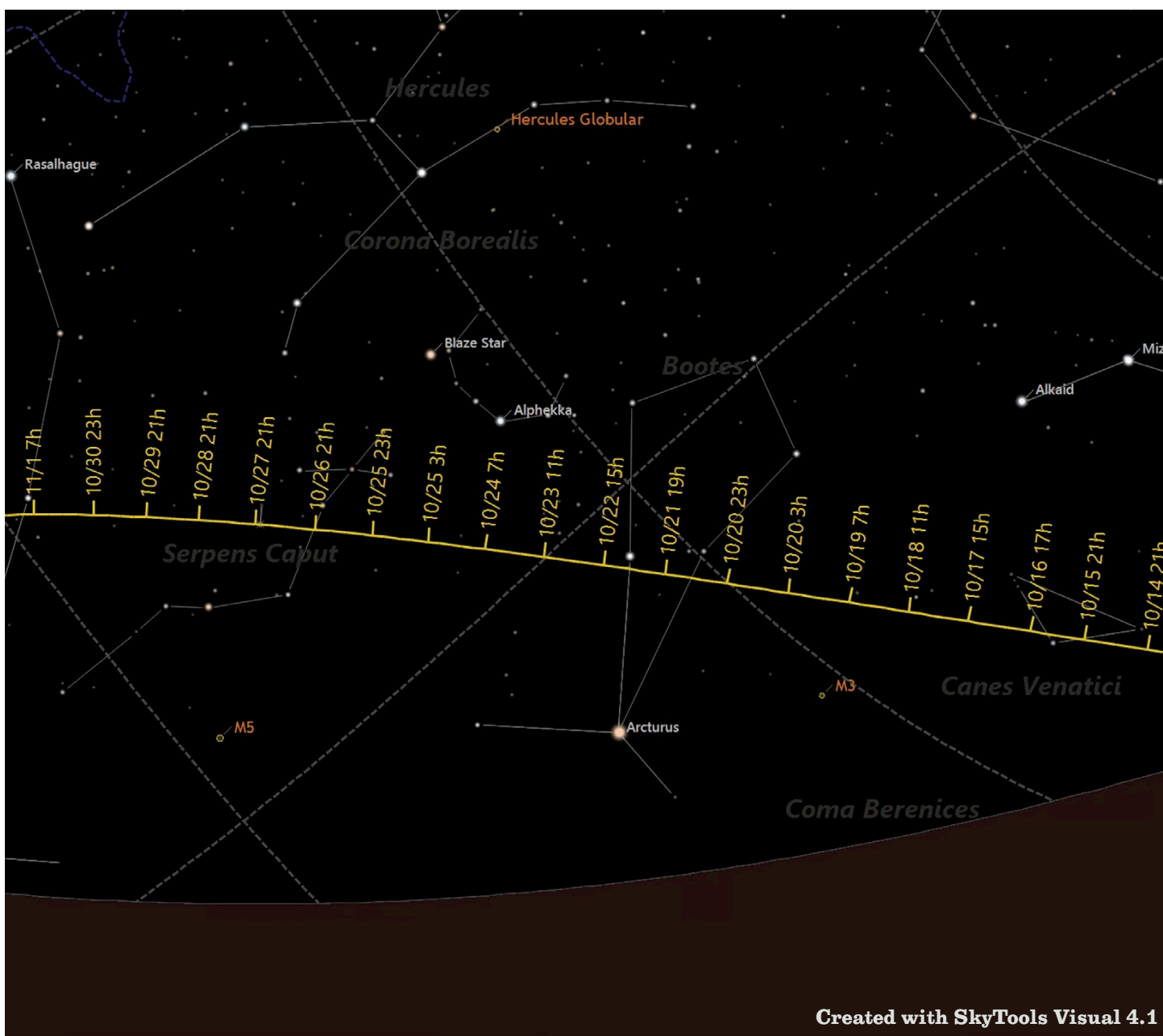
Comet C/2025 A6 (Lemmon) in October (early morning)



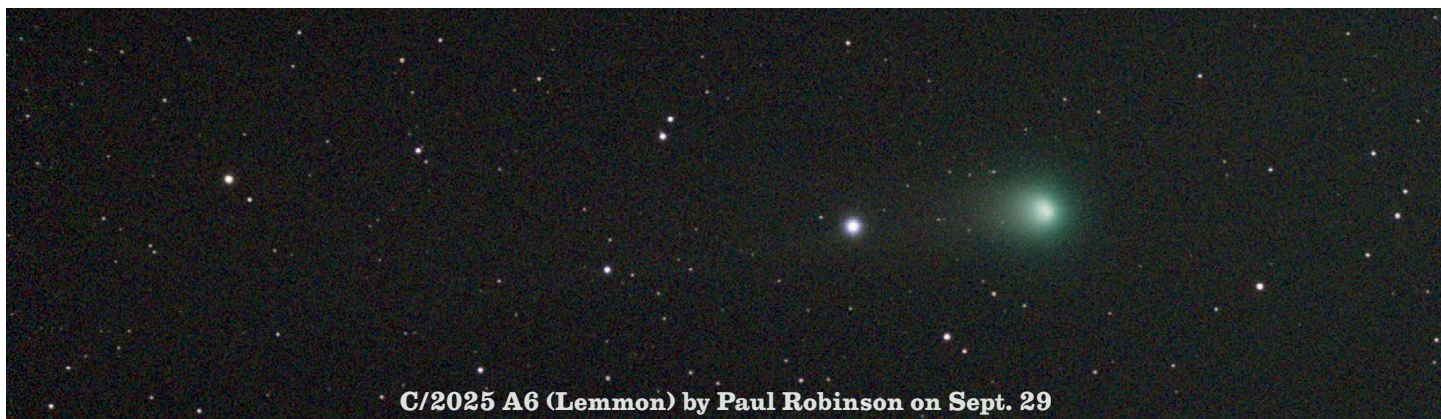
Created with SkyTools Visual 4.1

Date	Optimal time	RA	Dec	Constellation	Magnitude	Size (arc min)
Oct 1	4:39 am	09h49m10.1s	+40°17'36"	Leo Minor	6.0	8.3
Oct 8	5:42 am	11h00m28.9s	+42°13'06"	Ursa Major	4.5	10.6
Oct 15	5:56 am	12h55m59.2s	+38°45'26"	Canes Venatici	2.9	13.1
Oct 22	7:23 pm	14h51m46.0s	+25°03'52"	Bootes	1.8	13.7
Oct 31	7:09 pm	16h25m09.6s	+02°37'52"	Ophiuchus	1.2	10.6

Comet C/2025 A6 (Lemmon) in October (early evening)



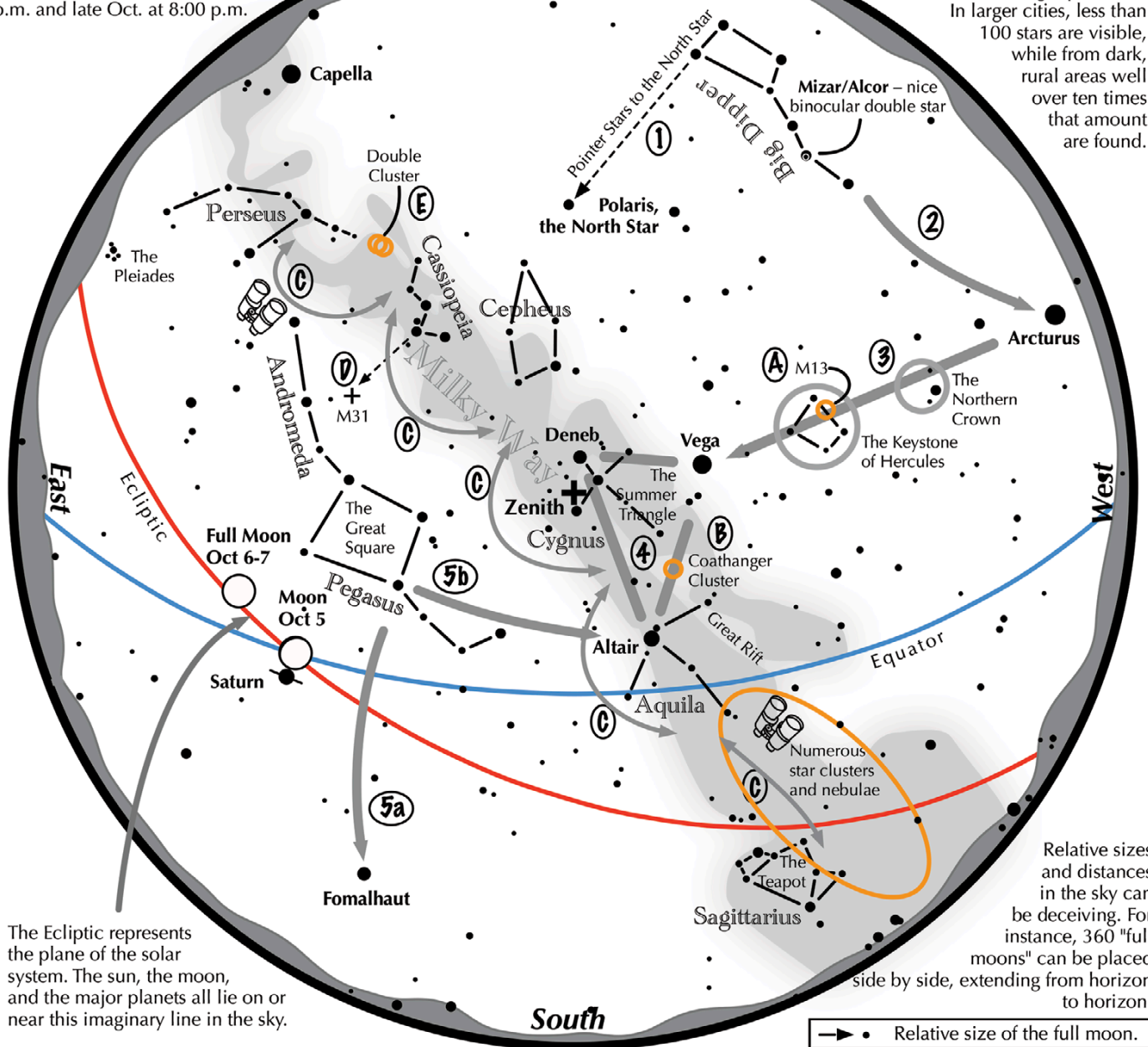
Comet C/2025 A6 was discovered by the Mount Lemmon Survey on January 3, 2025. It is now a naked eye object and should be somewhere around magnitude 3 by mid month. About mid month it should be visible in both the early morning and evening sky.



Navigating the October Night Sky

For observers in the middle northern latitudes, this chart is suitable for early Oct. at 9:00 p.m. and late Oct. at 8:00 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

Navigating the October night sky: Simply start with what you know or with what you can easily find.

- 1 Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
- 2 Follow the arc of the Dipper's handle. It intersects Arcturus, the brightest star in the early October evening sky.
- 3 To the northeast of Arcturus shines another star of the same brightness, Vega. Draw a line from Arcturus to Vega. It first meets "The Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
- 4 Nearly overhead lie the summer triangle stars of Vega, Altair, and Deneb.
- 5 High in the east are the four moderately bright stars of the Great Square. Its two southern stars point west to Altair. Its two western stars point south to Fomalhaut.

Binocular Highlights

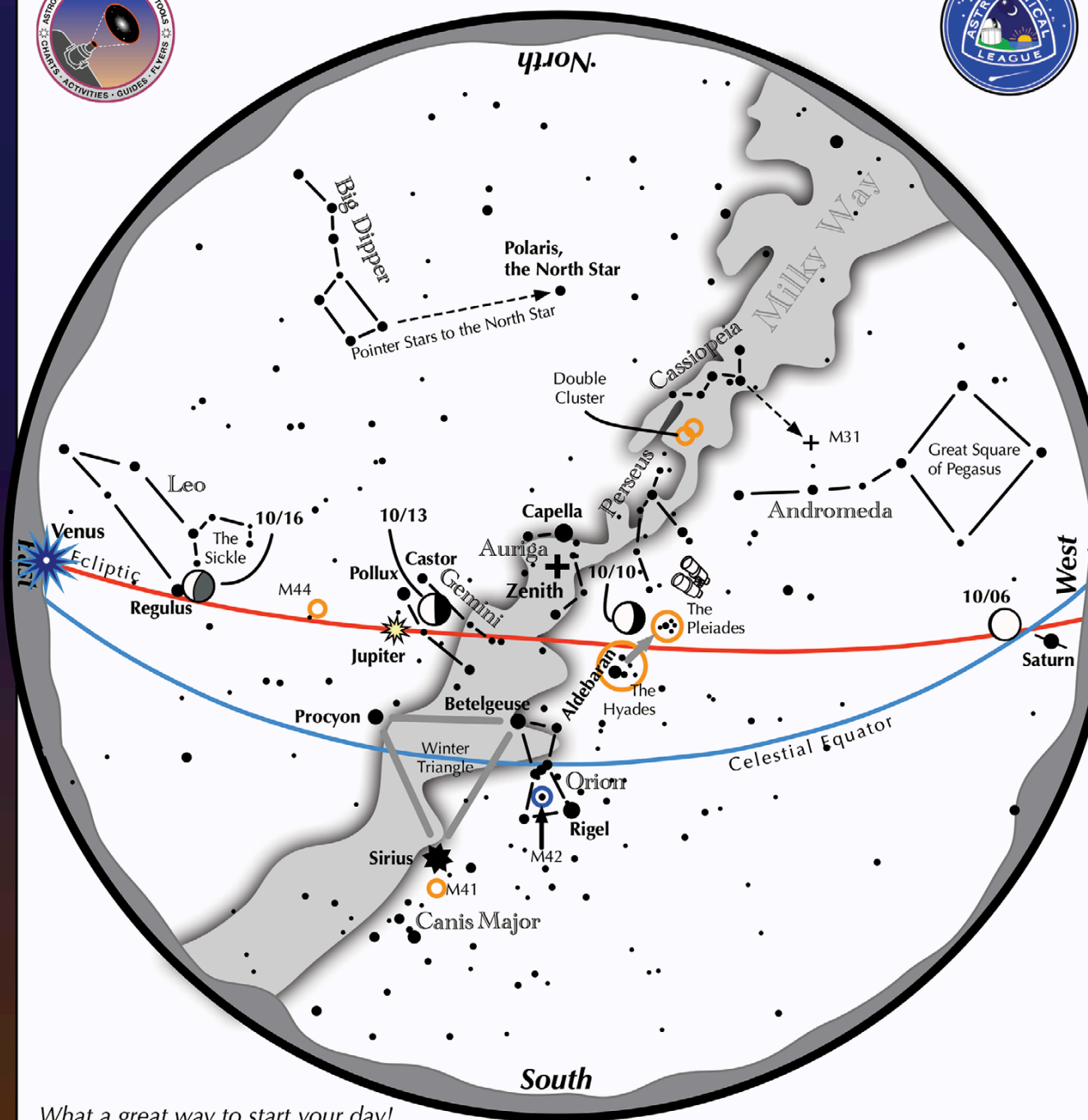
A: On the western side of the Keystone glows the Great Hercules Cluster, a ball of 500,000 stars. **B:** 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger. **C:** Sweep along the Milky Way for an astounding number of fuzzy star clusters and nebulae amid many faint glows and dark bays, including the Great Rift. **D:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **E:** Between the "W" of Cassiopeia and Perseus lies the Double Cluster.

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Navigating the mid October Morning Sky



What a great way to start your day!

For observers in the middle northern latitudes, this chart is suitable for mid October at 5:00 a.m.

Late sunrises in October provide opportunities for early morning skywatching.

- Bright Jupiter shines nearly overhead.
- Venus climbs above the eastern horizon 60 minutes before sunrise.
- The third quarter moon glows next to bright Jupiter on October 13.
- The waning crescent moon glows next to Regulus on October 16.
- During the first half of October, gaze high in the south and overhead to see these many celestial features: the Pleiades, the Hyades with Aldebaran, Jupiter, Orion, Capella and Auriga, the Winter Triangle with Sirius and Procyon, and Gemini.

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2509

LAS Meeting Notes for September 18th by Eileen Hall-McKim

I. Introduction

The September LAS monthly meeting was held in-person and by zoom on September 18st at the Longmont Evangelical Lutheran Church, 803 Third Ave. President, Vern Raben began the meeting with self-introductions of those attending in person and on-line. Twenty-three attended in person, 11 attended on-line.

II. Main Presentation

Our guest speaker for the evening is Dr. Fran Bagenal. Fran is a research scientist and professor emerita at the University of Colorado, Boulder and is co-investigator on NASA's New Horizons mission to Pluto and the Juno mission to Jupiter. Her main area of expertise is the study of charged particles trapped in planetary magnetic fields and the interaction of plasmas with the atmospheres of planetary objects, particularly in the outer solar system.

Born and raised in the UK, Fran received her bachelor degree from the University of Lancaster, England, and her doctorate degree in Earth and Planetary Sciences from MIT (Cambridge, Mass) in 1981. She has participated in several of NASA's planetary exploration missions, including Voyager 1 and 2, Galileo, Cassini, New Horizons and Juno.

https://lasp.colorado.edu/home/mop/home/people/fran_bagenal/
https://www.imdb.com/name/nm3293128/bio?ref=nm_ov_bio_sm

“The Voyagers: Half a Century of Exploration” By Dr. Fran Bagenal, LASP Univ. of Colorado

NASA's Voyager 1 and 2 spacecraft were launched in 1977 and flew past Jupiter, Saturn, Uranus and Neptune. Nearly half a century later, they are now about 5 times farther than Pluto from the Sun and are in the interstellar medium, having left the sphere of influence of the Sun – the Heliosphere. The Voyager mission opened our eyes to many different new worlds. This talk will present the glories of Voyager and discuss current and future exploration of the outer solar system

<https://libertypuzzles.com/products/juno-at-jupiter>

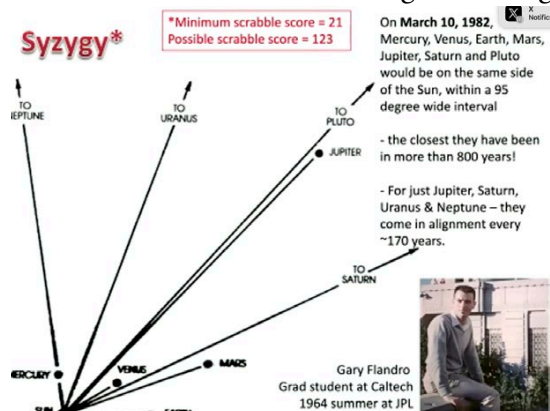
PLANET PUZZLES

Liberty Puzzles

Wood pieces
Cool shapes
Fun!

You need to go to this website:
<https://libertypuzzles.com/products/juno-at-jupiter>

- Wooden puzzles made in Boulder
- Got a cool image to make into a puzzle?
- Started out doing planets, now want to expand to Sun, Nebulae, Galaxies?
- Needs to be puzzleable! Can be either round or square
- Let Fran know – she is looking for more good images



to make more puzzles

- You need the following link - is not searchable...
<https://libertypuzzles.com/products/juno-at-jupiter>

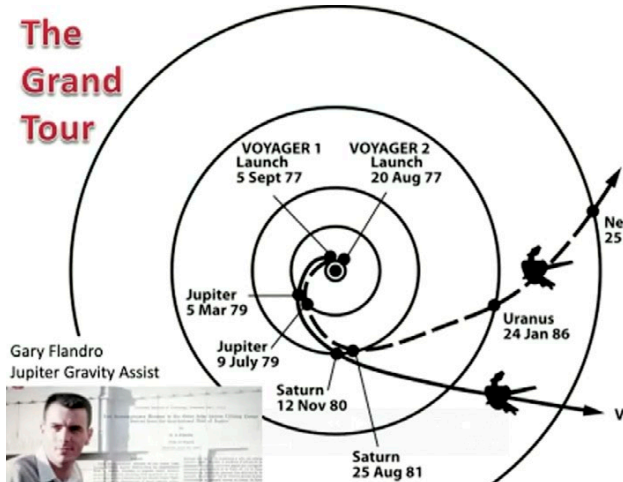
Syzygy

- When Gary Flandro Caltech grad student spent summer at JPL he started thinking about how to use this opportunity called syzygy where the planets are in one quadrant
- On March 10, 1982, Mercury, Venus, Earth, Mars,

Jupiter, Saturn and Pluto would be on the same side of the Sun, within a 95° wide interval

- This only happens for all of them about every 800 years!
- For just Jupiter, Saturn, Uranus & Neptune – they come in alignment every ~170 years and this was going to come up in the 1980's

The Grand Tour



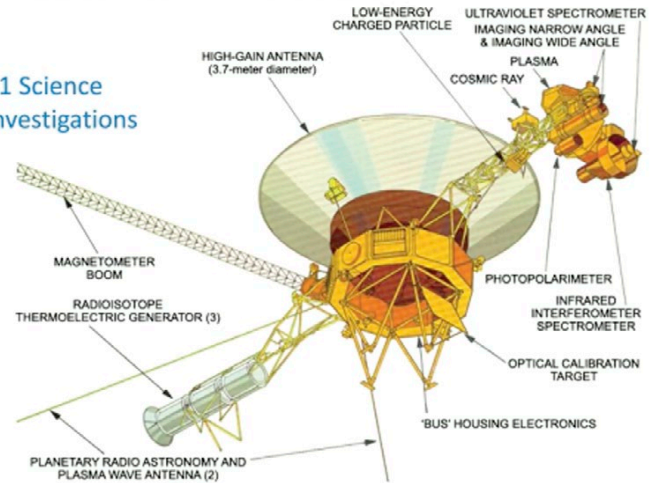
- Gary Flandro thought about using this alignment to get out to the outer solar system by gravity assist at Jupiter to get quicker to Saturn and then gravity assist at Saturn to get to Uranus and Neptune
- Idea was born of the Grand Tour of the Solar System to go to the outer solar system



1972 – Start of Mariner Jupiter Saturn mission

- Nixon thought too expensive to do all the planets – would do just the two Jupiter and Saturn, but the engineers designed the spacecraft to go further

11 Science Investigations



11 Science Investigations onboard the Voyager spacecraft

The Golden Record



The Golden Record – Carl Sagan's Idea

- Greetings in 55 languages, 115 images, natural sounds, music to try to capture across the globe the various cultures on a record and if some future civilization should find they could understand where it came from and what was happening on Earth

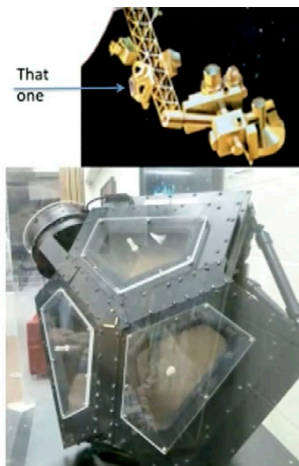


Class of 1976, Physics, University of Lancaster, UK blue arrow points to Fran



Fran arrives at MIT in 1976 - interesting year for a Brit to arrive at 200th anniversary, especially being in Lexington where the big celebration was on for kicking out the Brits 200 yrs ago!

Voyager Plasma Science (PLS) PI Herb Bridge, MIT



Jim Sullivan & Herb Bridge, MIT

- Fran was extremely lucky to meet up there with the team that was running the Voyager Plasma Science Instrument – as a grad student Fran had worked in space physics, timing was perfect and she started working on this instrument



1977

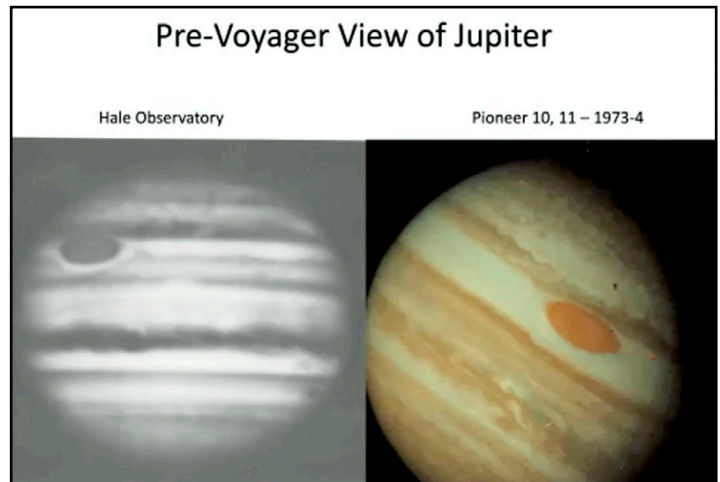
Voyager 2 launched Aug 20

Voyager 1 launched Sept 5

Both from Cape Canaveral, Florida aboard Titan-Centaur rockets



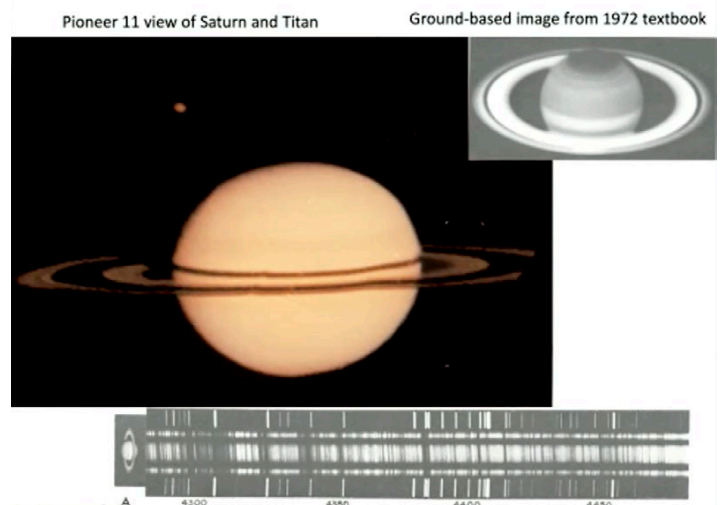
1977 - Two spacecraft launched; Voyager 2 launched Aug 20, Voyage 1 launched Sept 5. Both from Cape Canaveral, Florida aboard Titan-Centaur rockets



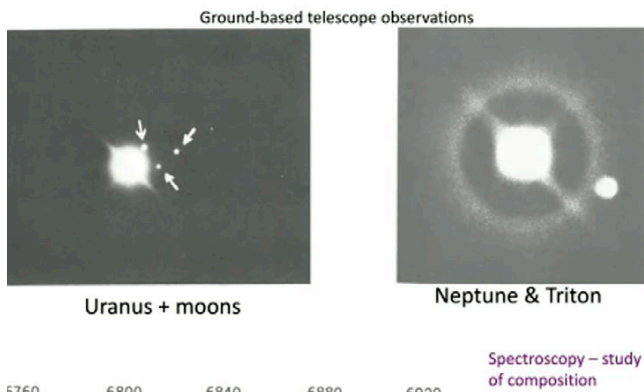
Pre-Voyager Views of Jupiter

What did we know about these planets before we sent the spacecraft? Not a whole lot...

- Pioneer 10, 11 – 1973-74 main goal was to get through the asteroid belt, did not know how dense the asteroid belt, thought may be very dense found it very spread out
- Knew Jupiter had very strong radiation belts from using radio emission, so worried about traveling through but the spacecraft survived and got through



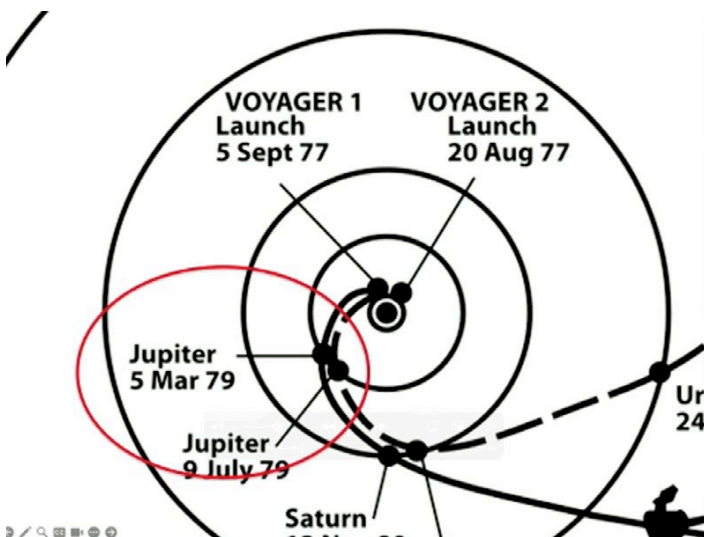
- Pioneer 11 – Very limited view of Saturn and Titan
- Ground-based image from 1972 textbook



Uranus & moons; Neptune & Triton

- Very poor quality back then
- Spectroscopy – study of composition

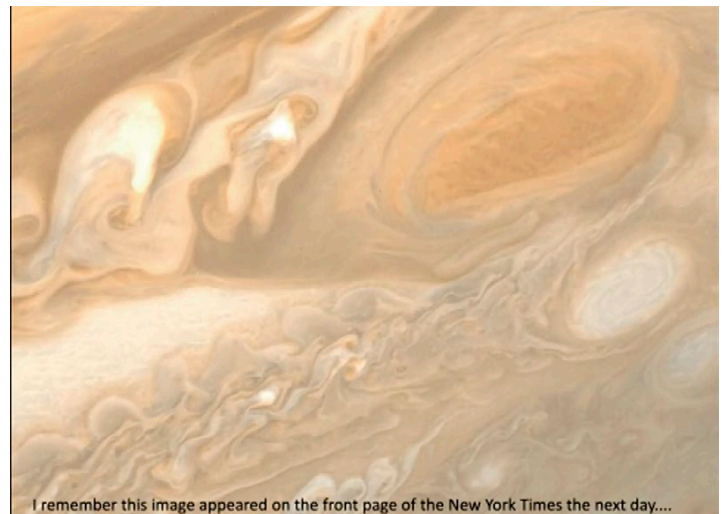
Methane absorption line in reflected sunlight



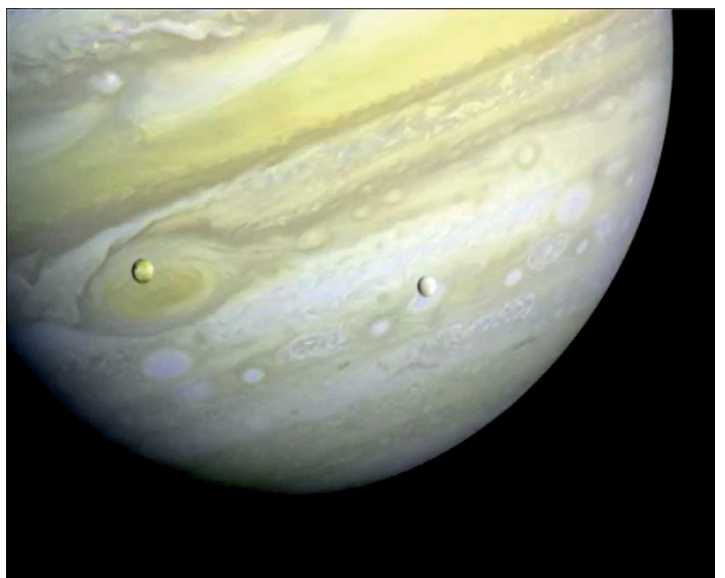
First came the arrival at Jupiter about 2.5 years after launch



Approach movie – very impressive view of belts and zones, Great Red Spot, moons



Quality was fantastic – can see how large the Great Red Spot was then, about double the size it is now



Fantastic view with moons Io and Europa



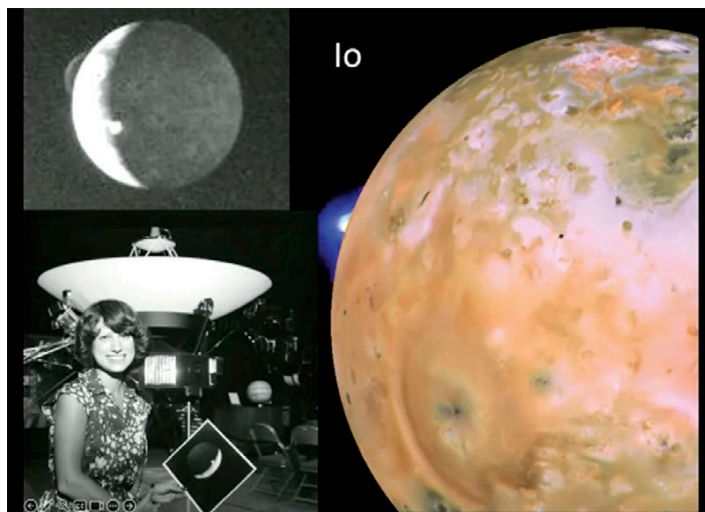
Except it was in black & white

Next day appeared on front of New York Times!



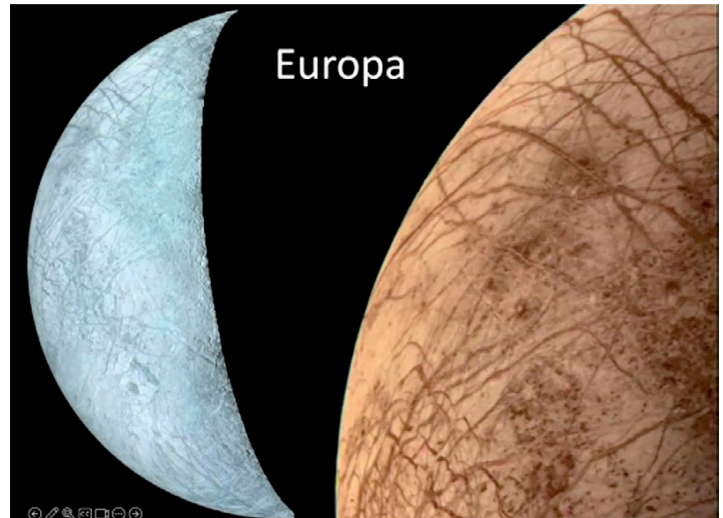
Four Moons of Jupiter – Io, Europa, Ganymede, Callisto

- Europa and Io about the size of our Moon
- Ganymede is the largest Moon in our solar system, Callisto a little smaller
- This was our first good picture of the 4 Galileo moons



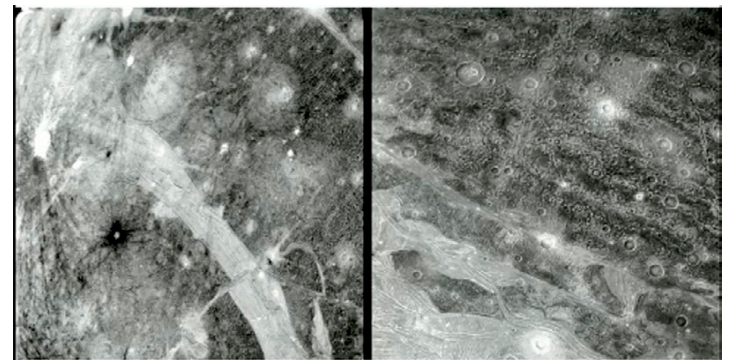
Big excitement over Io

- Linda Marbeto, the navigator saw blip on the side thought might be a feature on moon
- Realized these were volcanoes that were erupting
- Science article written 2 months earlier suspecting volcanoes would be found, but science team was not really thinking about what had been published



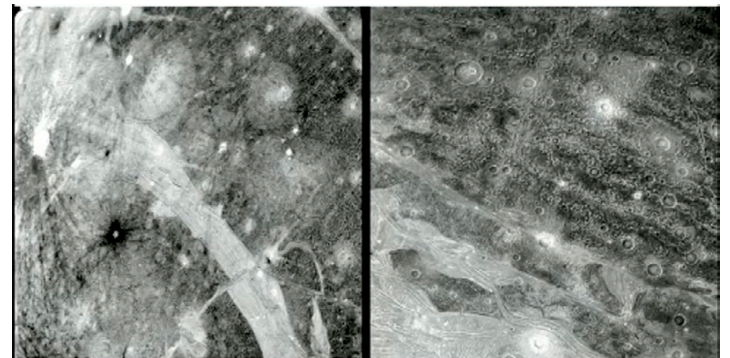
Europa

- We found many large cracks, ice, brown stuff, not many impact craters – that told us the surface was very young as was the surface of Io
- Was there ocean underneath? At this point we did not know what was under the ice surface layer



Ganymede

- Also covered in cracks but also a few impact craters told us older surface, less geologically active, areas of accumulated dust, fresh ice moving off the cracks



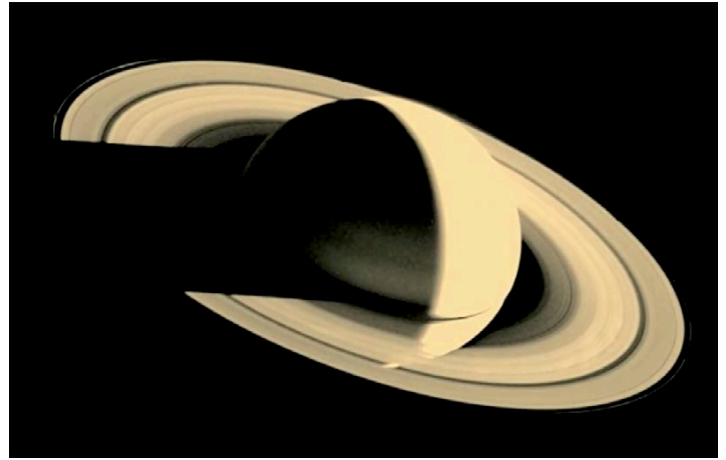
Callisto

- More like our moon, mostly impact craters, old, not very geologically active



Images came down as TV

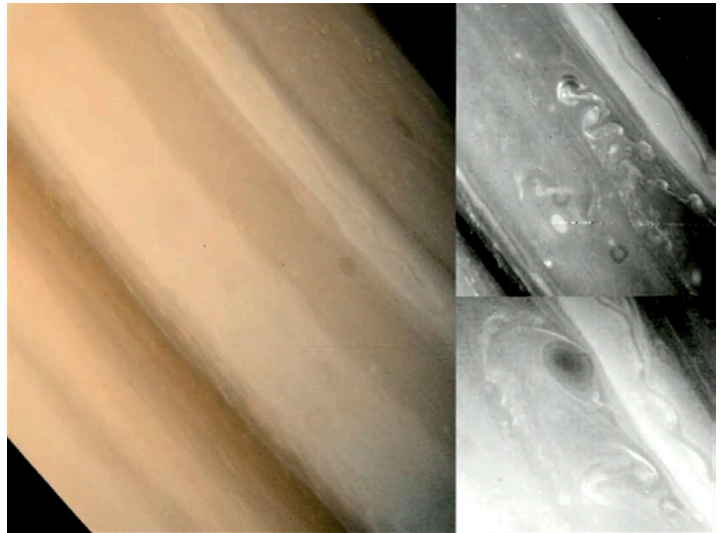
Most of the data were plotted on inkjet printers or pen plotters



Images projected on TV; most of the data were plotted on inkjet printers or pen plotters



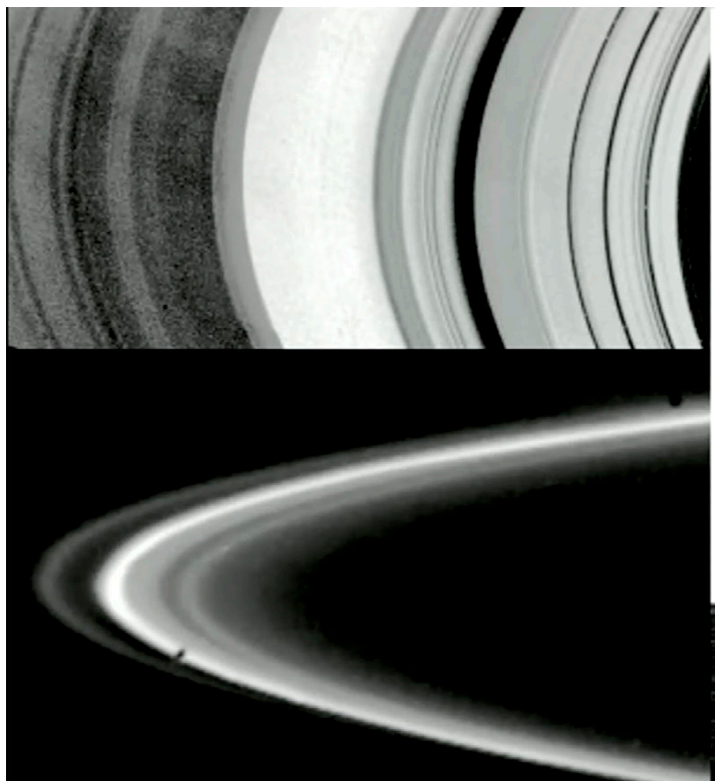
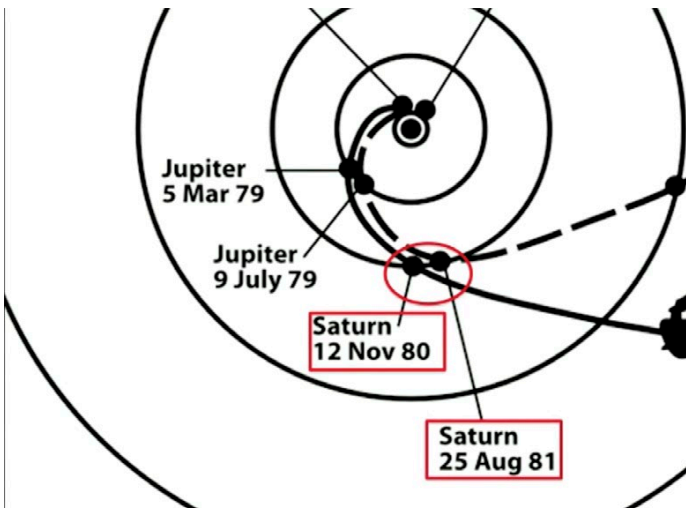
I started with punched cards and mag tape. By the 1980s we had keyboards and screens!



Saturn Rings

Images of atmosphere of Saturn and Jupiter – lots of interest in the difference between the two

Fran started off with punched cards and magnetic tape. By the 1980s we had keyboards and screens. Punch cards go into box then fed into machine with mag tapes with data on them.

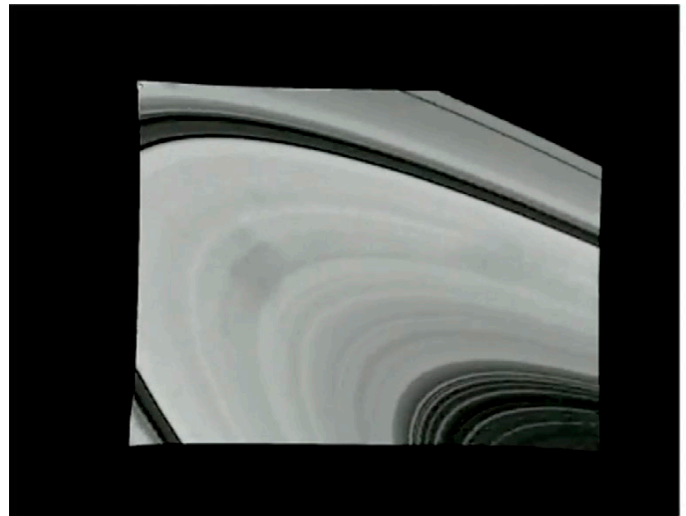


On to Saturn in early 1980s

- Saturn's spectacular ring system!
- Multiple rings within rings, within rings
- Shepherded by moonlets, subtle colors indicate different compositions



- Saturn's rings color often - way, way exaggerated to make more interesting



"Spokes" in Saturn's B-ring – charged dust levitated off the ring plane

"Spokes" of Saturn's B-Ring – charged dust levitated off the ring plane; electrically charged dust moving with the magnetic field



Long printout of occultation of rings by a star observed by CU-LASP's PPS Shows fine structure of rings

CU-LASP
Charles Barth, PPS team & press



The Imaging Team

The Saturn science team has become more diverse. Carl Sagan top left, third from end

CU – LASP Charles Barth, PPS team and press.

Long printout of occultation of rings by a star observed by CU-LASP's PPS shows fine structure of rings



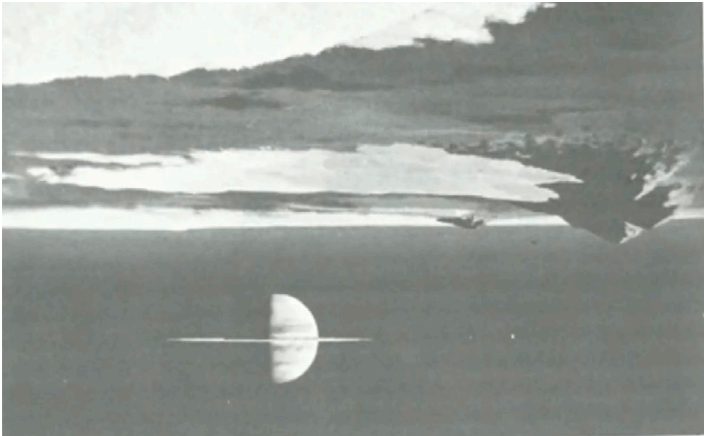
Check out the outfits & hair-dos!

Linda Spilker –
UVS rep. with young JPLers

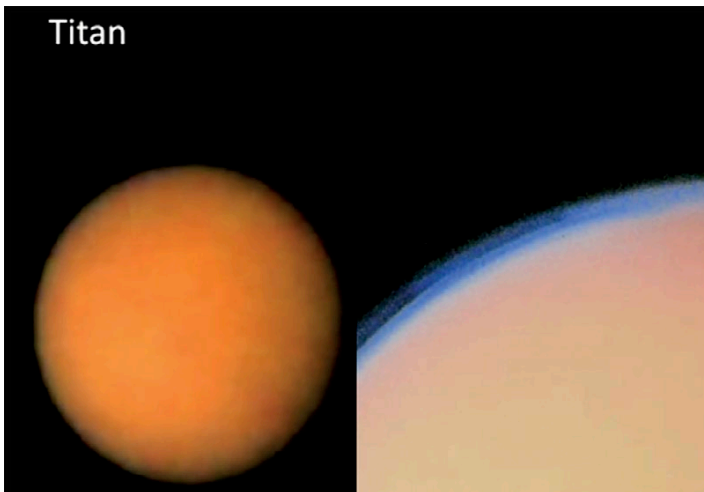
Candy Hansen – imaging team rep.

- JPL Team early 80s– Check out the outfits and hair-dos!

- Linda Spilker – UVS rep. with young JPLers
- Candy Hansen – Imaging team rep.



- Titan – Saturn's only large moon – known to have an atmosphere with methane
- Could this be the view of Saturn from Titan?
- What would Voyager find?
- Titan was a major objective – if Voyager did not get pictures of Titan, Voyager 2 would have to be re-directed to get close flyby

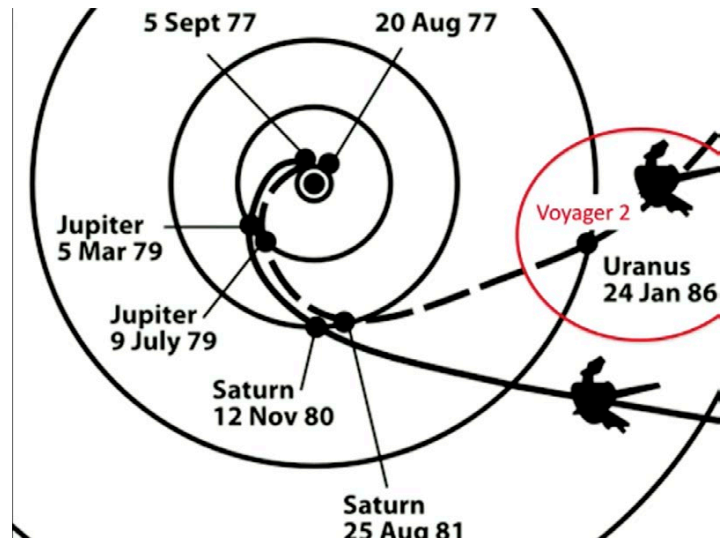


Titan – saw only a fuzzy ball, could tell atmosphere but that was it, had to wait for Cassini



Daily Science Team Meeting – Ed Stone, science lead for team

Press conference of what science team reported
Intellectuals of era would discuss new findings and how it relates to humankind

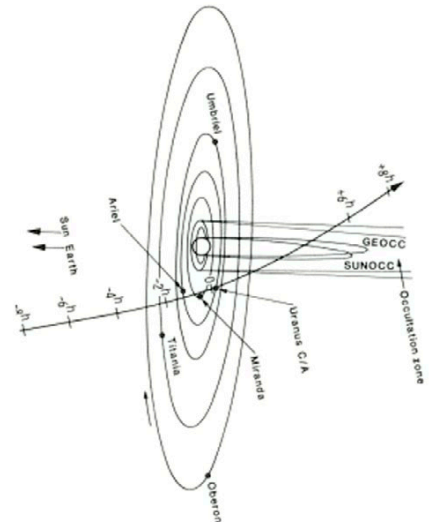


Uranus – 1986, 5 years after Saturn flyby

- Fashion was to have buttons with all the missions and moons
- Introduction of hand-held calculations as technology flourished

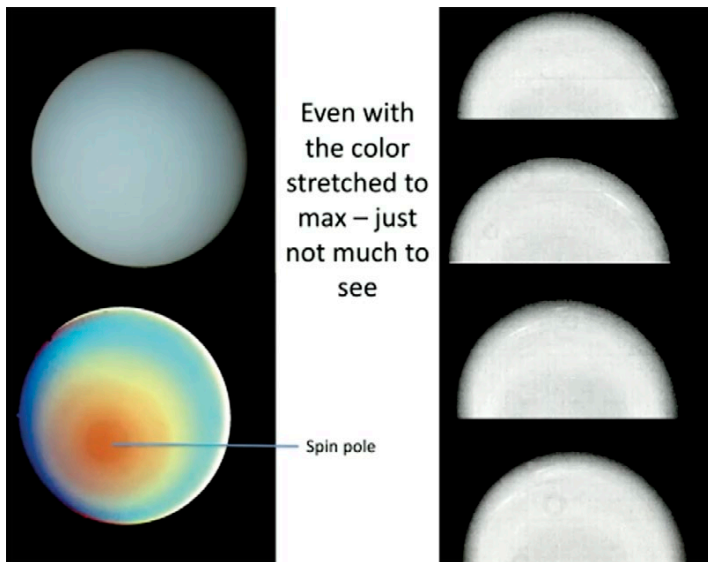
Voyager 2 flyby of
Uranus
January 1986

Through the whole
system in less than
a day!

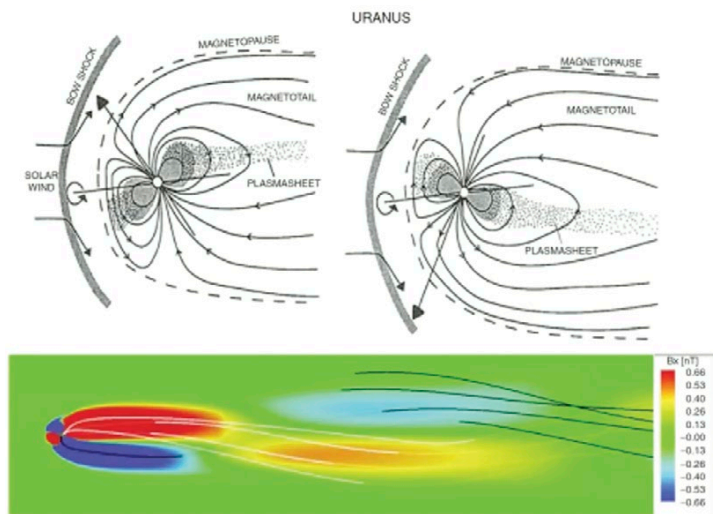


Voyager 2 flyby of Uranus – January 1986

- Uranus rotates on its side, spin axis pointed towards the Sun
- Through the whole system in less than a day!



Not only tilted on its side but magnetic dipole tilted 60° !!!!



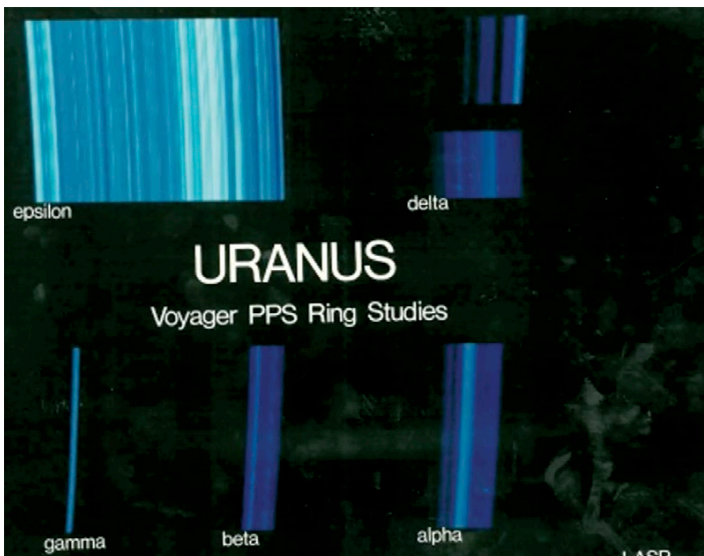
What did we see? Not a whole lot!

- Even with the color stretched to the max – just not much to see
- Cranked color up to show spin hole, bit of difference of color at poles
- What was interesting was the moon Miranda, small body but interesting features
- Made up of large blocks, cliffs, could have been broken up, pulled back together, could this be related to Uranus being tipped on its side? Collision? We still don't know
- Uranus not only tilted on its side, but magnetic dipole tilted 60°

Fran Bagenal at JPL press conference “Uranus had the most weird and wonderful magnetosphere we have ever seen” shown in the film “The Farthest” have a clip from the press conference showing Fran Bagenal Neptune



Voyager Science Steering Group August 1989



Uranus has rings, CU instrument look at and tried to figure out what going on
Most exciting...Plasma trapped in the magnetic field, Fran's area

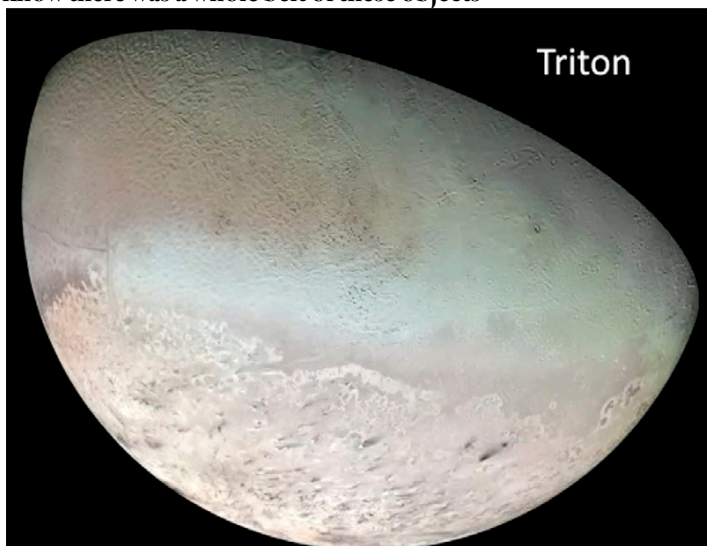


Voyager Science Investigations Support Team 1989 – now more diverse



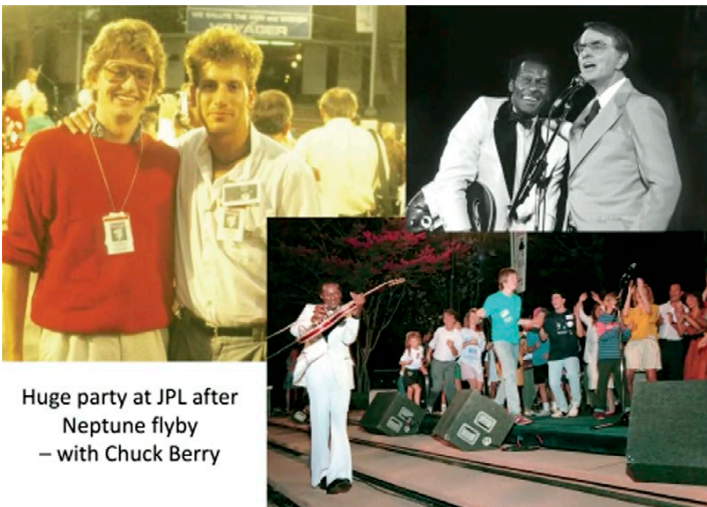
Neptune did not disappoint (phew!)

Neptune Images – big dark spot, various clouds
Triton – didn't know there was a whole belt of these objects



Triton

- Goes around clockwise, tells up probably captured perhaps from the Keiper belt
- Black plumes, winds, ice covered with cracks, only one fly-by, one set of observations



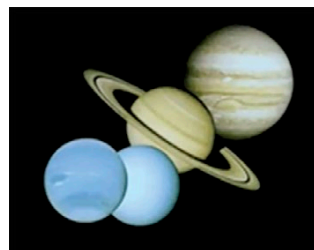
Huge party at JPL after Neptune flyby – with Chuck Berry

- Last flyby – had a big party after Neptune flyby – with Chuck Berry

I had to return to Colorado to teach my second class at CU

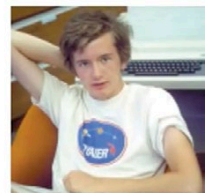


- Fran had to return to Colorado to teach her second class at CU



Voyager Planetary Legacy

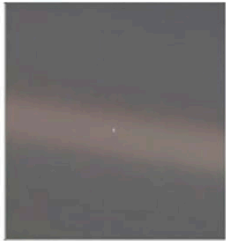
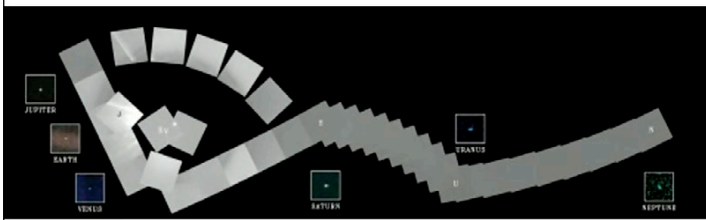
- 11,000 work-years was devoted to the Voyager project through the Neptune encounter.
- Inspired a generation of scientists post-Apollo, pre-Mars rovers
- Revolutionized our view of moons – separate, different worlds
- Weird and wonderful magnetospheres!



Voyager Planetary Legacy

- 11,000 work-years was devoted to the Voyager project through the Neptune encounter
- Inspired a generation of scientists post – Apollo, pre-Mars rovers
- Learned these planets were very different worlds
- Revolutionized our view of moons – separate, different worlds
- Weird and wonderful magnetospheres

Images taken by Voyager 1 on 14 Feb 1990



The Pale Blue Dot
– by Carl Sagan

Check him out on
YouTube

- After Neptune, Carl Sagan had the brilliant idea to point the Voyager spacecraft back through the solar system and look at the Earth and other planets
 - Makes us think about humanity on Earth and how we should be thinking about and protect the Earth
 - Images taken by Voyager 1 on 14 February 1990
- Check him out on YouTube – The Pale Blue Dot But

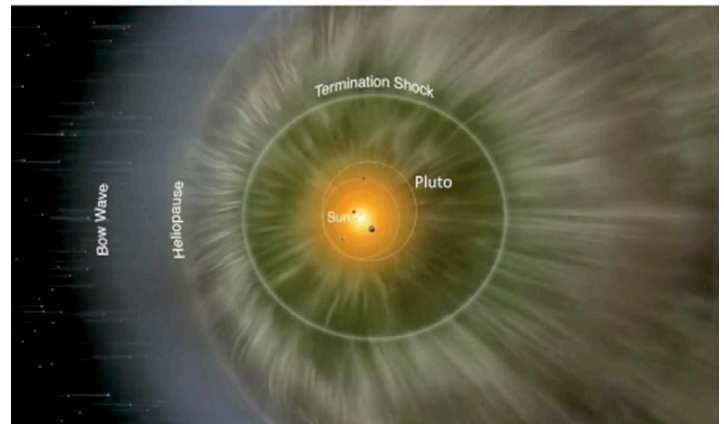
But Voyagers continue *InterStellar Mission*



Sadly Ed Stone is no longer with us

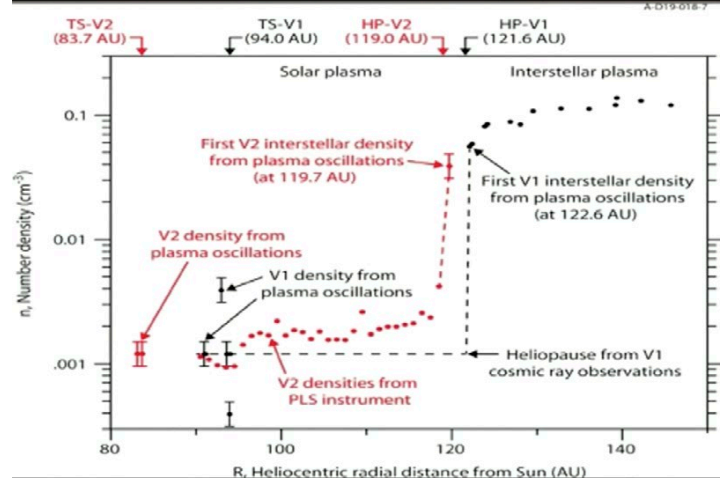
Voyagers continue – Interstellar Mission: Spacecraft then became the Interstellar Mission

Where does interstellar space begin?



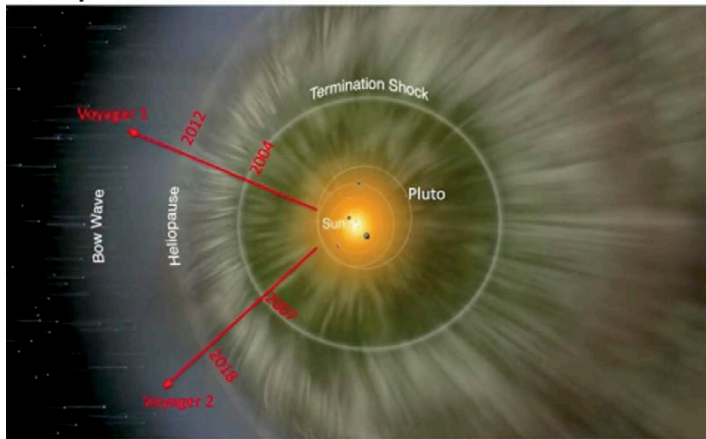
- Idea was to leave influence of Sun, go out into influence of interstellar medium
- Not leaving the gravity, but supersonic solar wind hits boundary with interstellar medium creates termination shock, boundary heliopause, possibly bow wave upstream; this is the heliosphere that Voyager 2 went out into

Particle number densities versus radial distance from the Sun in astronomical units (AU)



See something going along fairly flat, low density, then density jumps way up, this tell us we are out of the Suns influence and into the interstellar medium

Today Voyager 1 is at 168 AU, Voyager 2 is at 141 AU from the Sun
1-way communication takes 23 hours to V1 and 19 hours to V2



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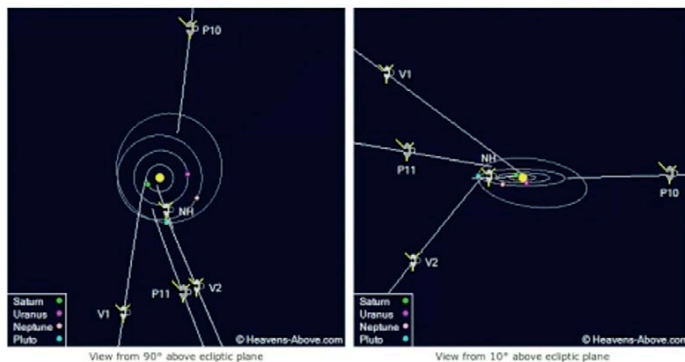


Voyager 2 is headed
towards Sirius in
Canis Major

Voyager 1 is headed
towards
Camelopardalis
(near Ophiuchus)

- Voyager 1 is moving up at 168 AU, Voyager 2 is moving down at 141 AU from the Sun
- Voyager crossed boundary in 2012, Voyager 2 in 2018, both now in interstellar medium
- 1-way communication takes 23 hours to V1 and 19 hours to V2

Today Voyager 1 is at 168 AU, Voyager 2 is at 141 AU from the Sun
1-way communication takes 23 hours to V1 and 19 hours to V2

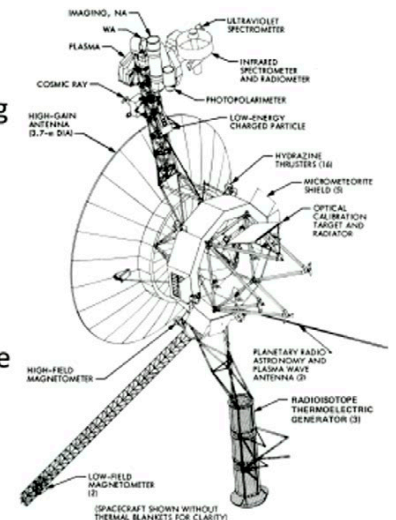


On this scale, the nearest star to the Sun would be approximately 100 meters away, and it would take Voyager 1 about 70,000 years to cover that distance.

- Looking down and sideways – on this scale, the nearest star to the Sun would be approximately 100 meters away, and it would take Voyager 1 about 70,000 years to cover that distance

- Voyager 2 is headed towards Sirius in Canis Major
- Voyager 1 is headed towards Camelopardalis (near Ophiuchus)

- MAG=magnetometer
PWS=Plasma Wave
Science –both working
on both V1&V2
- LECP=Low Energy
Charged Particle - V1
- CRS=Cosmic Ray
Science - V2
- MAG & PWS should be
good to ~2030.
- V1 LECP and V2 CRS
off next year.

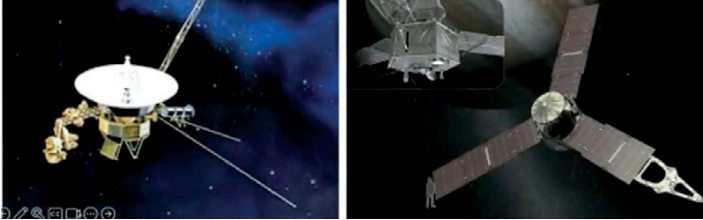


Where are we now? What is the status?

- Magnetometer and Plasma Wave Science instrument– still working on both V1 & V2
- Low Energy Charged Particle – V1
- CRS = Cosmic Ray Science Instrument- V2
- All other instruments turned off
- Mag & PWS should be good to ~2030
- V1 ECP and V2 CRS probably will get turned off next year
- We don't know what is beyond that heliopause and what stellar medium is really like

Voyager vs. Juno

	Voyager	Juno
Mass	815 kg	1593 kg
Instruments	11 adding to 105 kg	9 adding to 1200 kg
Power	Radioisotope Thermoelectric Generators 470 Watts	Solar 435 Watts
Comm.	115 kbits/s at Jupiter	50 Mbits/s
Radio Dish	3.7 meters	2.4 meters
Cost	~\$1.1 billion	~\$1.5 billion



Comparison of Voyager vs Juno

- Data stored on mag tapes on Voyager 1!
- Computer on Voyager 1 longest running computer in history
- Whether will continue – we do not know at this time



NASA will launch IMAP (Interstellar Mapping and Acceleration Probe) on September 24, 2025 to study the heliosphere boundary, solar wind, information to improve space weather predictions.

Questions and Comments:

- Are you affiliated with Cosmic Ray as we have moved out into interstellar medium field?
- What is it about the boundary– is it density? Why is it a boundary?
- What is it that slows the solar wind down as you are going out?
- There is a discussion about the reconnection of solar wind on the downwind side of the Earth, can either of the Voyagers make measurements of that?

- What are the particle densities near the termination shock?

III. Upcoming Events

- Star party September 21st, 6:30 – 9:30pm Dark Sky Colorado, Beech Shelter (north of Boulder off Neva road) “Saturn at Opposition and Autumn Equinox”
- Star Party September 26th, Ron Stewart Preserve Rabbit Mountain – Boulder County Open Space, presentation by Boulder County Naturalists “Nebulas to Star Clusters”
- Next LAS Meeting, Thursday, October 16th Dr. John Spencer, SWRI at 7:00pm at 1st Evangelical Lutheran Church, Longmont

IV. Business Meeting by Treasurer, Bruce Lamoreaux



Longmont Astronomical Society

P.O. Box 806
Longmont, CO 80502-0806

LAS Treasurer's Report - Bruce Lamoreaux

9/18/2025

Main Checking Account (xxx-1587)

Begin Balance:	\$ 6,060.00	8/5/2025
Deposits:	\$ -	
Expenses:	\$ (4.00)	Bank Charges
Current Balance:	\$ 6,056.00	9/3/2025

2-Year Savings Account (xxx-1478) (matures 10/23/23)

Past Balance:	\$ 8,275.00	3/31/2025
Interest:	\$ 15.00	
Balance:	\$ 8,290.00	6/30/2025

Telescope Fund (xxx-0165)

Past Balance:	\$ 1,100.00	7/30/2025
Deposits:	\$ -	
Expenses:	\$ -	
Balance	\$ 1,100.00	8/28/2025

Petty Cash

Past Balance:	\$ 50.00
Deposits:	\$ -
Expenses:	\$ -
Balance	\$ 50.00

<u>Total Assets</u>	\$ 15,496.00	\$ (4.00) Down from July
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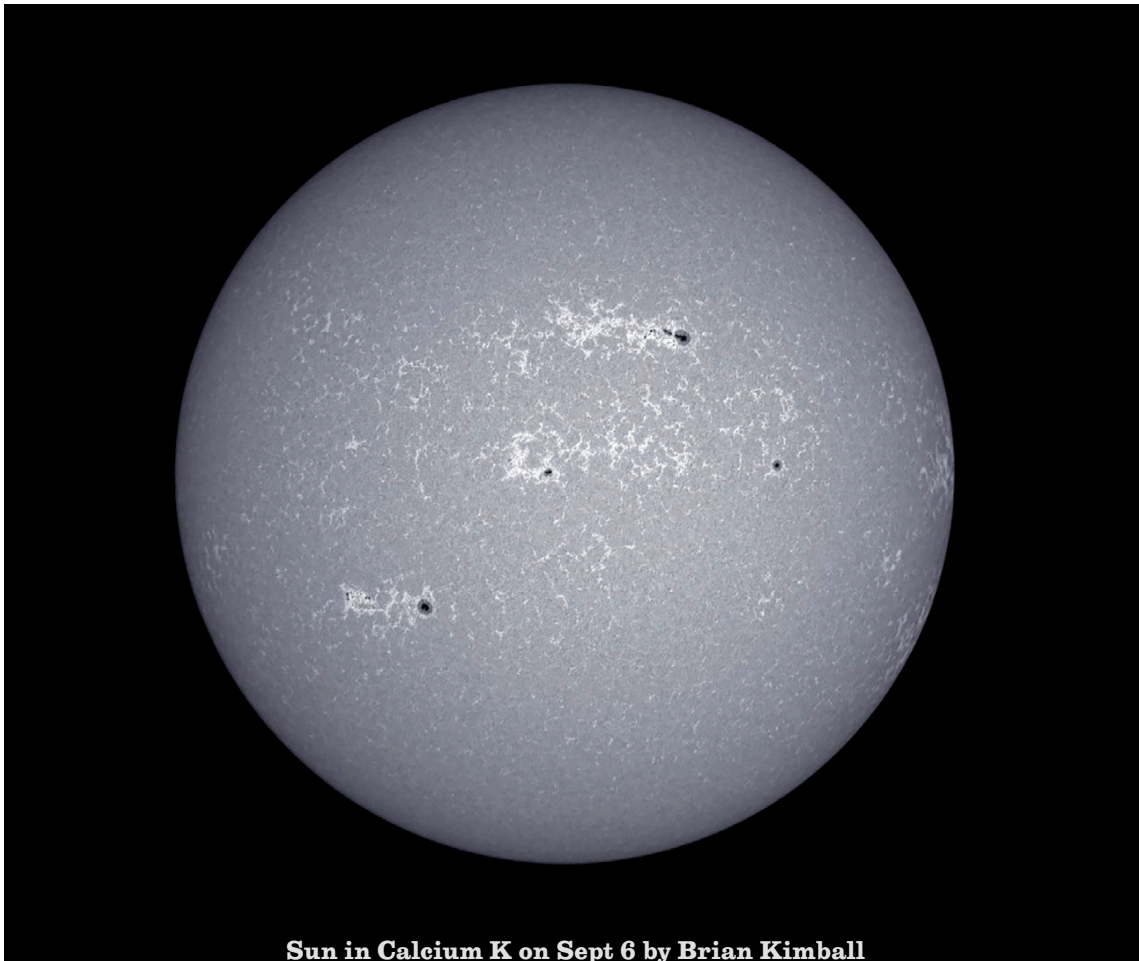
Active Membership:	102
Student Membership:	2
Total	104 Active



Comet C/2025 A6 (Lemmon) on Sept 28 by Gary Garzone



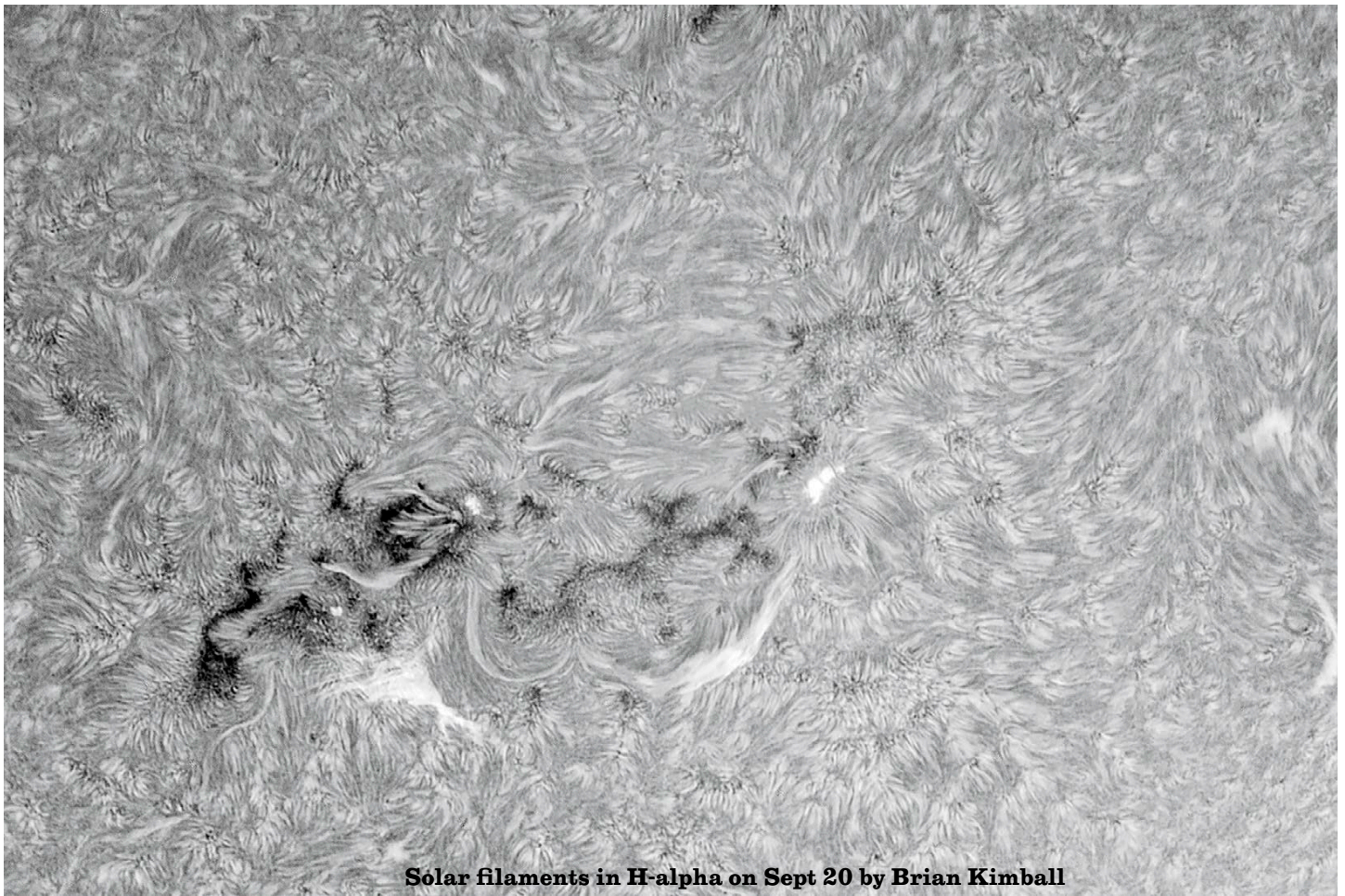
M 31 by Eddie Hunnell



Sun in Calcium K on Sept 6 by Brian Kimball



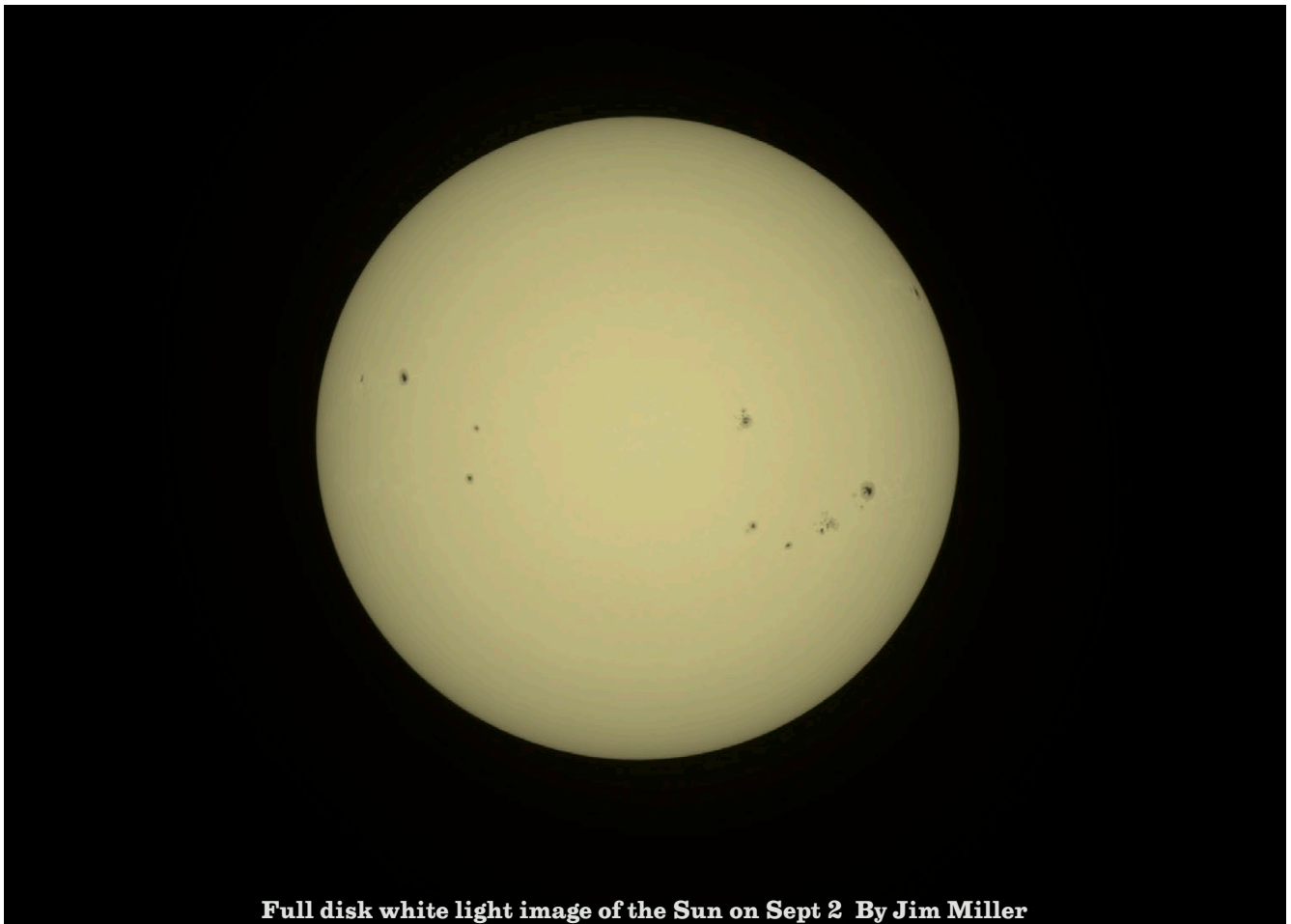
Solar region AR 4221 on Sept 17 by Brian Kimball



Solar filaments in H-alpha on Sept 20 by Brian Kimball



Moon and Jet on Sept 3 by Brian Kimball



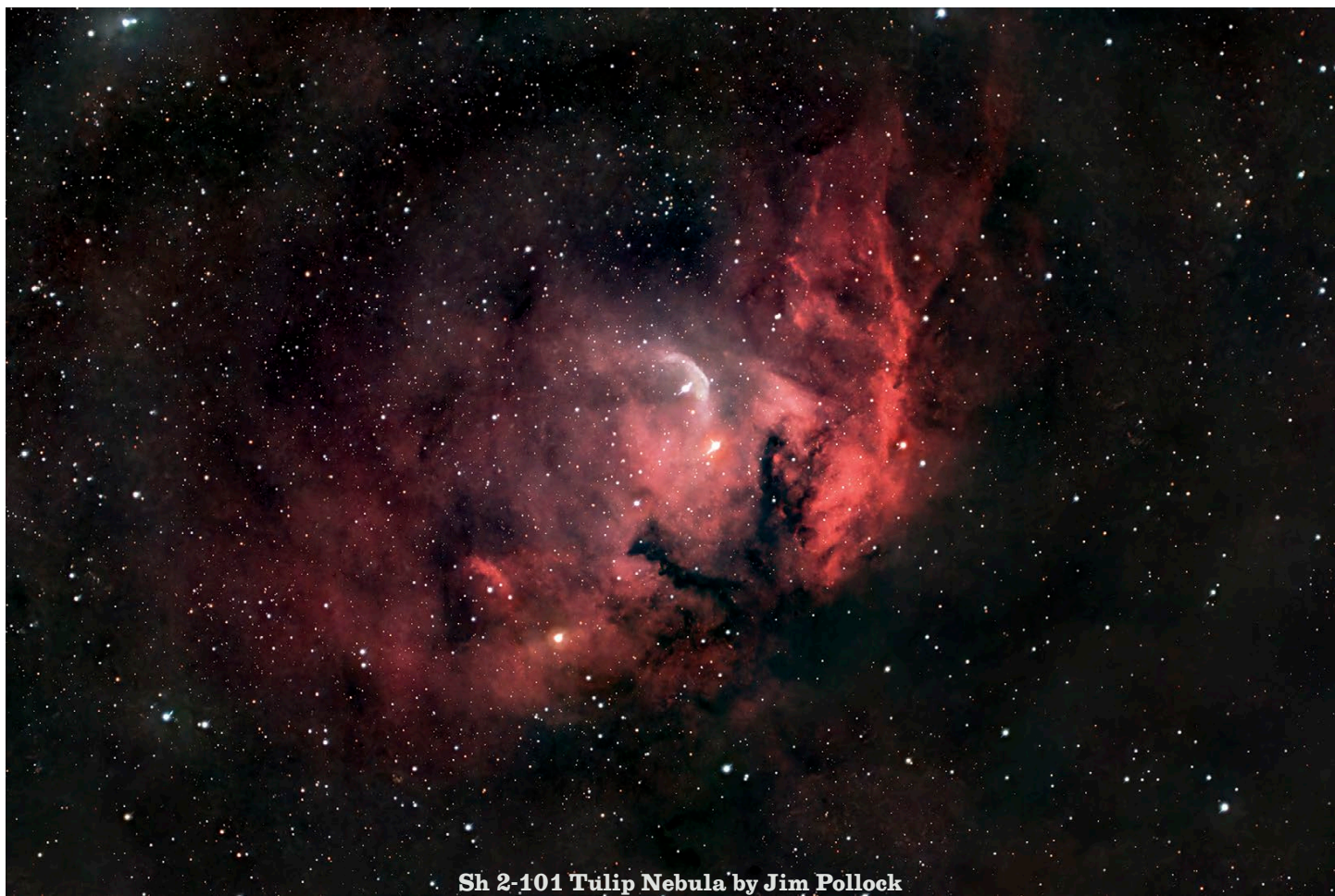
Full disk white light image of the Sun on Sept 2 By Jim Miller



IC 5070 by Aref Nammari



M24 by Aref Nammari



Sh 2-101 Tulip Nebula by Jim Pollock

Got my first photographic look at The Tulip Nebula in Cygnus, which certainly deserves its name. The Tulip is an emission nebula rich in hydrogen with some fun dark lanes threading into it.

This image is created from 19 frames of 5-minutes each for a total of 95 minutes of exposure. Shot through my 14" EdgeHD at f/7 (focal reducer) into the ZWO 6200mc color camera with an L-Pro filter. Full details are after the commercial break.

Target	SH2-101 Tulip Nebula (Cygnus)
Location	The Farm
Date	09/01/2025
Scope	14Edge f7
Main Camera	6200mc
Filter	Optolong LPro
Guide Scope	OAG
Guide Camera	ZWO 174-mini
Frames & Exposure	19 Frames at 300 secs = 95 minutes



Cygnus is rich in narrowband emissions, but it also sports a few broadband reflection features. Here is one region with two van den Bergh objects, vdBs 131 and 132, collectively tabulated as NGC 6914. Strangely, the coordinates listed for NGC 6914 are well to the southeast of this pair of reflection nebulae, rather than centered between them. Beverly Lynds listed these two objects as LBNs 274 and 280. Many dark lanes and Bok modules can also be seen.

Near the bottom and just right of center is an unusual small yellowish object that is embedded in a dark nebula. Does anyone have a clue what this might be?

From DSNM with CDK14 scope, 2.7 hours time on target with luminance filter and ASI 6200MC camera. FOV is about 0.42 x 0.28 deg.



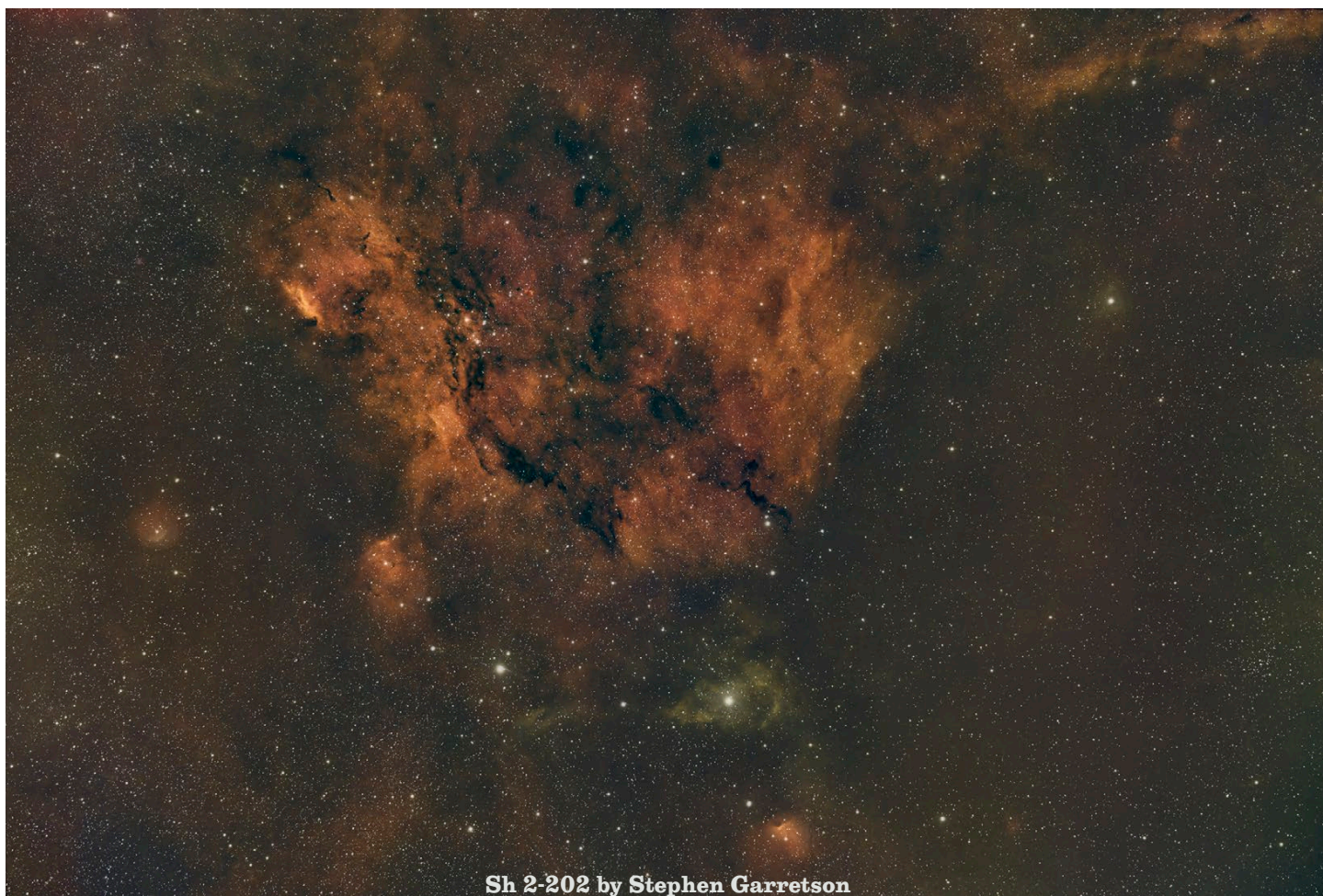
This interesting little gem is in Delphinus (the Dolphin). It's about 3700 light years distant, magnitude 14, and covers 2 arc minutes in the sky. I especially like its intertwining filaments.

This is an HOO image with RGB stars: 1.3 hours each for H-alpha and OIII filters using the RASA telescope, and 27 minutes using the CDK14 scope for stars. Field of view is about 36 x 24 arc minutes.



Aurora on Sept 15 by Paul Robinson

Last evening (Sept 15) I saw that the magnetic numbers looked good at the L1 satellite (ACE) position, so I went to Boulder Reservoir and on arrival a bit after 8 pm in lingering twilight, using my phone to take a photo, I saw that aurora was visible! To my naked eye, I could see it, but not really any color. It lasted a little while and eventually faded, but then a green arc appeared (to eye, no green, but it was easy to see). Note that while I could see this all from Boulder Res, my brother in Longmont could not see it during its peak.



Continuing to dig into some previous target datasets, I reviewed this target from a few years ago, and decided I needed all new data. Wanting to increase each channel I looked into combining new and old data, however the FOVs were enough off that there was what I felt was unacceptable loss of the subject area. While it's no surprise that Ha is dominant in a Sharpless object, SII was reasonably robust; OIII was essentially absent despite 2 hours of data at f/3.6.

AKA, LBN 677, 202 is pretty faint and quite large, with an apparent size of ~240 x 120 arcminutes, or about 6 Earth Moons widths across. It resides in Cassiopeia on the border with Camelopardalis, just east [below in a typical FOV] of the Soul Nebula [IC 1848]. Its distance from Earth is estimated at 2600 light years.

[29] 600s guided Ha subs
 [12] 600s guided OIII subs
 [26] 600s guided SII subs
 total integration: 11 hours, 10 minutes

capture:

Borg 55FL Triplets. Each image train has the following

components:

Borg 55FL f/3.6 Astrograph
 ZWO 2600MM Pro
 ZWO EFW
 Chroma 3nm filters

Gerd Neumann CTU [camera tilt unit]
 Bahtinov mask modified Wanderer Astro Eclipse

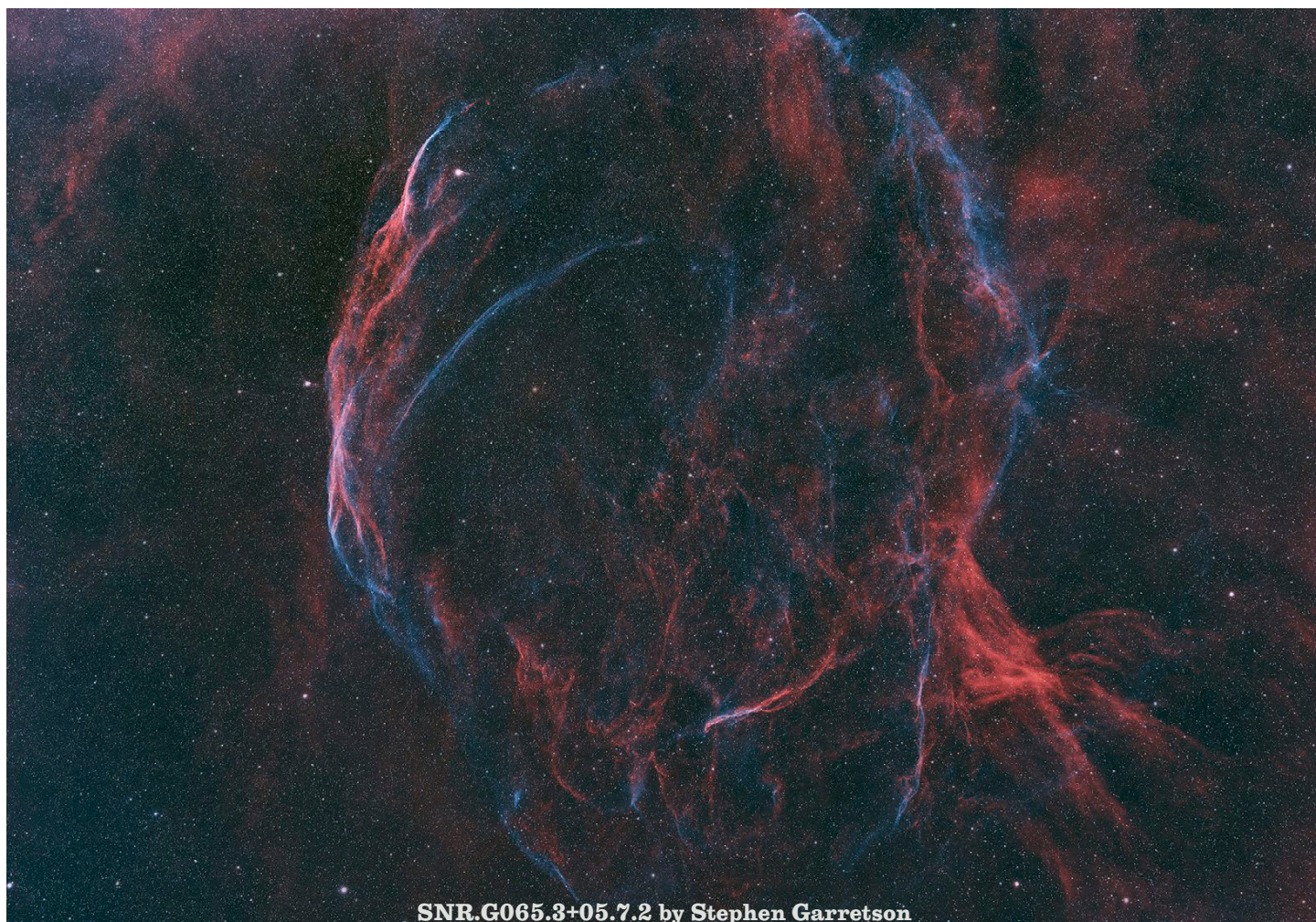
guiding:

William Optics UniGuide Scope [30 x 130]
 ZWO 220M Mini guide camera

Paramount MX+

TheSkyX, SGP, Wanderer Empire, PHD2
 PixInsight, Mac OS Photos, Preview

from the Beevo Dome



This is a large SNR in Cygnus near Albireo [which lies just out of this FOV lower left] rendered as essentially HOO. I labeled it as 2 color NBCM as that more accurately describes the pathway to this version. MJ posted some images of this target as a 4-panel mosaic taken with his RASA 11; the Borg 55FL Triplets have a wider FOV so the whole target fits in one frame. I was originally going to gather more data, especially in OIII, and may yet do so. But I am reasonably pleased with this result given it's only 10 hours 20 minutes of subs.

[38] 600s guided Ha subs
 [24] 600s guided OIII subs
 total integration: 10 hours, 20 minutes

guiding:
 William Optics UniGuide Scope [30 x 130]
 ZWO 220M Mini guide camera

capture:
 Borg 55FL Triplets. Each image train has the following components:
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Paramount MX+
 TheSkyX, SGP, Wanderer Empire, PHD2
 PixInsight, Mac OS Photos, Preview
 from the Beevo Dome

Newsletter Archives by Eileen Hall-McKim

30 Years Ago – 1995

October Agenda:

- The October meeting of the LAS is on the 19th, the scheduled speaker will be Bob Ross. Bob will be showing a new video about the Steward Mirror Lab. The video is a progress report since Bob's last visit to the SML. Those of you that saw Bob's last video know this is real interesting stuff!
- Also on October agenda is officer nominations for 1996. Be thinking about someone you want to volunteer. Uh, I mean nominate
- The October star party will be at Woodrow on the 21st
- Please note that there will not be a regular November LAS meeting. Instead, we will be going on a tour of LASP (Laboratory for Atmospheric and Space Physics) in Boulder. A map and other information is provided in this issue of the Journal

September Meeting Notes; President, Thom Peck opened the meeting with general discussion:

- The September FRASC Deadman star party is canceled due to 17" of snow; A club party is scheduled for 9/30/95 at Pawnee grasslands
- Dan Laszlo gave a report on comet deVico, Fred Lacy gave a report on the Halley book, Dave Street gave a report on the developments at Mt Evans

ALCOR, Bob Spohn handed out information and software with all the Astronomical Leagues observing programs

- Tom Melsheimer gave a presentation on telescope mounts and drives and his involvement with Telescopes in Education (TIE)
- Bob Ross: There are at least 8 comets you can view during Oct.15th-Nov.13 This includes: Schwassman-Wachmann3, Hale-Bopp, Jackson-Neujmin, Clark, d'Arrest, Bradfield, deVico, and Churyumov-Gerasimenko. Have fun chasing these brief interlopers!

20 Years Ago – 2005

Burlington Elementary School Star Party by Philippe Bridenne

On Friday 30th, few LAS members met at a local restaurant to have dinner before heading to the school to setup their telescope. The skies were very clear of clouds, and despite the city lights were able to see few celestial objects. The key event of the evening was an Iridium satellite flare at 20:52:52 of magnitude -3. I was pretty anxious since we had about 100 kids, teachers and parents searching in the sky and waiting for this flare. And what if the calculation was wrong? But once again, the web site had the right information and when the flare came up (for about 5 to 10 seconds) the crowd was quite surprised and pleased to see this bright flare in the Longmont night! We had a very good turn out and the whole evening was very well organized.

DSES Visit by Dick Mallot

The Deep Space Exploration Society (DSES) invited members up to see the twin giant 60 foot telescopes and talk about the studies that they are doing up there. The LAS, BASS, and DAS members were invited up to see the radio telescopes at Table Mountain, southwest of Longmont on Saturday 9/17. It was a marvelous afternoon to be up there overlooking Longmont and the Flatirons. Special thanks to Ray Warren for publicizing this event for LAS. I have included some pictures of the site, the demo, and some of the LAS members who attended. They are looking for new members to help them build up and maintain the site and who have an interest in actually collecting and analyzing data that is gathered with the system. To find them on the web, just visit the following web site <http://dses.org/>

Star party for Natural Museum of Greeley by Gary Garzone

Hello all, we did a star party for Natural History museum of Greeley, Colorado, along with National Forest service

of the Pawnee National grasslands. A huge crowd of over 100 people came to dark sky place like Crow Valley campground near Briggsdale for views. They all got a special treat and we saw one Iridium flare, a satellite pass. That's where a satellite spins comes into view, solar collectors reflect sun light back to you in early evenings. Minus 1 or 2 magnitude, so bright, easily out shines rest of stars in field, lasted for under a minute I would guess. Great sunsets shots from there too!

Lyons Elementary School Star Party by Phillepe Bridenne

On October 7th, few LAS and BASS members met to setup their scope on the field at the Lyons Elementary School. It was another great evening with clear skies! Despite being in the middle of Lyons, the skies were quite dark and we could see the Milky Way quite well. The organizers had prepared food and drinks for all the participants. The crowd was estimated to be around a 100 kids and parents. The only annoyance was kids running around with white flash lights! Few participants wondered what was that bright star close to the moon before sunset....It was....Antares!

10 Years Ago – 2015

LAS Meeting Thursday October 15 7pm

“Mr. Messiers Neighborhood” by Mike Roos

To paraphrase an exercise from Dale Carnegie, “I know amateur astronomers in a rut. And they are going to stay in a rut. Why? I'll tell you why. It's because they keep looking at the same objects.” There are thousands of galaxies and double stars within the range of modest size telescopes. Several hundred of these objects should be easy to find, yet many of us have never observed them. These objects happen to be located near Messier objects, in Mr. Messier's Neighborhood, so to speak. In this presentation, we examine astronomical databases, estimating visual magnitudes of galaxies and lists of objects near the Messier objects.

Meeting Notes from September 18

Introduction of Officers: Vern Raben as president, Gary Garzone as vice president, Mike Fellows as treasurer, Brian Kimball as board member, Jim Elkins as board member, Tally O'Donnell board as member, and Joe Hudson as secretary
Presentation “The Timely discussion about Time” by Dr. Suzanne Metlay, professor of geodesic sciences at Western Governors Univ. and a longtime member and friend of LAS

Business Meeting:

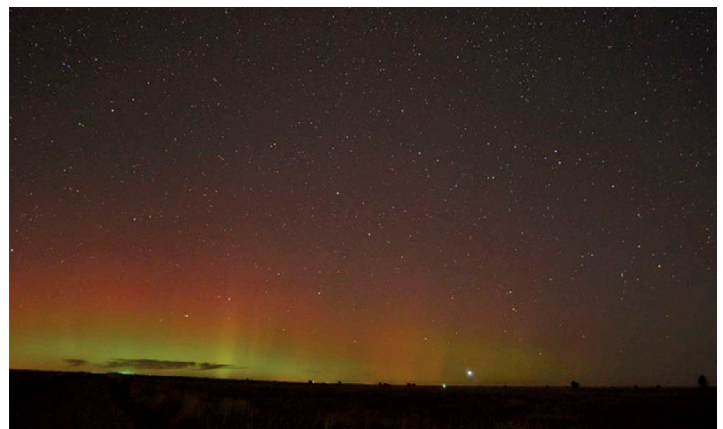
LAS Club Telescope update by Gary. He is attempting to pick up the rest of the parts – scheduling is difficult. Possibly a work day could be scheduled to assemble and distribute (charitably or commercially) the built telescopes. We still need to collect parts, purchase telrads, and eyepieces.

New club projects were proposed. Vern suggested an all sky camera upgrade. There is a possibility we might use tower at Marr Lab mountain research station. Internet might be available to us there. Requirements need to be established such as adding weather information, inside temperature, and higher resolution camera.

Jim Elkins suggested a radio astronomy project. The Astronomy League now has a Radio Astronomy award. Jim also mentioned high altitude balloon project during the solar eclipse in August 2017.



Dumbbell Nebula
by Gary Garzone



Aurora near Ault Co
By Paul Robinson September 20



LONGMONT ASTRONOMICAL SOCIETY
P. O. Box 806
LONGMONT, CO 80506

SH 2-190
BY TALLY O-DONNELL