

Astronomy Picture of the Day

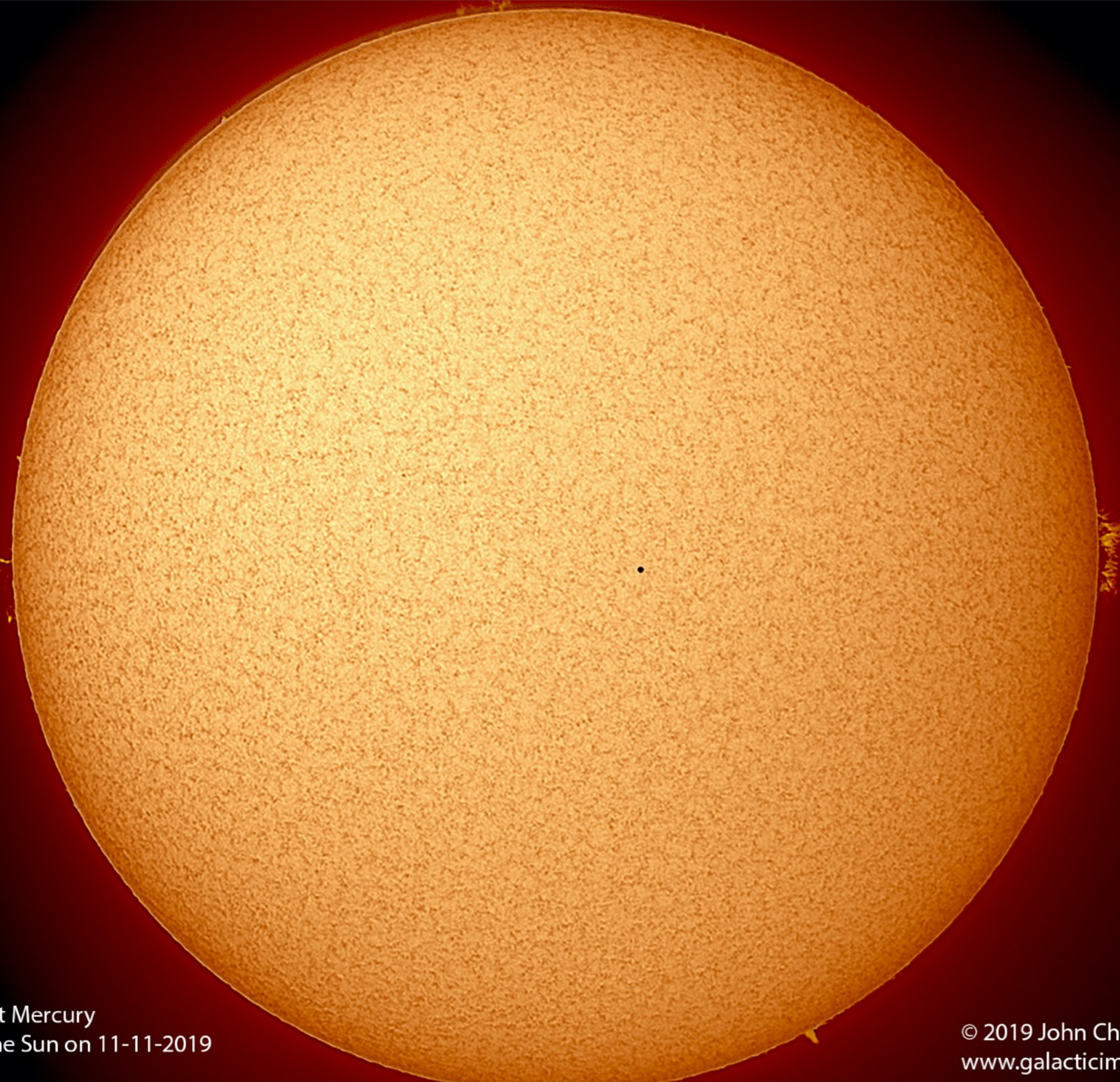
2020



MERCURY AND THE QUIET
SUN

Explanation: On November 11, 2019 the Sun was mostly quiet, experiencing a minimum in its 11 year cycle of activity. In fact, the only spot visible was actually planet Mercury, making a leisurely 5 1/2 hour transit in front of the calm solar disk. About 1/200th the apparent diameter of the Sun, the silhouette of the solar system's inner most planet is near center in this sharp, full Sun snapshot. Taken with a hydrogen alpha filter and safe solar telescope, the image also captures prominences around the solar limb, the glowing plasma trapped in arcing magnetic fields. Of course, only inner planets Mercury and Venus can transit the Sun to appear in silhouette when viewed from planet Earth. Following its transit in 2016, this was Mercury's 4th of 14 transits across the solar disk in the 21st century. The next transit of Mercury will be on November 13, 2032.

Image Credit
& Copyright: John Chumack



The Planet Mercury
Transits the Sun on 11-11-2019
14:59 U.T.

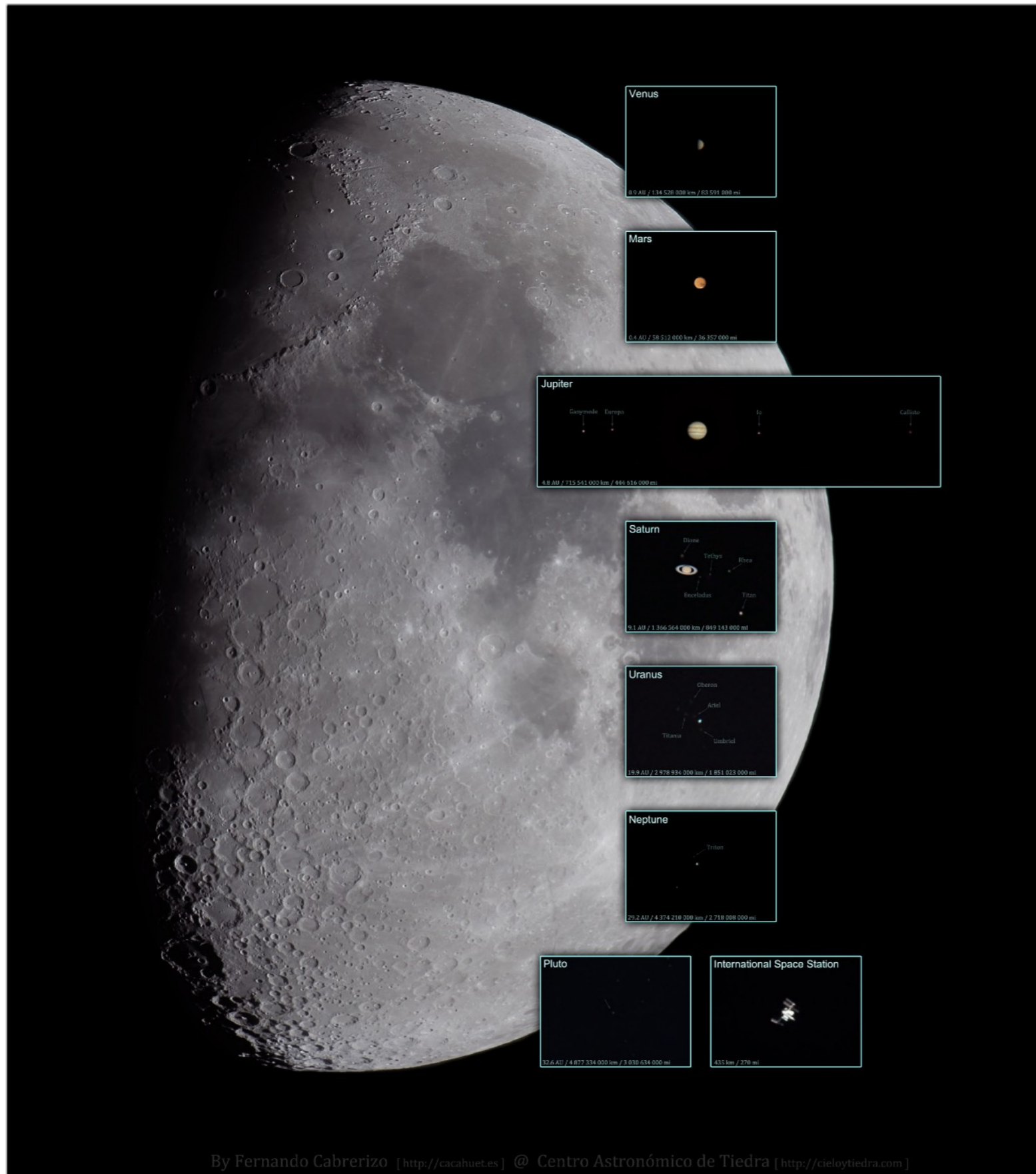
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Sun	Mon	Tue	Wed	Thu	Fri	Sat
			Jan 1	2	3 <i>Quadrantids Meteor Shower</i>	4 <i>Quadrantids Meteor Shower</i>
5	6	7	8	9	10 Full Moon	11
12	13	14	15	16	17	18
19	20	21	22	23	24 New Moon	25
26	27	28	29	30	31	

Notes:

February

Su	Mo	Tue	We	Th	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29



ONE NIGHT, ONE TELESCOPE, ONE CAMERA

Explanation: Taken on the same night, from the same place, with the same telescope and camera, these postcards from our Solar System are shown at the same scale to provide an interesting comparison of apparent sizes. Spanning about half a degree in planet Earth's sky, the Moon is a stitched mosaic of six images. The others are the result of digitally stacked frames or simple single exposures, with the real distances to the objects indicated along the bottom of each insert. Most of the Solar System's planets with their brighter moons, and Pluto were captured during the telescopic expedition, but elusive Mercury was missed because of clouds near the horizon. The International Space Station was successfully hunted, though. The night was July 21st. Telescope and camera were located at the Centro Astronomico de Tiedra Observatory in Spain.

Image Credit & Copyright: Fernando Cabrerizo (Centro Astronomico de Tiedra)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						Feb 1
2	3	4	5	6	7	8
9 Full Moon Supermoon	10	11	12	13	14	15
16	17	18	19	20	21	22
23 New Moon	24	25	26	27	28	29

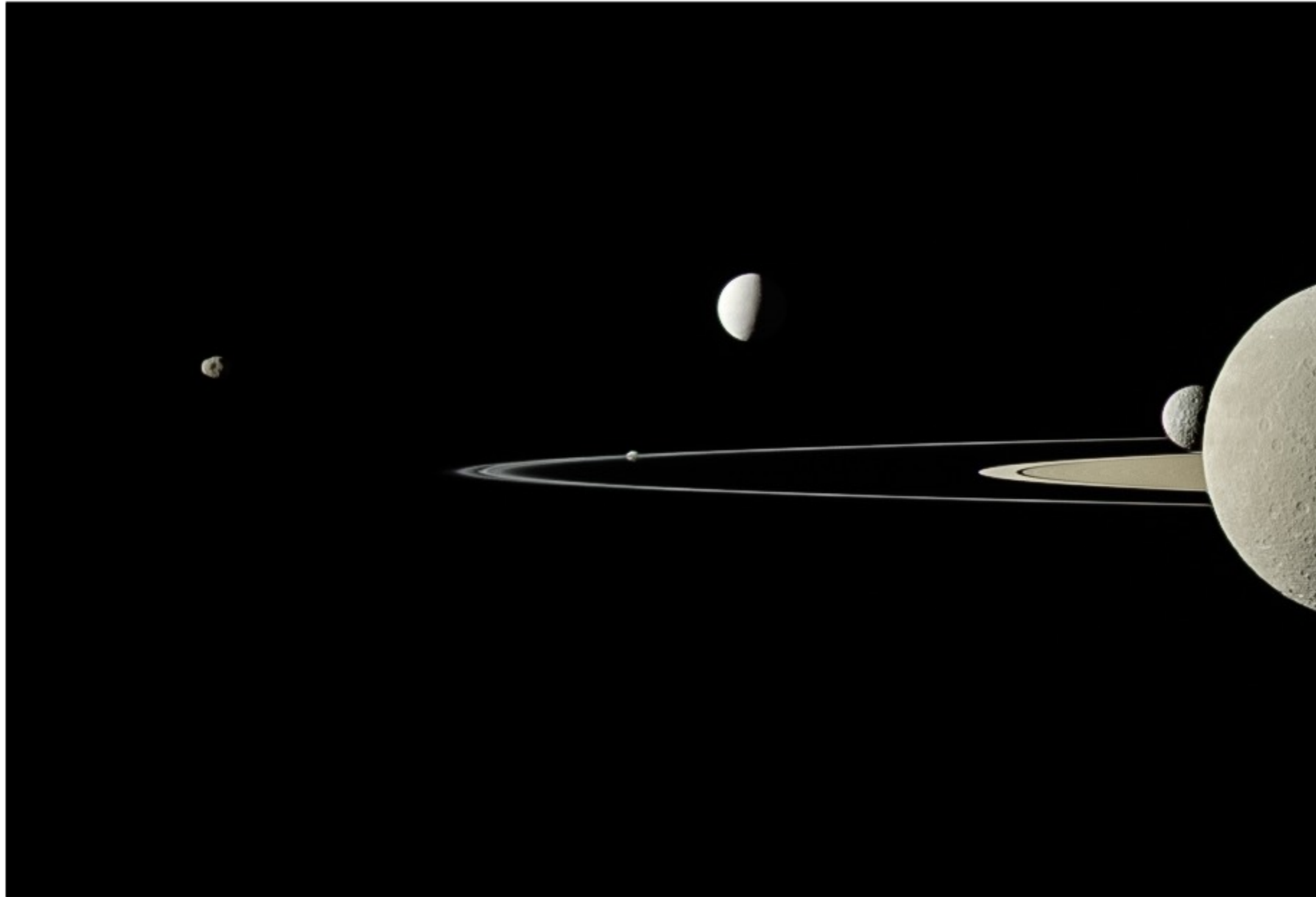
Notes:

March						
Su	Mo	Tue	We	Th	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

MOONS OF SATURN

Explanation: On July 29, 2011 the Cassini spacecraft's narrow-angle camera took this snapshot and captured 5 of Saturn's moons, from just above the ringplane. Left to right are small moons Janus and Pandora respectively 179 and 81 kilometers across, shiny 504 kilometer diameter Enceladus, and Mimas, 396 kilometers across, seen just next to Rhea. Cut off by the right edge of the frame, Rhea is Saturn's second largest moon at 1,528 kilometers across. So how many moons does Saturn have? Twenty new found outer satellites bring its total to 82 known moons, and since Jupiter's moon total stands at 79, Saturn is the Solar System's new moon king. The newly announced Saturnian satellites are all very small, 5 kilometers or so in diameter, and most are in retrograde orbits inclined to Saturn's ringplane. You can help name Saturn's new moons, but you should understand the rules. Hint: A knowledge of Norse, Inuit, and Gallic mythology will help.

Image Credit: Cassini
Imaging Team, SSI, JPL,
NASA



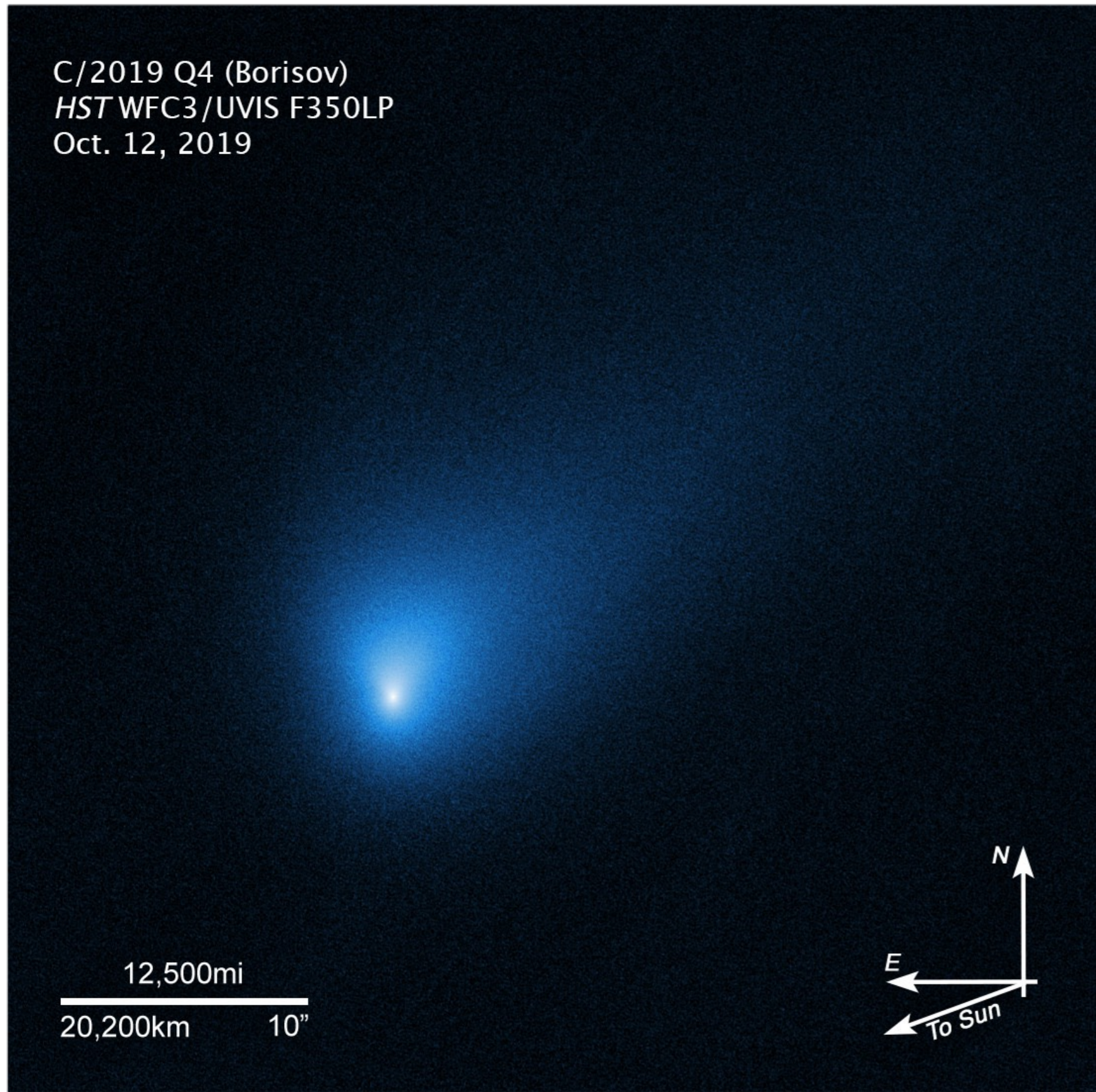
Sun	Mon	Tue	Wed	Thu	Fri	Sat
Mar 1	2	3	4	5	6	7
8	9 Full Moon Supermoon	10	11	12	13	14
15	16	17	18	19	20 Vernal Equinox	21
22	23	24 New Moon	25	26	27	28
29	30	31				

Notes:

April

Su	Mo	Tue	We	Th	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

C/2019 Q4 (Borisov)
HST WFC3/UVIS F350LP
Oct. 12, 2019



INTERSTELLAR INTERLOPER 2I/BORISOV

Explanation: After the 2017 detection of 1I/'Oumuamua, comet 2I/Borisov has become the second recognized interstellar interloper. Like 'Oumuamua, Borisov's measured hyperbolic trajectory and speed as it falls toward the Sun confirm that its origin is from beyond our Solar System. But while detailed observations indicate 'Oumuamua is a rocky body with differences from known Solar System objects, Borisov is definitely a far wandering comet. Taken on October 12, 2019 this Hubble Space Telescope image of Borisov reveals a familiar looking comet-like activity and concentration of dust around around its nucleus. Not resolved in the image, some estimates suggest the nucleus could be between 2 and 16 kilometers in diameter. At the time of the Hubble image, comet 2I/Borisov was about 418 million kilometers away. Borisov is still inbound though and will make its closest approach to the Sun on December 7 at a distance of about 300 million kilometers (2 Astronomical units).

Image Credit: NASA, ESA, and D. Jewitt (UCLA) et al.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			Apr 1	2	3	4
5	6	7	8 Full Moon Supermoon	9	10	11
12	13	14	15	16	17	18
19	20	21	22 Lyrids Meteor Shower	23 New Moon Lyrids Meteor Shower	24	25
26	27	28	29	30		

May

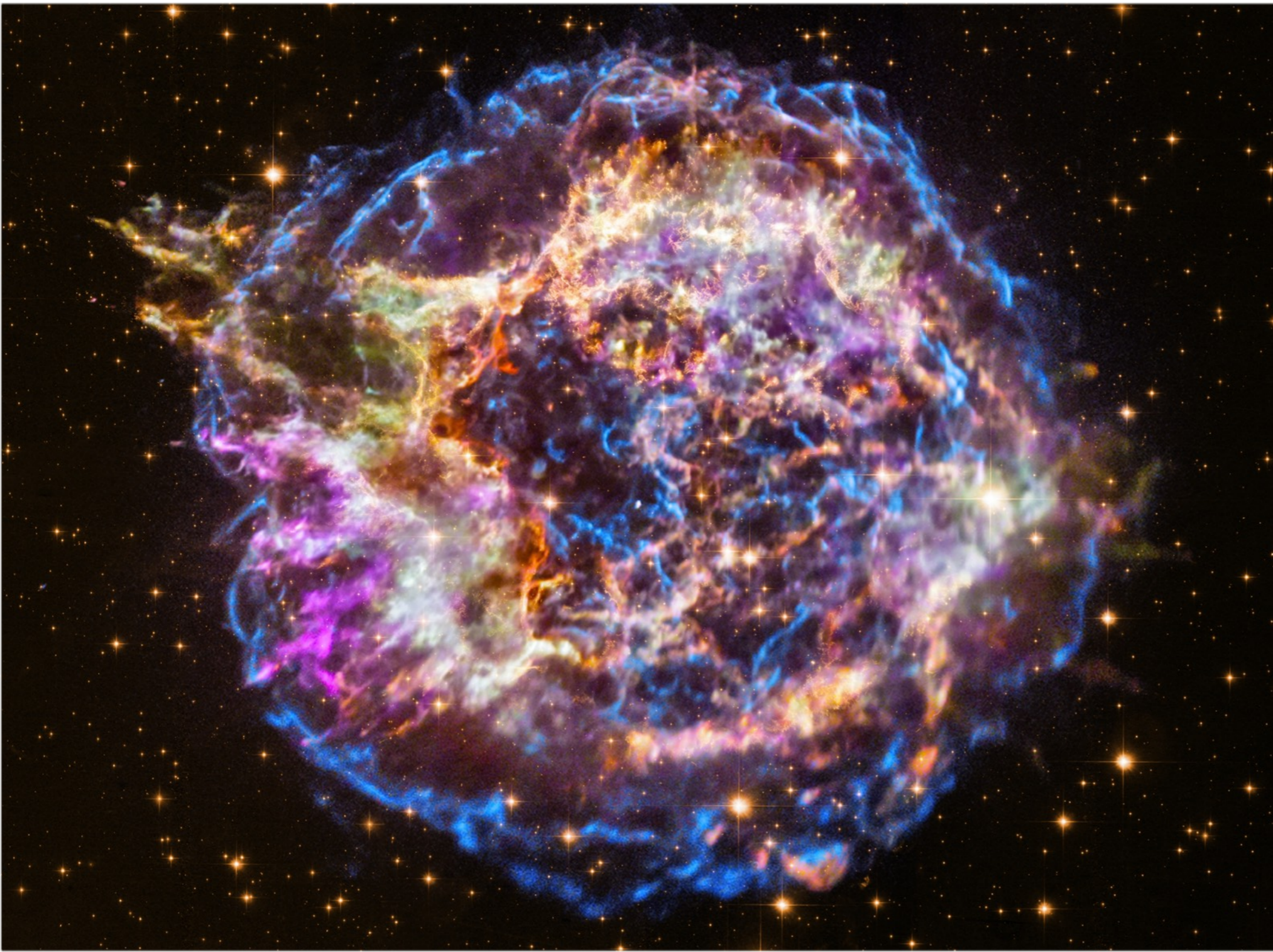
Su	Mo	Tue	We	Th	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Notes:

RECYCLING CASSIOPEIA A

Explanation: Massive stars in our Milky Way Galaxy live spectacular lives. Collapsing from vast cosmic clouds, their nuclear furnaces ignite and create heavy elements in their cores. After a few million years, the enriched material is blasted back into interstellar space where star formation can begin anew. The expanding debris cloud known as Cassiopeia A is an example of this final phase of the stellar life cycle. Light from the explosion which created this supernova remnant would have been first seen in planet Earth's sky about 350 years ago, although it took that light about 11,000 years to reach us. This false-color image, composed of X-ray and optical image data from the Chandra X-ray Observatory and Hubble Space Telescope, shows the still hot filaments and knots in the remnant. It spans about 30 light-years at the estimated distance of Cassiopeia A. High-energy X-ray emission from specific elements has been color coded, silicon in red, sulfur in yellow, calcium in green and iron in purple, to help astronomers explore the recycling of our galaxy's star stuff. Still expanding, the outer blast wave is seen in blue hues. The bright speck near the center is a neutron star, the incredibly dense, collapsed remains of the massive stellar core.

Image Credit: X-ray - NASA, CXC, SAO; Optical - NASA, STScI



Sun	Mon	Tue	Wed	Thu	Fri	Sat
					May 1	2
3	4	5	6 Eta Aquarids Meteor Shower	7 Eta Aquarids Meteor Shower Full Moon Supermoon	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22 New Moon	23
24	25	26	27	28	29	30
31						

Notes:

June

Su	Mo	Tue	We	Th	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				



**MESSIER 24: SAGITTARIUS
STAR CLOUD**

Explanation: Unlike most entries in Charles Messier's famous catalog of deep sky objects, M24 is not a bright galaxy, star cluster, or nebula. It's a gap in nearby, obscuring interstellar dust clouds that allows a view of the distant stars in the Sagittarius spiral arm of our Milky Way galaxy. When you gaze at the star cloud with binoculars or small telescope you are looking through a window over 300 light-years wide at stars some 10,000 light-years or more from Earth. Sometimes called the Small Sagittarius Star Cloud, M24's luminous stars fill the left side of this gorgeous starscape. Covering about 4 degrees or the width of 8 full moons in the constellation Sagittarius, the telescopic field of view contains many small, dense clouds of dust and nebulae toward the center of the Milky Way, including reddish emission from IC 1284 near the top of the frame.

Image Credit
& Copyright: Roberto
Colombari

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	Jun 1	2	3	4	5 Full Moon	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21 New Moon	22 Summer Solstice	23	24	25	26	27
28	29	30				

Notes:

July						
Su	Mo	Tue	We	Th	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Markus Bauer
Astrofotografie



THE LEO TRIO

Explanation: This group is popular in the northern spring. Famous as the Leo Triplet, the three magnificent galaxies gather in one field of view. Crowd pleasers when imaged with even modest telescopes, they can be introduced individually as NGC 3628 (left), M66 (bottom right), and M65 (top). All three are large spiral galaxies but they tend to look dissimilar because their galactic disks are tilted at different angles to our line of sight. NGC 3628, also known as the Hamburger Galaxy, is temptingly seen edge-on, with obscuring dust lanes cutting across its puffy galactic plane. The disks of M66 and M65 are both inclined enough to show off their spiral structure. Gravitational interactions between galaxies in the group have left telltale signs, including the tidal tails and warped, inflated disk of NGC 3628 and the drawn out spiral arms of M66. This gorgeous view of the region spans almost two degrees (four full moons) on the sky. The field covers about a million light-years at the trio's estimated distance of 30 million light-years. Of course the spiky foreground stars lie within our own Milky Way.

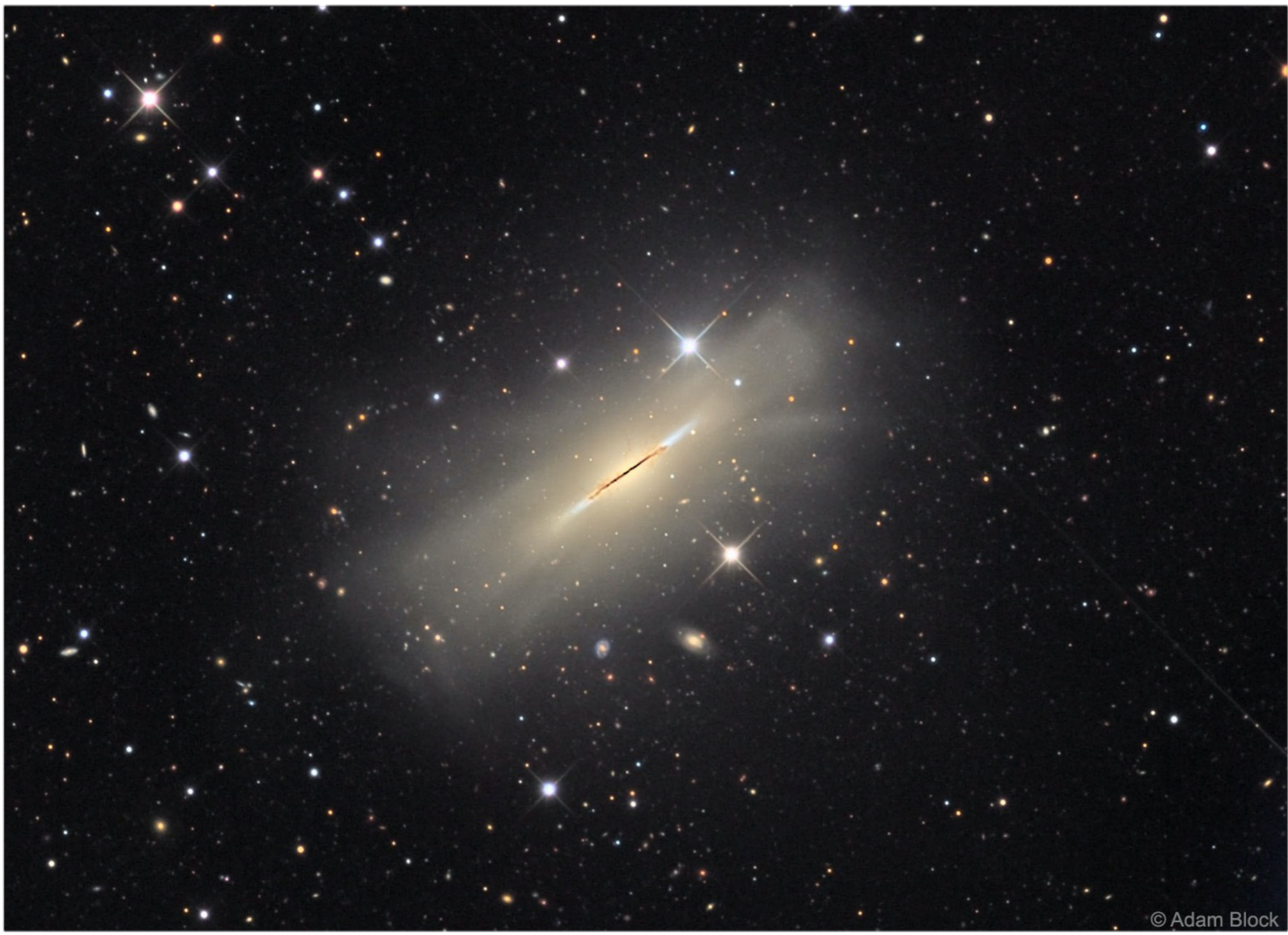
Image Credit & Copyright: Markus Bauer

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			Jul 1	2	3	4
5 Full Moon	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20 New Moon	21	22	23	24	25
26	27	28 Delta Aquarids Meteor Shower	29 Delta Aquarids Meteor Shower	30	31	Aug 1

August

Notes:

Su	Mo	Tue	We	Th	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					



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THE EDGE-ON SPINDLE GALAXY

Explanation: What kind of celestial object is this? A relatively normal galaxy -- but seen from its edge. Many disk galaxies are actually just as thin as NGC 5866, pictured here, but are not seen edge-on from our vantage point. A perhaps more familiar galaxy seen edge-on is our own Milky Way Galaxy. Cataloged as M 102 and NGC 5866, the Spindle galaxy has numerous and complex dust lanes appearing dark and red, while many of the bright stars in the disk give it a more blue underlying hue. The blue disk of young stars can be seen extending past the dust in the extremely thin galactic plane. There is evidence that the Spindle galaxy has cannibalized smaller galaxies over the past billion years or so, including multiple streams of faint stars, dark dust that extends away from the main galactic plane, and a surrounding group of galaxies (not shown). In general, many disk galaxies become thin because the gas that forms them collides with itself as it rotates about the gravitational center. The Spindle galaxy lies about 50 million light years distant toward the constellation of the Dragon (Draco).

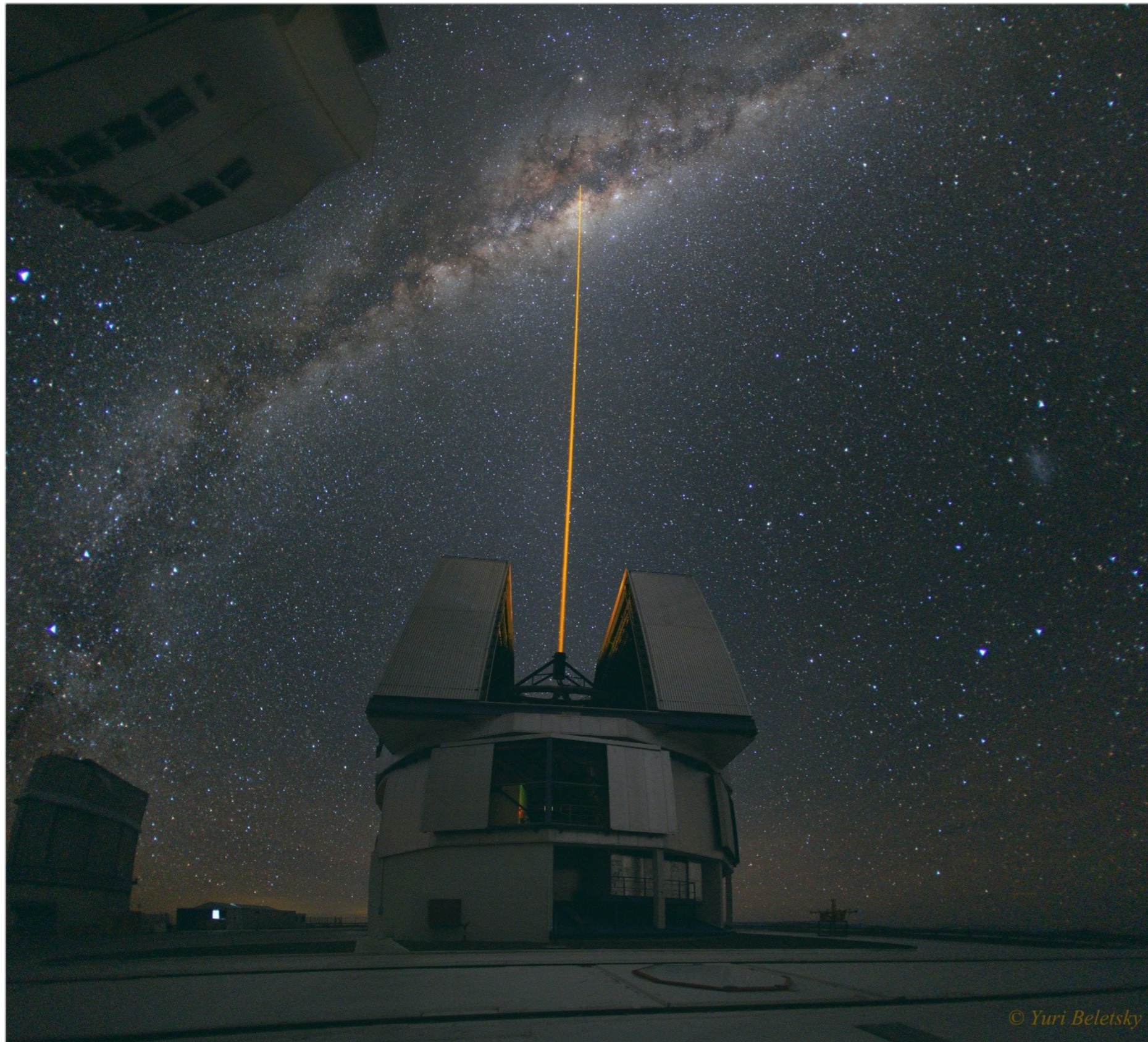
Image Credit & Copyright: Adam Block, Mt. Lemmon SkyCenter, U. Arizona

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						Aug 1
2	3 Full Moon	4	5	6	7	8
9	10	11	12 Perseids Meteor Shower	13 Perseids Meteor Shower	14	15
16	17	18	19 New Moon	20	21	22
23	24	25	26	27	28	29
30	31					

Notes:

September

Su	Mo	Tue	We	Th	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			



A LASER STRIKE AT THE GALACTIC CENTER

Explanation: Why are these people shooting a powerful laser into the center of our Galaxy? Fortunately, this is not meant to be the first step in a Galactic war. Rather, astronomers at the Very Large Telescope (VLT) site in Chile are trying to measure the distortions of Earth's ever changing atmosphere. Constant imaging of high-altitude atoms excited by the laser -- which appear like an artificial star -- allow astronomers to instantly measure atmospheric blurring. This information is fed back to a VLT telescope mirror which is then slightly deformed to minimize this blurring. In this case, a VLT was observing our Galaxy's center, and so Earth's atmospheric blurring in that direction was needed. As for inter-galaxy warfare, when viewed from our Galaxy's center, no casualties are expected. In fact, the light from this powerful laser would combine with light from our Sun to together appear only as bright as a faint and distant star.

Image Credit: Yuri Beletsky (ESO)

© Yuri Beletsky

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		Sep 1	2 Full Moon	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17 New Moon	18	19
20	21	22 Autumnal Equinox	23	24	25	26
27	28	29	30			

Notes:

October						
Su	Mo	Tue	We	Th	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31



COCOON NEBULA DEEP FIELD

Explanation: Inside the Cocoon Nebula is a newly developing cluster of stars. The cosmic Cocoon on the upper right also punctuates a long trail of obscuring interstellar dust clouds to its left. Cataloged as IC 5146, the beautiful nebula is nearly 15 light-years wide, located some 3,300 light years away toward the northern constellation of the Swan (Cygnus). Like other star forming regions, it stands out in red, glowing, hydrogen gas excited by young, hot stars and blue, dust-reflected starlight at the edge of a nearly invisible molecular cloud. In fact, the bright star near the center of this nebula is likely only a few hundred thousand years old, powering the nebular glow as it slowly clears out a cavity in the molecular cloud's star forming dust and gas. This exceptionally deep color view of the Cocoon Nebula traces tantalizing features within and surrounding the dusty stellar nursery.

Image Credit & Copyright: Marcel Drechsler (Baerenstein Obs.)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				Oct 1 Full Moon	2	3
4	5	6	7 Draconids Meteor Shower	8	9	10
11	12	13	14	15	16 New Moon	17
18	19	20	21 Orionids Meteor Shower	22 Orionids Meteor Shower	23	24
25	26	27	28	29	30	31 Full Moon Blue Moon

Notes:

November

Su	Mo	Tue	We	Th	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					



M72: A GLOBULAR CLUSTER OF STARS

Explanation: Globular clusters once ruled the Milky Way. Back in the old days, back when our Galaxy first formed, perhaps thousands of globular clusters roamed our Galaxy. Today, there are less than 200 left. Many globular clusters were destroyed over the eons by repeated fateful encounters with each other or the Galactic center. Surviving relics are older than any Earth fossil, older than any other structures in our Galaxy, and limit the universe itself in raw age. There are few, if any, young globular clusters in our Milky Way Galaxy because conditions are not ripe for more to form. Pictured above by the Hubble Space Telescope are about 100,000 of M72's stars. M72, which spans about 50 light years and lies about 50,000 light years away, can be seen with a small telescope toward the constellation of the Water Bearer (Aquarius).

Image Credit: NASA, ESA, Hubble, HPOW

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Nov 1	2	3	4 Taurids Meteor Shower	5 Taurids Meteor Shower	6	7
8	9	10	11	12	13	14
15 New Moon	16	17 Leonids Meteor Shower	18 Leonids Meteor Shower	19	20	21
22	23	24	25	26	27	28
29	30 Full Moon					

Notes:

December

Su	Mo	Tue	We	Th	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		



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GIGANTIC JET LIGHTNING OVER INDIA

Explanation: Yes, but can your lightning bolt do this? While flying from Munich to Singapore earlier this month, an industrious passenger took images of a passing lightning storm and caught something unexpected: gigantic jet lightning. The jet was captured on a single 3.2-second exposure above Bhadrak, India. Although the gigantic jet appears connected to the airplane's wing, it likely started in a more distant thundercloud, and can be seen extending upwards towards Earth's ionosphere. The nature of gigantic jets and their possible association with other types of Transient Luminous Events (TLEs) such as blue jets and red sprites remains an active topic of research.

Image Credit & Copyright: Hung-Hsi Chang

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		Dec 1	2	3	4	5
6	7	8	9	10	11	12
13 Geminids Meteor Shower	14 New Moon Geminids Meteor Shower	15	16	17	18	19
20	21 Winter Solstice Ursids Meteor Shower	22 Ursids Meteor Shower	23	24	25	26
27	28	29	30 Full Moon	31		

Notes:

January

Su	Mo	Tue	We	Th	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

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Jupiter Engulfed and the Milky Way
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