



Newsletter of the Pomona Valley Amateur Astronomers

Space isn't remote at all. It's only an hour's drive away,
if your car could go straight upwards.

Sir Fred Hoyle



Volume 41 Number 08

nightwatch

August 2021

M13 and M16

With new moon on July 9, we were at the dark site camping on the nights of Friday July 9 and July 10. Both nights were pretty clear, even though the daytime was quite hot with clouds passing throughout the afternoon. However, I woke to a brief rain shower Saturday morning that woke me up to cover the equipment with tarps for protection. Sunday night I was awoken again by the sound of rain on the RV, but this time I took the equipment apart in large sections and brought it inside the RV for a shortened session. Right after sunset on both nights, Venus was easily seen in the west and with binoculars, nearby Mars was also visible. Closest approach was July 12, but the two were easily within a degree apart on July 10. No pictures, though.

Prior to heading out the dark site, I needed to set up in the back yard and sort out parameters for a new, longer guide scope I purchased. Obviously, I needed a target so I aimed at M13, the Hercules Cluster, a globular cluster that you might remember from about 3 years ago. After working out adapters and spacers to be able to focus, I took an hour's worth of 60 second luminance data for evaluation. Between gear that has changed over the last 3 years (mainly a new mount and filters) and probably an unusually stable sky that evening, the cluster looked very sharp. At that point, I wished I had taken some color shots to add to the image. Then I remembered the previous shot, which did have color. I aligned the two frames and combined them. The new luminance data really improved the old image. So the first image is a new and improved M13.



So with a new guide scope dialed in, I targeted M16 in Serpens for the dark weekend. I last shot this 8 years ago. In fact, it was my first target from the dark site when I first started going there in 2013. M16 is also known as the Eagle Nebula and includes the well-known star-forming region “the Pillars of Creation” that the Hubble Telescope made famous, an open cluster of stars, and several other star-forming regions such as

the aforementioned Pillars. The nebula is about 5,700 light years away and spans about 50 to 70 arcseconds of the sky. The open cluster that is lighting the nebula is estimated to be very young at only 1-2 million years and contain about 8,100 stars. The brightest star included in M16 shines is about magnitude 8.24 and is easily viewed using binoculars.



The technical details for the M16 image are that the image is an LRGB picture comprising 189 1-minute luminance subframes (3+ hours), 21 3-minute red subs (just over an hour), and 28 2-minute green and blue subs (just under an hour). All were calibrated with 10 to 15 darks and 21 flats and dark flats. All the color data was captured in one evening, while the luminance data was captured over two nights. The luminance and RGB images were processed separately before combining

After combining, color saturation was gradually increased. While I like the detail in the image, I’m not satisfied with the final color. I’m not sure if I needed more color data or if I’m still having trouble balancing the red compared with green and blue.

I hope you enjoy the images.

Ron Ugolick

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PVAA General Meeting 07/23/21

We held our general meeting remotely using Zoom. All the officers that were up for re-election were voted in. We have the secretary's position on the board still open for those who are interested.

Our speaker for the night was Thomas Spirock of the Springfield Telescope Makers, in Springfield Vermont. The title of his presentation was 'Latest Lucky Imaging Results Using the 13" Schupmann Telescope at Stellafane and the 6" Warner & Swasey Refractor at Mt. Wilson'. Thomas started with a little history of the club. He showed a picture of their first mirror making class – taken on 8/17/20 with 13 men in suits and ties, and one lady. So, the club has been around for a hundred years!

Why do we want a Schupmann? ...

Latest Lucky Imaging Results Using the Stellafane Schupmann

Our goal is to capture the most subtle details on our target as possible.

- A perfectly achromatic refractor.
- No central obstruction.
- Corrects for atmospheric dispersion.
- Back surface reflective coatings scatter less than front surface coatings.
- Smaller mirrors scatter less than larger mirrors.
- A Mangin mirror is easier to make than a 2nd lens.
- All spherical optics.



From "Building a Schupmann Refracting Medial Telescope", 2019 HHW, Cliff Ashcraft

By Thomas Spirock, tspirock@gmail.com, STMs, 7/23/2021, PVAA



The Shupmann Telescope is a combination of refracting and reflecting in one telescope. It starts out with a 14-inch (13" usable) lens in front, followed by two mirrors. This design eliminates the chromatic aberration caused by the main lens. By design the Shupmann does not have any central obstructions. A Newtonian reflector has a secondary mirror, blocking some of the incoming light and causing diffraction. The Schupmann design can also correct for atmospheric diffraction, just by changing the tilt of the field mirror. Using a back-surfaced mirror reduces the scattering, resulting in better contrast and sharpness. Another way to increase sharpness on a marginal seeing night is to use smaller telescopes, or "stop-down" the larger scope.

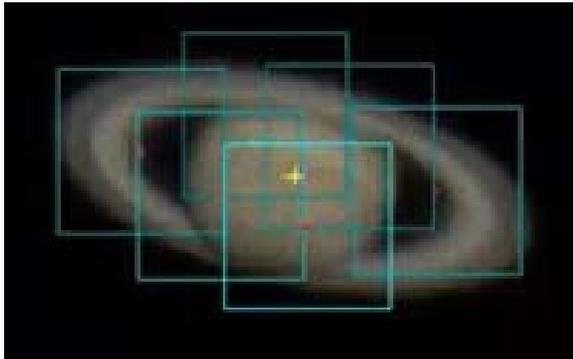


Image being aligned.

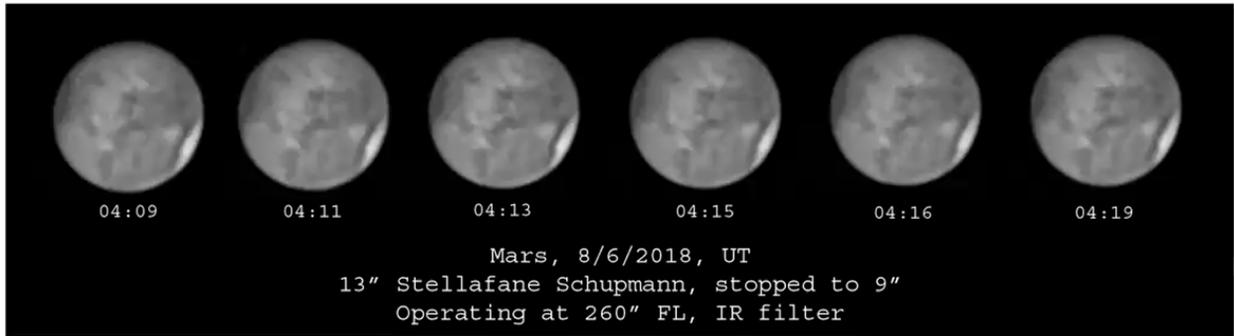


Final image after wavelet processing

Thomas mentioned the 6-inch reflector at Mt. Wilson, and then got into 'Lucky Imaging'. Lucky imaging is the process of capturing and saving many short exposures as rapidly as possible then selecting the "good" images, to be aligned, averaged, and enhanced, in post-processing. 1-Capture raw images, 2-Pre-align, if necessary, 3-Select "good" images, align and average, 4-Wavelet processing, 5-Other post-processing, as necessary.

Latest Results ... [Stellafane Schupmann](#)

Latest Lucky Imaging Results Using the Stellafane [Schupmann](#)



Mars, August, 2018

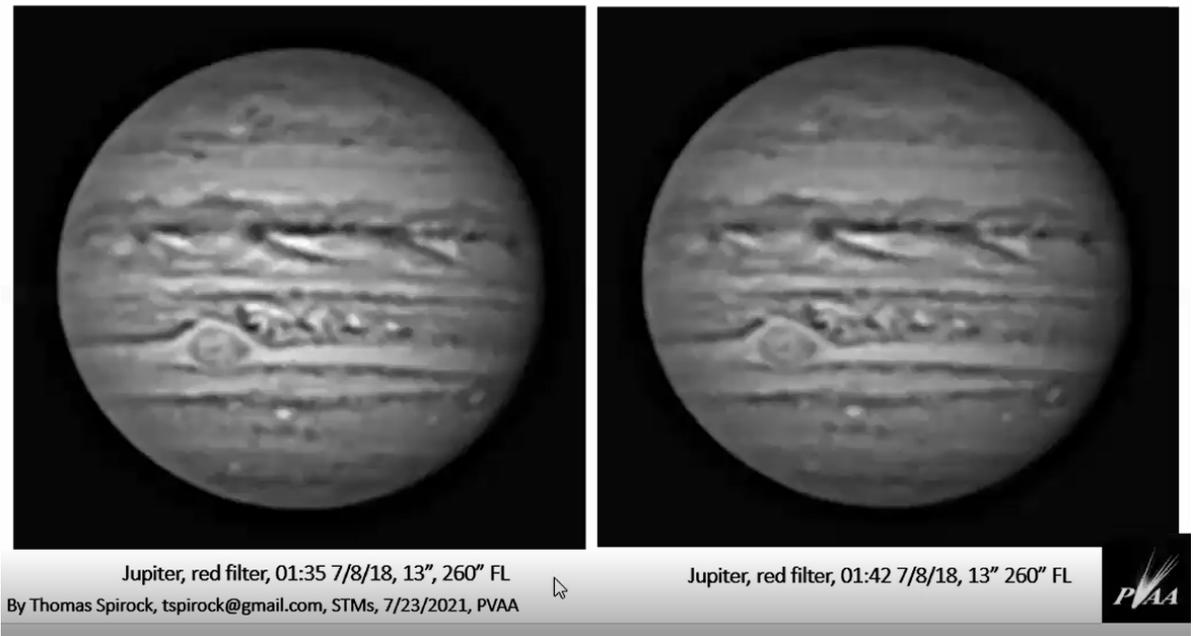
To capture his images, he uses cameras and filters by ZWO, and a free capture software called FireCapture. It creates a video of all the images. Thomas also uses another free program called Planetary Image Pre-Processor. This aligns the images so they can be shown as a video without the image wobbling around. Now we have a video of good, marginal, and bad image quality frames. Another free program called AutoStakkert selects the highest quality frames and stacks them to create a single image. He then goes into Wavelet processing using a program called Registax, which is also free. This will really sharpen the image.

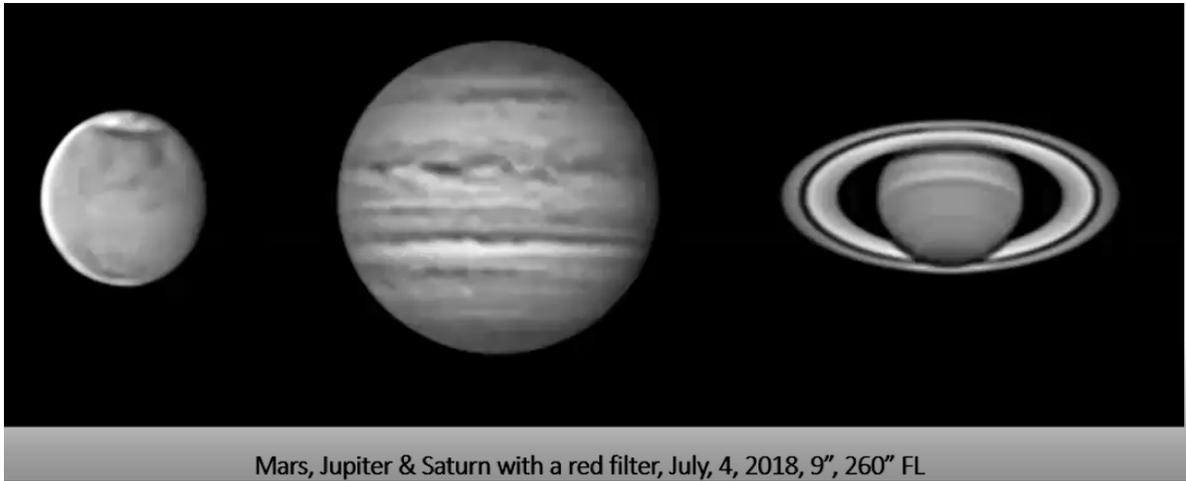
Mr. Spirock then showed us several images of Mars, Saturn, Jupiter, and the moon. He showed the difference of HDR (High Dynamic Range) images using different filters.

Gary Thompson

Latest Results ... [Stellafane Schupmann](#)

Latest Lucky Imaging Results Using the Stellafane [Schupmann](#)





Mars, Jupiter & Saturn with a red filter, July, 4, 2018, 9", 260" FL

Image after Wavelet processing.

HRD imaging is not just for astronomical targets ...

Latest Lucky Imaging Results Using the Stellafane [Schupmann](#)

Stellafane and the Porter Turret Telescope, Autumn, 2019



HDR



Standard Exposure

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Club Events Calendar

Aug 20 General Meeting – David Nakamoto of LAAS on “Star Hopping”

Sep 4 Star Party – GMARS

Sep 8 Board Meeting

Sep 11 Star Party in the Park – Cahuilla Park

Sep 17 General Meeting – Brian Carter on “Three-Body Problem”

Oct 9

Oct 13

Oct 22

Nov 6

Nov 10

Nov 19

Dec 11

Star Party – TBD

Board Meeting

General Meeting (presentation: TBD)

Star Party – TBD

Board Meeting

General Meeting (presentation: TBD)

Christmas Party

Tulip Nebula

We went out early this month, starting on Thursday August 5, and stayed an extra day. New moon was Sunday, so what little moon was out rose very early in the morning. Normally I try to get set up at home a week or so before heading out, to make sure that everything is set up and working properly, and to help make sure I bring everything needed, but I generally don't take enough images to make a good final result. I aimed at my dark site target and managed 8 hours of narrow-band from which I was able to get a good final image. With narrow-band data in hand, the dark site session focused on broad-band data. Once there, though, I found that after taking luminance data Thursday night and color data Friday night, I had enough data for a good image, so I repeated the narrow-band sequence from the dark site. That's why this month you get three different versions of the same image. Hopefully at least one of them suits your taste.

The target for August is one I haven't imaged since 2014, the Tulip Nebula or Sharpless 2-101, in Cygnus. Located about 6,000 light years from Earth, it is a hydrogen-rich region of space lying in the plane of the Milky Way from our vantage point as evidenced by the large number of stars in the image. Additionally, although I find no reference to it, there is a good amount of oxygen in the region as well, based on the blue glow to the west of the Tulip in the Hubble palette versions.

In addition to the gas clouds, there is a microquasar, a small-ish black hole, nearby as well. Cygnus X-1 is part of a binary system, also about 6,000 light years away, west of the Tulip. The lower part of the Tulip points west (to the right) toward two relatively bright stars that are oriented vertically. The brighter of the two stars is the companion to the invisible microquasar.



The first image was taken from my backyard, Bortle 8 skies (that means almost inner city bright) using narrow-band filters, so I could only take 5-minute frames in order to avoid limiting the contrast (or dynamic range) in the final image. (Narrow-band means that only specific wavelengths of light are passed through the filter. They are "narrow" because the range of light frequencies that pass are only 5 nm in width. So for example, using the H-alpha filter, light at 656.3 ± 2.5 nm passes through the filter and all other frequencies are blocked.) This image is a combination of 36 frames taken through each of the S-II and O-III filters and 12 frames through the H-alpha filter for a total of 7 hours. The frames were calibrated with 21 dark frames, flat frames, and dark flat frames.

The so-called Hubble palette was used where sulfur is mapped to red, hydrogen is mapped to green, and oxygen is mapped to blue giving a “false color” image. For those who “need to know”, the frames were stacked in DeepSkyStacker, initially stretched in FITS Liberator, and converted to color in Photoshop. In Photoshop, colors were adjusted to get (what I think) are more pleasing turquoise/gold colors.



The second image is from the dark site under Bortle 4 skies, which is sufficiently dark to see the Milky Way. On the first evening, I shot only luminance frames. The luminance filter allows all light from just under 400 nm to just over 700 nm in wavelength to pass through (a range greater than 300 nm compared to the narrow-band range of 5 nm). Seeing for the entire weekend was unusually good, meaning the stars were not twinkling very much, and that made for smaller stars than I normally see. However, taking 5-minute frames saturated and bloated many of the stars, negating the seeing conditions. The second night I shot through the color filters red (about 620 to 700 nm), green (about 495 to 565 nm), and blue (about 400 to 510 nm) with exposures of 5-minutes. In all I took 68 images through the luminance filter and 24 images through each of the red, green, and blue filters for a total of 11 hours and 40 minutes. The frames were calibrated with 21 darks, flat, and dark flat frames. The toughest part of processing this version was in taming the stars, which still are a little too numerous and bright in my opinion. After stacking the frames, the red, green, and blue stacks were prestretched in FITS Liberator and combined into a color image, then the luminance and RGB frames were processed separately. Once I got to a point where I didn't want the stars brighter, I created a starless version of each for further stretching. Then I recombined the starless version with the stars version. Finally, the luminance stack was combined with the RGB stack and some final adjustments were made in Photoshop.



The final version is another narrow-band image, but this time taken from the Bortle 4 dark site. Because the sky is so much darker, I took 15-minute frames, but even then, I should have taken longer frames. The longer integration time used, compared to those taken at home, brought out many more of the faint details in the area, even though the total integration time is less. That is why taking these pictures from a dark site is so important. This image is a combination of 8 frames taken through each of the H-alpha, S-II, and O-III filters for a total of 6 hours of data. The frames were calibrated with 8 dark frames and 21 flat and dark flat frames. After stacking, in DeepSkyStacker, prestretching was done in FITS Liberator before combining the frames in Photoshop. Processing was done about the same as with the version taken from home except that it was much easier to process without having to deal with the light pollution.

Until next month, I hope you enjoy the images.

Ron Ugolick

<https://www.astrobin.com/users/rucedu/>

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Catch Andromeda Rising

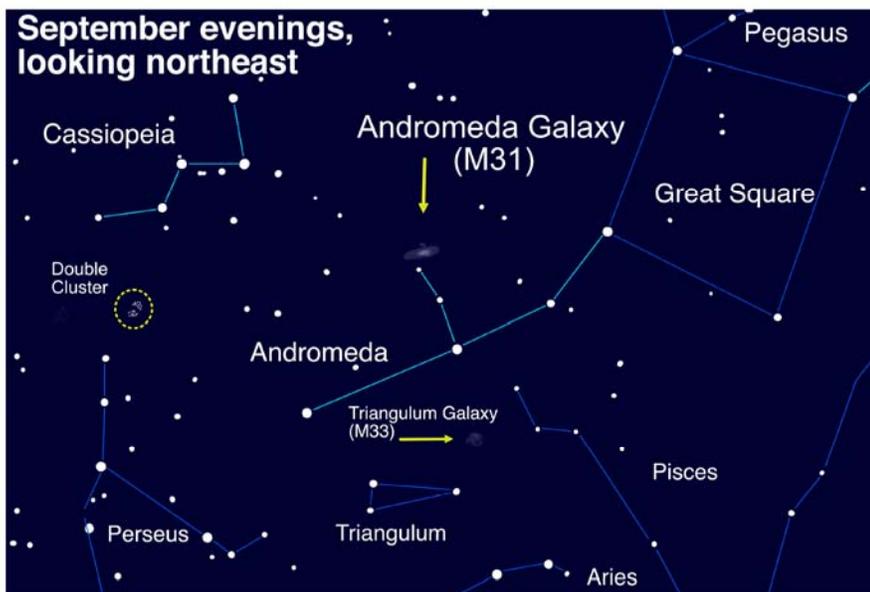
David Prosper

If you're thinking of a galaxy, the image in your head is probably the Andromeda Galaxy! Studies of this massive neighboring galaxy, also called M31, have played an incredibly important role in shaping modern astronomy. As a bonus for stargazers, the Andromeda Galaxy is also a beautiful sight.

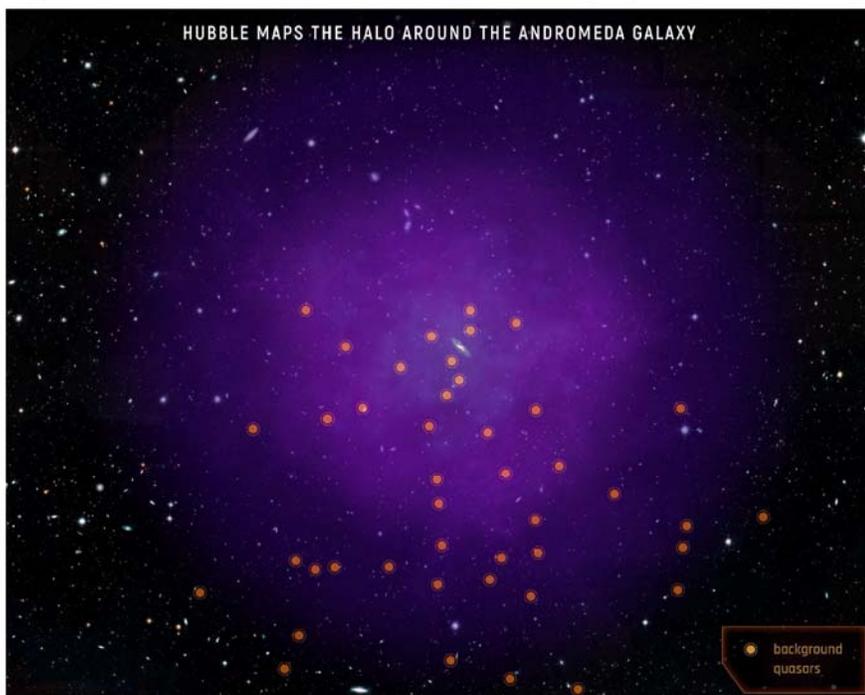
Have you heard that all the stars you see at night are part of our Milky Way galaxy? While that is mostly true, one star-like object located near the border between the constellations of Andromeda and Cassiopeia appears fuzzy to unaided eyes. That's because it's not a star, but the Andromeda Galaxy, its trillion stars appearing to our eyes as a 3.4 magnitude patch of haze. Why so dim? Distance! It's outside our galaxy, around 2.5 million light years distant - so far away that the light you see left M31's stars when our earliest ancestors figured out stone tools. Binoculars show more detail: M31's bright core stands out, along with a bit of its wispy, saucer-shaped disc. Telescopes bring out greater detail but often can't view the entire galaxy at once. Depending on the quality of your skies and your magnification, you may be able to make out individual globular clusters, structure, and at least two of its orbiting dwarf galaxies: M110 and M32. Light pollution and thin clouds, smoke, or haze will severely hamper observing fainter detail, as they will for any "faint fuzzy." Surprisingly, persistent stargazers can still spot M31's core from areas of moderate light pollution as long as skies are otherwise clear.

Modern astronomy was greatly shaped by studies of the Andromeda Galaxy. A hundred years ago, the idea that there were other galaxies beside our own was not widely accepted, and so M31 was called the "Andromeda Nebula." Increasingly detailed observations of M31 caused astronomers to question its place in our universe – was M31 its own "island universe," and not part of our Milky Way? Harlow Shapley and Heber Curtis engaged in the "Great Debate" of 1920 over its nature. Curtis argued forcefully from his observations of dimmer than expected nova, dust lanes, and other oddities that the "nebula" was in fact an entirely different galaxy from our own. A few years later, Edwin Hubble, building on Henrietta Leavitt's work on Cepheid variable stars as a "standard candle" for distance measurement, concluded that M31 was indeed another galaxy after he observed Cepheids in photos of Andromeda, and estimated M31's distance as far outside our galaxy's boundaries. And so, the Andromeda Nebula became known as the Andromeda Galaxy.

These discoveries inspire astronomers to this day, who continue to observe M31 and many other galaxies for hints about the nature of our universe. One of the Hubble Space Telescope's longest-running observing campaigns was a study of M31: the Panchromatic Hubble Andromeda Treasury (PHAT): bit.ly/m31phat . Dig into NASA's latest discoveries about the Andromeda Galaxy, and the cosmos at large, at nasa.gov.



Spot the Andromeda Galaxy! M31's more common name comes from its parent constellation, which becomes prominent as autumn arrives in the Northern Hemisphere. Surprising amounts of detail can be observed with unaided eyes from dark sky sites. Hints of it can even be made out from light polluted areas. *Image created with assistance from Stellarium*



While M31's disc appears larger than you might expect (about 3 Moon widths wide), its "galactic halo" is much, much larger – as you can see here. In fact, it is suspected that its halo is so huge that it may already mingle with our Milky Way's own halo, which makes sense since our galaxies are expected to merge sometime in the next few billion years! The dots are quasars, objects located behind the halo, which are the very energetic cores of distant galaxies powered by black holes at their center. The Hubble team studied the composition of M31's halo by measuring how the quasars' light was absorbed by the halo's material. *Credits: NASA, ESA, and E. Wheatley (STScI) Source: <https://bit.ly/m31halo>*