NIGHTFALL

A Publication of the Huachuca Astronomy Club

February 2019

President's Notes

It's February everybody, time to tug on the warm clothes and begin renewing our familiarity with the nighttime sky. Throughout the night, Orion rules the sky first battling Taurus the bull then later in the night being snuck up on by the lion Leo. Put together a list of the most varied objects you can think of and you will find representatives of those objects in these three constellations. Galaxies? Gotem, loads of them. Any kind of nebula? You bet, emission, reflection, planetary, dark, look in Orion. Supernovas? Yes, Messier numbero uno, in Taurus. What about a carbon star? Nice try but there is, BL Orionis 6h 25m RA., +14°43′+2.4 Dec, mag 5.9 – 6.6 (6.6) described as fiery orange-red. Oh yeah well how about a comet? Comet C/2018 E1 (ATLAS) is in Leo but its estimated mag is 18.8 and fading so bring out the big scope. Those three have got it all.

If planets are your thing this month, most of the bright planets show themselves in the predawn sky. Jupiter is in Scorpius, Saturn is in Sagittarius, and Venus wanders close to both through the month making for some nice conjunctions. Our evenings in February will be devoid of bright planets but there will be a conjunction of Mars (now a meager ruddy dot at mag 1) and Uranus (at mag 5.8), which will actually be more than 12 times farther away from Earth. Their smallest separation of about 1 degree will happen on Wednesday February 13 evening, when the red and blue planets will appear together in binoculars or in the eyepiece of a backyard telescope at very low magnification.

Lastly, I would be remiss to not remind you that next month it is time again for the Huachuca Astronomy Club of Southeastern Arizona's (HAC)'s 2nd Short Periodic Astronomical/Optical Swap Meet and Sale. The event will take place Saturday, March 23, 2019, at the Patterson Observatory. Setup starts at 11AM. Sales are from Noon to 4PM. Bring things, leave with things. See old friends and become an astro enabler, it's a good thing.

Until next time dress warm get out there and stare.

Please Welcome Our New Members

Will and Karen Tool of Sierra Vista joined the club in January. We also welcome back Scott Schneeweis who recently rejoined the club. Welcome! We are glad you joined.

At the February Meeting

The February meeting will be held at the Patterson Observatory at 7 pm on Friday, February 22. Our usual venues are unavailable so this month's meeting will be a little less formal. We will have the opportunity to hear from our members about their new equipment and their latest projects. Contact David Roemer if you want to give a short update on your own activities.

Are your Dues up to date?

Some members are still in arrears. Please contact the treasurer, Ted Forte, if you haven't paid your 2019 dues.

Brightest Comets Seen Just before World War II

By David Roemer

Months ago, I was asked if there was a way to find a comet that one of our HAC members remembered as a young man. Without a solid date, it isn't easy, so chatting about it little more we were able to confine the time frame to the period just before World War II. Beyond that, he could remember living in the Midwest, and while viewing the comet, he remembered it being very bright. However, he couldn't remember the exact month or what type of weather he had experienced. I think most people remember being pulled from the bed, bundled up, and still freezing our keisters off, to view some early morning celestial event. Whether the event was spectacular or not, cold weather usually plays a part in a story's retelling. Therefore, it was probably not a winter comet.

Whittling it down that far still could lead to a long list of comets, but he recalled it because it was quite to very bright. Luckily, we have the International Comet Quarterly (ICQ), an organization that keeps track of these things. As well, there is reference information available from the Harvard College International Astronomical Union, the *Quarterly Journal of the Royal Astronomical Society*, *Sky and Telescope*, *Publications of the Astronomical Society of the Pacific*, and *Journal of the British Astronomical Association*. I've included the whole list of bright comets seen since 1935, as it includes some recent favorites, for your records.

Brightest Comets Seen Since 1935	
Peak Visual Magnitude m1**	Comet Designation and Year
(-10)	C/1965 S1 (Ikeya-Seki)
(-5.5)	C/2006 P1 (McNaught)
-3.0	C/1975 V1 (West)
(-3)	C/1947 X1 (Southern comet)
(-1)	C/1948 V1 (Eclipse comet)
(-1)	C/2011 S3 (Lovejoy)
-0.8	C/1995 O1 (Hale-Bopp)
(-0.5)	C/1956 R1 (Arend-Roland)
(-0.5)	C/2002 V1 (NEAT)
0.0	C/1996 B2 (Hyakutake)
0.0	C/1969 Y1 (Bennett)
(0)	C/1973 E1 (Kohoutek)
(0)	C/1962 C1 (Seki-Lines)
0.5	C/1998 J1 (SOHO)
1.0	C/1957 P1 (Mrkos)
(1.0)	C/2011 L4 (PANSTARRS)
(1)	C/1970 K1 (White-Ortiz-Bolelli)
1.7	C/1983 H1 (IRAS-Araki-Alcock)
(2)	***C/1941 B2 (de Kock-Paraskevopoulos)***
(2.2)	C/2002 T7 (LINEAR)
2.4	1P/1982 U1 (Halley)
(2.4)	17P (Holmes) [Oct. 2007]
2.5	C/2000 WM_1 (LINEAR)
2.7	C/1964 N1 (Ikeya)
2.8	C/2001 Q4 (NEAT)
2.8	C/1989 W1 (Aarseth-Brewington)
2.8	C/1963 A1 (Ikeya)
2.9	153P/2002 C1 (Ikeya-Zhang)
3.0	C/2001 A2 (LINEAR)
3.3	***C/1936 A1 (Peltier)***
(3.3)	C/2004 F4 (Bradfield)
3.5	C/2004 Q2 (Machholz)
3.5	C/1942 X1 (Whipple-Fedtke-Tevzadze)
3.5	***C/1940 R2 (Cunningham)***
3.5	***C/1939 H1 (Jurlof-Achmaro Hassel)***
3.5	C/1959 Y1 (Burnham)
3.5	C/1969 T1 (Tago-Sato-Kosaka)
3.5	C/1980 Y1 (Bradfield)
(3.5)	C/1961 O1 (Wilson-Hubbard)
(3.5)	C/1955 L1 (Mrkos)
3.6	C/1990 K1 (Levy)
3. 7	C/1975 N1 (Kobayashi-Berger-Milon)
3.9	C/1974 C1 (Bradfield)
3.9	***C/1937 N1 (Finsler)***

** As documented in the ICQ archive and Circulars (but also consulting the reports in the "peak m1" is the maximum observed total visual magnitude as seen by ground-based observers.

Poring over the combined list, five comets jumped to the front. C/1941 B2 (de Kock-Paraskevopoulos) was a very bright comet in 1941, peaking at a visual magnitude of two. For comparison, C/1941 B2 was brighter than Halley's Comet during its last passage, and there are only 48 stars brighter than mag. 2, so this was a very bright comet. It also had a classical comet look. A wide, bright head and a long, broad, straight tail, much as Comet Halley usually presents. Unfortunately, for this inquiry, C/1941 B2 came and went early in the dead of winter, surely weather would have been a factor in the upper Midwest; bummer.

C/1941 B2 Comet de Kock-Paraskevopoulos

Source: A photograph of Comet C/1941 B2 (de Kock-Paraskevopoulos) taken with the 61-cm (24-in) reflector at the Yerkes Observatory (Courtesy University of Chicago Photographic Archive, apf6-02105, Special Collections Research Center, University of Chicago Library) Photograph Date 1941-02-15

The second brightest of the five, C/1936 A1 (Peltier), appeared years earlier at the other end of his comet viewing window. This comet was met with some fanfare in May of 1936. *The Harvard Crimson* wrote:

"Promising one of the heavens' most brilliant spectacles in recent years, the new Peltier comet, first of the season, gives indications that it will become visible to the naked eye just before sunrise during the latter part of July. No other comet has swum into man's unaided ken since 1927. Since its discovery Friday, computations of the stellar body's orbit and other conclusive calculations have already been made by the Observatory.

The local astronomers were only second on the scene of notion, however. Credit for the discovery goes to Leslie C. Peltier, garage employee of Delphos, Ohio. One of the world's most distinguished amateur astronomers, Mr. Peltier hereby chalks up the fourth in his string of comet discoveries; his other most recent success was achieved in 1933.

With a nucleus and tail about one degree in length, the comet is located in the Constellation Cepheus through which it is rambling south and east at a rate sufficient

to keep visible for some months to come. On the average about six comets a year, come within range of the earth's telescopes.

This one is now 120,000,000 miles away. Latest Observatory figures show it has increased in brightness from ninth to eighth magnitude since the initial recording Friday, and by the end of July, before beginning to recede, will be brighter than the sixth magnitude and within 20,000,000 miles of terra firma."

Visual estimates for comet C/1936 A1, peaked at magnitude 3.3, much brighter than anticipated and the comet was visible all through the summer of 1936. Bright and seen in summer skies makes this comet a strong possibility. Descriptions of the comet and images taken during its passage show the head was bright but the tail was narrow and spike-like.

C/1936 A1 Comet Peltier

Source: Publications of the Astronomical Society of the Pacific © 1936 The University of Chicago Press

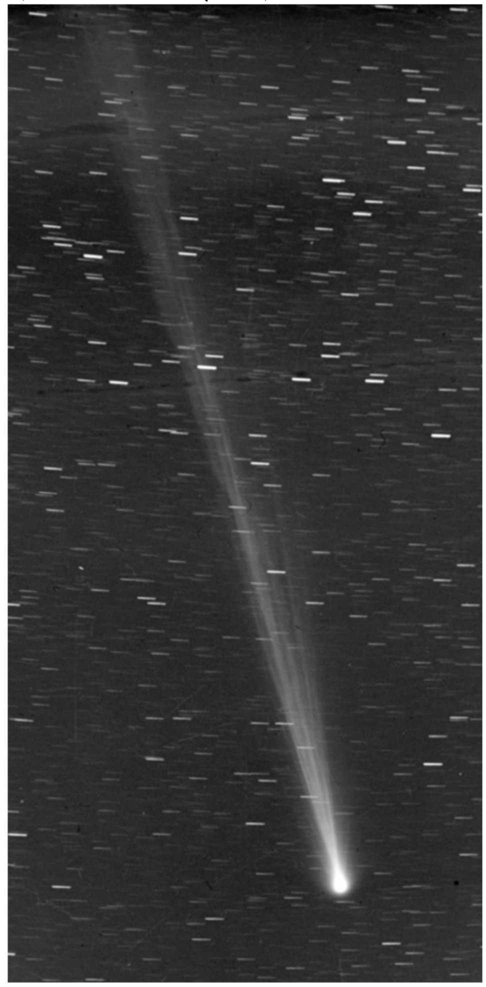
Right dab in the middle of the expected timeframe, the third candidate, comet C/1940 R2 (Cunningham), made its appearance. At a peak magnitude of 3.4, it was just about as bright as C/1936 A1, but it came and went in the depths of winter, shining brightest in December of 1940. Images show a large head and narrow perhaps braiding tail like C/1936 A1.

Comet C/1940 R2 (Cunningham)

Source: Comet C/1940 R2 (Cunningham) photographed with the 24-inch reflector telescope at Yerkes Observatory on December 24, 1940

Just a year before, comet C/1940 R2 (Cunningham), another very bright comet had been found, C/1939 H1 (Jurlof-Achmarof-Hassel), peaked at magnitude 3.5 in the spring of 1939. This must have been a beautiful object to behold. Although a bit dimmer, C/1939 H1 would have displayed a bright tail braiding out for many degrees in a dark sky. Could this be the comet of his memories?

Comet C/1939 H1 (Jurlof-Achmarof-Hassel)



Source: C/1939 H1 (Jurlof-Achmarof-Hassel) April 19-20, 1939, at Heidelberg Koenigstuhl Observatory

When it rains it pours, as the old saying goes, describes the string of bright comets that were pouring in the later years of the 1930's. Comet C/1937 N1 (Finsler) was discovered on July 4, 1937, about 1.5 months before its perihelion passage. It occupied the night skies until it was last seen on December 30, 1937. At its peak during the summer of 1937, it was mag. 3.9. A bit dimmer than the rest of the comets on our list, however it may make up for that by its longevity during summertime viewing, everyone would have had a chance to see this one. C/1937 N1 (Finsler) made its closest approach to the Earth on August 9, 1937, at only 0.548 AU, and that was just 6 days before perihelion passage. It should have dazzled.

Comet C/1937 N1 (Finsler)

Credit: Stanisław Szeligowski, Komety i meteory, Państwowe Zakłady Wydawnictw Szkolnych, Warszawa, Poland

So, while we may never be absolutely sure which comet he saw as a young man, I think there are two good possibilities, the comets of 1936 and 1937. C/1936 A1 (Peltier) peaked in July as a classic looking, very bright comet with a lot of press to insure it got noticed. On the other hand, Comet C/1937 N1 (Finsler), peaking in August 1937 when only 0.548 AU from Earth and just 6 days before perihelion. But what about the springtime, comet C/1939 H1 (Jurlof-Achmarof-Hassel), perhaps seen during early April of 1939? Weather records show it was cold in the Midwest that April.

In any case, a wonderful memory to hold!

Color: Part 3 The Colors of Galactic Clouds

By Alex Woronow

Interstellar nebulae command the attention of both visual observers and astro-imagers. For the visual observer, these nebulae seldom display much, if any, color. But, for the imagers, a full array of colors appears. In this article, I describe what physical processes in the nebulae give rise to these colors. Bear in mind that imagers are an unpredictable lot, and the red light of Hα, for example, may be rendered blue or green or any other color. Ground-rules do not apply to assigning narrow-band-image colors, for sure, and are not even required for broad-band imaging.

Limitations of Observing Colors in Nebulae

Unfortunately, human perception of color has impactful limitations. In dimly lit scenes, our eyes' color receptors (cones) shut down and pass the task of seeing on to our gray-level receptors, the rods. The rods have higher spatial resolution and greater sensitivity to low light, but without the cones, input, the color of nebulae eludes us. Then too, our eyes can sense only a limited range of wavelengths. Some "colors" lie in the ultraviolet or infrared, for instance, and do not stimulate a visual response, but may be captured in images, particularly by professional equipment. Additionally, many nebulae have little or no color in the visual spectrum, and they may appear black against starry surroundings. Fortunately, many nebulae do have a variety of hues: reds, blues, greens, and such, and a full range of tones, as our cameras can reveal.

Broad- and Narrow-band Images

The two common modes of imaging are broad-band and narrow-band. For gray-level cameras, the former uses the three primary-color filters, red, blue, green, to span the range of human color perception. Narrow-band imaging uses filters that reject all wavelengths of light except for very narrow windows centered on atomic emission lines. Common narrow-band filters used by amateurs are the Hydrogen α (or H II), the Sulfur II, and the Oxygen III filters. (The notation, such as "III", indicates the ionization state of the atoms. One 'I' indicates a neutral atom; "II" indicates loss of one electron, etc.)

Sources of Nebular Color

Dark Nebulae

First of all, the obvious: colors require the presence of light: no light, no color! If a particular nebula lacks nearby bright stars nor strongly interacting with other clouds, it has neither starlight to reflect nor energy enough to emit its own light. The results equal a "dark nebula." Some dark nebulae are virtually black. Their dust and molecules absorb what light falls upon them in the visual spectrum and radiate it in the infrared, beyond the reach of amateur imagers. These nebulae have temperatures in the range of 7 to 15^{o} K. In the parlances of professional astronomers, clouds <10^{o} K are "cold" clouds and the others are "warm" clouds--really! The cold clouds have neutral hydrogen molecules (H_2), and carbon atoms. In the coldest central region, they may have CO_2 molecules and exotic molecules such as molecules HNC (hydroisocyanic acid) and its isomer HCN (hydrocyanic acid).

Dark nebulae "dust" consists of various molecules and ices stuck together to form irregular grains in the size range from a few tens of nanometers to millimeters. The dust compositions include graphite, various ices, a variety of silicates, and some carbon-based compounds. The dust grains and cold molecules are light absorbers, and, consequently, their host cloud appears black. When some moderately strong light exists near the dark nebula, the light can bounce off the dust grains, producing a brown tone.

But even dark nebulae are clumpy and some of those clumps attain enough internal gravity to condense into stars. When a new star ignites, it may ionize atoms in the local region, and spawn a “bright nebula.” For example, the dark nebula LDN 673 has two visible young stellar objects (YSOs) that have ionized the local gasses (Fig 1).

But this article is about color; so let’s move on to some nebulae that have more of it.

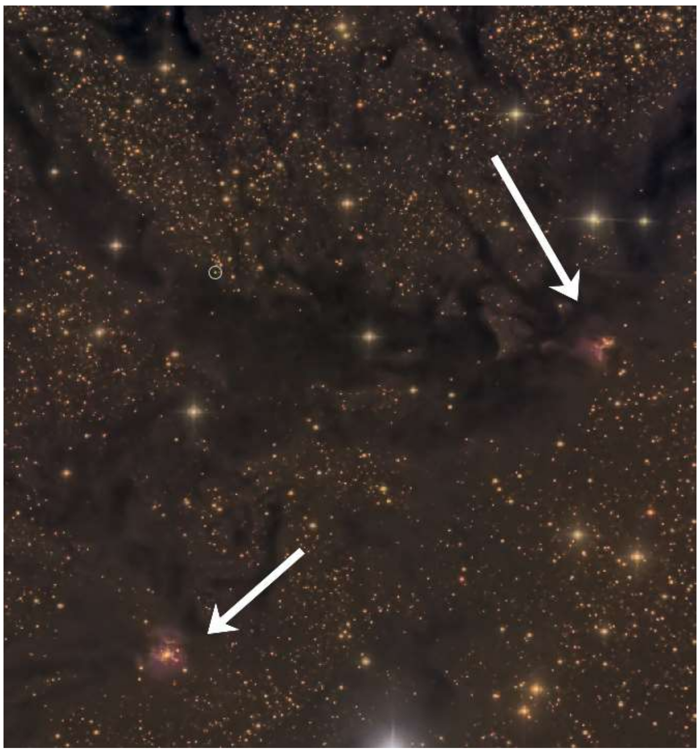


Figure 1. The dark nebula LDN 673 with two obvious sites where young stars ionized the local nebula and spawned emission nebulae. (Image by author)

__Bright Nebulae: sources of light__

Bright nebulae come in two over-lapping varieties. The first is a reflection nebula where the light source is reflected starlight, and the second is a self-radiating nebula where the ionized gasses in the nebula emit the light.

__Reflection Nebulae__: Reflection nebulae commonly have a blue cast because...

Whether a bright star lies just beyond a nebula and shines through it, or lies just in front of a nebula and shines on it, when the starlight intersects the cloud, it has three options. It can pass through the nebula uninterrupted, be absorbed by the dust and molecules in the nebula, or be scattered (usually multiple times) off the dust and molecules. Of these three possibilities, let’s focus on the third, scattering.

Scattering affects blue, short wavelengths more than longer red wavelengths. Our daytime sky appears blue because, as the sun shines through the atmosphere, the gas, molecules, and dust, scatter blue photons but do not do too much to the red photons. This wavelength-dependent scattering is called “Rayleigh scattering.” Lord Rayleigh (c. 1871) showed that blue light is about 10x more prone to scattering by small particles than is red light. In the earth’s atmosphere, molecules of oxygen and nitrogen do most of the scattering because their sizes roughly match the wavelength of the blue light.

(Aside, if shorter wavelengths are more prone to scattering, why isn’t the sky violet? The answer lies in human visual perception. Our eyes are not very sensitive to violet, but considerably more receptive to blue light. So if both colors are scattered--and they are--it is the blue that dominates our visual impressions.)

In broad-band images, reflection nebula have an obvious blue component. NGC 1333 (Fig 2) is an example. The YSO BD +30 549, the bright star in the white spot at the nebula’s center, provides the scattered light. This nebula has a plethora of young stars that eventually will cause large portions of the nebula to ionize and radiate as a H II-region emission nebula. For now, they are mostly concealed in and behind the dark gases and dust. But eventually, their strong UV radiation will clear a bubble through the cloud and they, and their surrounding ionized cloud, will become visible as emission nebulae.

Figure 2. NGC 1333 in broad-band RGB. The blue nebular region (LBN 741) largely arises from scattering of light from the YSO BD +30 549, which is in the bright (white) spot at the center of the nebula. (Image by author)

__Emission Nebulae (aka, H II regions)__: The archetypical H II emission region may be the Orion Nebula. It reveals an abundance of detail in both broad-band and narrow-band images. Among the many other emission nebulae, we find Melotte 15, pictured in Figure 3.

Figure 3: Melotte 15 is a cluster of young stars, some of which are hidden behind the cloud and some others that appear to the upper right of the bright H II cloud. They are YSOs and their strong UV radiation has ionized the cloud and caused the glow seen here. This is a narrow-band HSO image. (Image by the author)

The three most common emission lines explored by amateur imagers are those of excited hydrogen (Hα or, equivalently, H **II**), doubly ionized oxygen (O **III**), and singly ionized sulfur (S **II**). Usually the strongest of these, for emission nebulae, is Hα--by far.

The Hα line is a member of the Balmer Series (Fig 4), with a wavelength of 656 nm, which places the line in the deep red (Fig 5). When the single electron of a hydrogen atom is excited out of its ground state (by absorbing radiation or suffering an energetic collision), it moves to a higher, unstable energy state, or suffers total ejection from the atom. Sometime later, the electron spontaneously drops to a lower, more stable orbital and in so doing emits radiation in the form of a photon of light. It may move downward in a number of small steps, or in a single large step. At some point, some of the excited electrons find themselves in energy state *n*=3 (Fig 4), and sometimes they emit a photo of just the right energy to drop to *n*=2 energy level (where *n* is the "principal quantum number"). The photon emitted from that transition is the Hα emission that we capture as red light. For the record, photon energy = hc/λ, where h is Plank's constant, c is the speed of light and λ is the wavelength of the photon. So, as wavelength increases, photon energy decreases.

Emissions from S **II** and O **III** follow the same phenomena as Hα: the jump of an electron to a lower energy state with the difference in energies (before and after moving) balanced by the emission of a photon at a specific wavelength or energy.

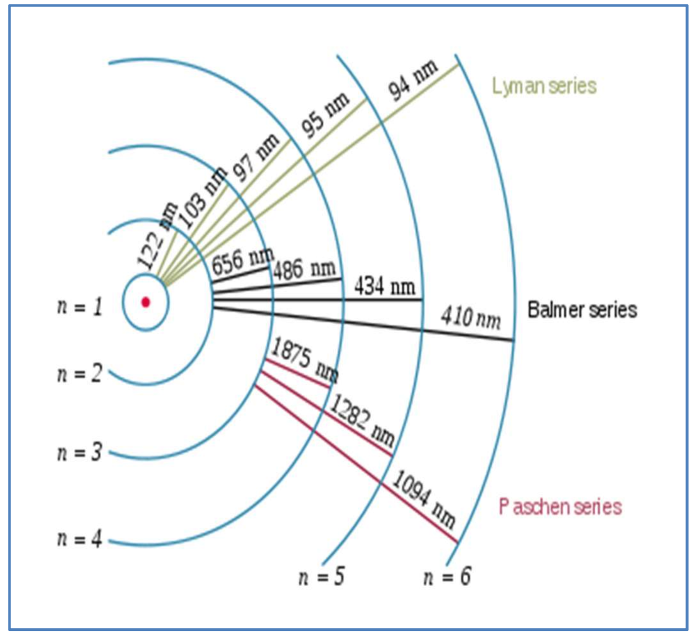


Figure 4. The wavelengths of radiation that an electron in a hydrogen atom emits as it falls from a higher energy (larger *n*) state into a lower one.

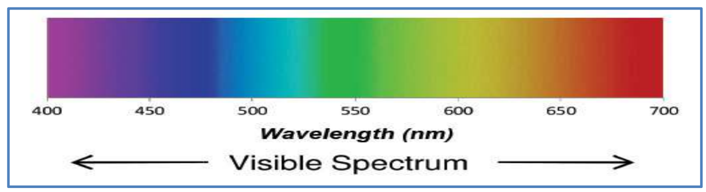


Figure 5. The range of human color perception. Note that only the Balmer series (Fig 4) has photon emissions that fall in the range of colors we can see. Hα wavelength equals 656 nm.

S **II** emissions also occur in the red part of the spectrum at a wavelength of 672nm--not far from Hα. O **III** emits in the blue-green, at 500nm. Both O **III** and S **II** emissions arise from "forbidden transitions." "Forbidden" is an exaggeration. When an electron is excited into a "meta-stable" orbital, an orbital that is almost stable, and left undisturbed, it will remain there for a very long time before spontaneously decaying to a lower energy state. "Long time?" Well, meta-stable states decay in milliseconds to seconds whereas normal excited states decay in the microsecond or less time range. In earthbound laboratory experiments, forbidden transitions are not observed because well before the average decay time is reached the excited atom will collide with another atom and energy from the collision will spawn the transition without a photon being emitted. However, in the very rarefied-gas environments of interstellar clouds, with densities of a few atoms/cc, atom-atom collisions occur less commonly and meta-stable electrons do decay spontaneously by emitting a photon.

But how do the electrons get excited in the first place? Why aren't all the electrons in their lowest energy states? Conversely, why are all hydrogen atoms in GMCs ionized? (GMC=Giant Molecular Clouds--common jargon in scientific papers, just like "YSO".) To ionize H, we need a source of energy equivalent to that of a substance at 10,000^{o} K. Few star types reach such high temperatures, but very young and massive O and B stars do. Not coincidentally, "OB associations" are found in H II clouds. O and B stars form from the collapse of the gasses and dust in the GMCs. The OB stars' energetic UV radiation ionizes the gasses moving electrons out of their lowest energy states and usually ionizing the atoms. (It also disintegrates the dust particles.) Furthermore, the ignition of these YSOs sends out hypervelocity shock waves, dense streams of material, called Herbig-Haro Objects, that impact the surrounding interstellar medium with high energies and also cause it to ionize.

Planetary Nebulae are a little different from the GMC H II regions described above. Their ionizing energy source is not the birth of a star, but a star's demise. The material in a planetary nebula consists of the outer shell of a dying, approximately sun-size, star. The dying star collapses to form a white dwarf with a temperature exceeding 100,000° K--providing far more than enough energy to ionize the surrounding, ejected gasses.

Coming Up

What next? I think it is time to talk about human color perception directly. Color is little more than an artifact of our visual processing. It does not occur in nature; we interpret it. From my first article, you may recall that the night sky has an abundance of green stars, but that's not what we see. The explanation for that, and more, is coming soon.

Lunar Eclipse Sequence – By Richard Burke

Want Ad

FOR SALE: 127mm, f7.5 ED Triplet Explore Scientific refractor (like new) tube assembly $1400.00.

Or will sell complete system with Celestron CGEM equatorial mount with autoguider and all equipment ready for astrophotgraphy. $3,100.00.

Phone: Bob Kepple 520-366-0490.

FOR SALE: Celestron CGEM Equitorial Mount. Less than 3 years old, like new. Will hold an 11-inch SCT plus camera. Rated at 40 lbs. Tripod included. $1000.00. Permanent pier also available.

Phone Bob Kepple at 520-366-0490 or see me at meeting.

Some Swap Meet Items

Celestron AVX mount (less tripod)
Celestron hand paddles (Computerized) (3)
Canon cameras (10D and XS) (Various lenses)
Nikon camera (D3300) (Various lenses)
Imaging Source DMK 21AF04.AS
Orion 50mm Guide Scope & Guide Camera
Orion 120mm F5 refractor
Meade 70mm ETX (computerized)

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***Nightfall* Editor:** Cindy Lund cindy.jean.lund@gmail.com

Webmaster: Ken Kirchner

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Huachuca Astronomy Club (HAC) of Southeastern Arizona
2019 Astronomical, Optical Swap Meet and Sale
March 23, 2019
Noon to 4PM

This is the perfect opportunity for you to go through your cameras and lenses, binoculars, spotting scopes, telescopes, astro equipment, hardware, cases, widgets and doodads. Check your closets, garage, and observatory and find those once precious items that are now just taking up space, and make them available to others (who may want or need them). It's also a great chance to find some interesting stuff, learn a lot, and mingle with other, likeminded enthusiasts.

Bring your big and small items as well as your odds and ends, and bring cash!

WHO: Huachuca Astronomy Club of Southeastern Arizona, members and community

WHAT: 2019 Astronomical & Optical Swap Meet and Sale

WHERE: Patterson Observatory, University of Arizona South Campus, 1140 Colombo Ave, Sierra Vista, AZ 85635

WHEN: Saturday, March 23, 2019. **Setup starts at 11AM**. Sales are from Noon to 4PM.

WHY: To allow members and others in the amateur Arizona astronomy community a venue for buying and selling optical and astro gear, while also supporting the Huachuca Astronomy Club. **Other interested parties might be photographers or naturalists who use such equipment.**

HOW: Dig through all your photographic, optical and astro gear, decide what you want to move out, bring it to the Meet; or, come and see what's available, bring cash or items to barter.

Here are more details and important points:

- Advance registration is advised but not required. But, arrive early for a better table position!
- Bring a *small* table, chair, and protective cloth to be positioned around the rooms and patio.
- HAC member volunteers will be present to facilitate paperwork and handle donations.
- Suggested, voluntary donation to HAC is 10% of total amount sold, or a flat donation.
  Donations are voluntary and are tax deductible.
  Receipts will be available.
- We will have a Sellers Registration/Sales Form for sellers to complete to track items sold and dollars.
- Consignment: We will have a consignment table in case you only have one or two items to sell.
  The table will be staffed by HAC member volunteers and you (the seller).
  Items should be marked with the seller's name and a price.
  The seller should be available later that day for either picking up or reconciling.
- Don't bring guns, illegal stuff, or stuff that cannot be reasonably considered optical or astronomy related. Please use your best judgment!

HAC Feb - Mar Calendar of Events

SU	MO	TU	WE	TH	FR	SA
3 Feb	**4** **2:04 PM**	**5**	**6** Pie in the Sky JCMS Vesta 1° fm moon	**7** Patterson Public Night 6:30 PM	**8**	**9**
10	**11**	**12** **3:26 PM**	**13**	**14**	**15**	**16**
17	**18**  Venus/Saturn	**19** **8:54 AM**	**20**	**21**	**22** HAC Meeting at Patterson Obs 7 PM	**23**
24	**25**	**26** **4:28 AM** **School Field Trip Patterson 9 AM**	**27**	**28**	**1 Mar** Dave Healy Memorial Star Party @ Junk Bond Saturn /Moon	**2**
3	**4**	**5**	**6** **9:04 AM**	**7**	**8**	**9** Astro Night at Huachuca City Library
10 Daylight Savings Time Begins	**11**	**12**	**13**	**14** **4:27 AM** Patterson Public Night 7 PM	**15**	**16**
17	**18**	**19**	**20** **7:43 PM** **Vernal Equinox 3:58 PM**	**21**	**22** HAC Meeting Student Union	**23** **Astronomy Swap Meet at Patterson. Noon – 4 PM**
24	**25**	**26** Jupiter/Moon	**27** **10:10 PM**	**28**	**29** Saturn/Moon and Pluto	**30**
31	**1 Apr** Total solar eclipse during the transit of Venus.	**2**	**3**	**4**	**5** **2:50 AM**	

All event times MST. Join Haclist to keep up to date with all of the Huachuca Astronomy Club events
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