Starry Nights

WEHR ASTRONOMICAL SOCIETY

October, November, December 2005 Volume 24, Issue 4

In this Issue

The Lights are Back On

Once again our southerly neighbor, the Milwaukee County Sports Complex, has turned the lights back on. Perhaps you remember back to the summer of 2002 when the Milwaukee Rampage was playing on alternating Fridays interrupting our peaceful observing sessions with loud music and of course the overwhelming glare of the enormous light banks. Well, the lights are back on, lighting a new sport and more often. The users of the field, the Ironman Football League, frequent the field every Friday and Saturday night from August through most of October at prime time 8:00 with the lights not turning off until 11:00. August through October offers us the best observing from Froemming Park, with the observation of many showpiece objects.

As a club, we need to take some action, whether it means spending more time with the city of Franklin or finding a new location to observe. We do need to address this problem, even though this issue is a little late to resolve this year. The light pollution around the park has become pretty bad even without the sports complex lights on. Keep in mind we need a location in Southern Milwaukee County. Check for updates and share your opinion on the Message board on www.wehrastro.org.

Resources
http://www.ironmanfootballleague.com/
http://www.wehrastro.org/Rampage
http://www.wehrastro.org/newsletter/2002_3Q.pdf
http://www.wehrastro.org/newsletter/2002_4Q.pdf

W.A.S. News and Information

Astronomy Classic

The club recently received a book from Workman Publishing, entitled *Grand Tour: A Traveler's Guide to the Solar System.* The readers are taken on an imaginative trip through every corner of the solar system. It includes recent discoveries made by Voyager I and II, the Hubble Space telescope, the Mars Global Surveyor Mission and other space initiatives. The book is filled with 100 paintings and other photos. The club is offered a discount rate for 10 or more orders, of 40% off the retail price of $19.95, which is $11.97 each. Shipping cost will be covered by the club. The book will be on the front table at the October 11th meeting. Anyone interested in purchasing the book can write their check out to Wehr Astronomical Society, give the check to the treasurer, Sandy Dombeck, and sign their name on the order list, which will be on the table next to the book.

Wizards and Telescopes

Members of Wehr Astronomical Society helped the Milwaukee Public Library celebrate the rollout of the latest Harry Potter book, *Harry Potter and the Half-Blood Prince*. The book went on sale at midnight and Wehr was part of the festivities to entertain the kids and their parents as they waited in line to purchase the book or check it out at the Central library.

Members Todd Weiler and Adam Machajewski brought their telescopes, while Greg Gonia and Jan-Marie Weiler wrangled the crowded. The crowd started to build before the official start time of 9:00 P.M. By 8:30 P.M. the scopes were up and running despite being located on the south-side of a 5-story building, hence an exact alignment was not possible. Add the light pollution and the list of sky wonders quickly shortened. Adam had to set up in front of a 5,000 watt building light over which an improvised shield had to be placed because nobody could find a switch. (Note for future: Add a roll of aluminum heavy-duty foil to mask blinding lights.) Even with the metal cover blocking the light, it acted as a heat radiator, which we didn't need on the 90 plus degree evening.

Todd Weiler was in full costume as Professor Cumulus Nimbus as were many of the visitors waiting in line to enter the library. A number of activities in addition to stargazing were available. A wizard show, owls, potion and wand making, fortune telling, carriage rides and giveaways were just some of the things that were used to hold the kids' attention until the midnight hour. Line counters stopped counting after 1,750 people passed through. Over 1000 sky maps where handed out.

Jupiter and the moon were in view for the first hour of the night and Adam had to move his scope twice to track the moon. One big advantage of a small scope! Surprisingly people were singing the Oh's and Ah's of just being able to see Alberio or Antares. While the event was supposed to end at 11:30 P.M. the last person in line didn't get through until an hour later. The club was rewarded for its efforts with a $100 check from the promoter of the event.

If there is a moral to this story, it is never underestimate the imagination of a young child even under light polluted skies. Just imagine what they could have seen if they got away from the urban lights. A real star will always shine brighter than one in a book.

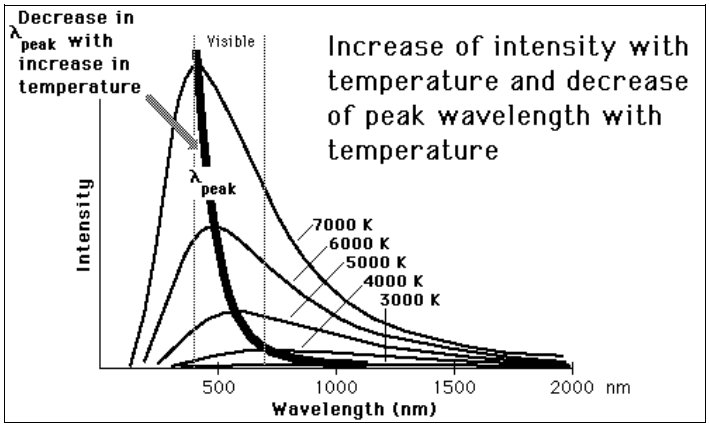
What Color is that Star?

You may have heard that stars have different spectral types. But for an observer how does this translate into what one sees at the telescope? If I am looking at an M3 type star, what color is it? This article will help you in figuring that out. Also, please bear with me as there are some technical terms ahead.

Let's start at the color of light. Light is electromagnetic radiation where a photon vibrates at a specific frequency both electrically and magnetically. The wavelength of the light is its speed (the speed of light) divided by its frequency. A spectrum, or range of light output, is usually listed by wavelengths, not frequency. What we call visible light, what the human eye can detect, ranges from a wavelength of 380 to 760 nanometers (a nanometer is 1×10^{-9} or 0.000000001 of a meter). Sometimes this is listed in Angstroms. An Angstrom is 1×10^{-10} or 0.0000000001 of a meter (so visible light would be 3800 to 7600 Angstroms). The wavelengths of the fundamental colors are given to the left:

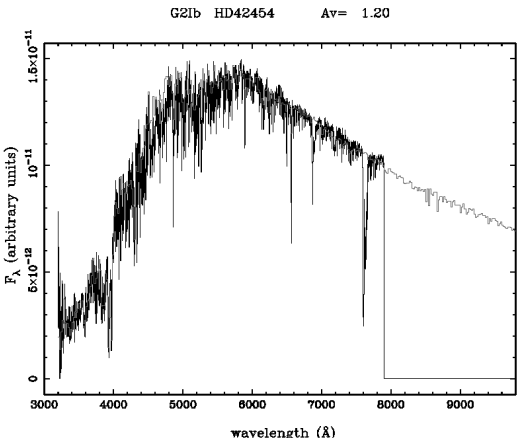
Color	Wavelength Range
Red	620 – 760nm
Orange	585 – 620nm
Yellow	570 – 585nm
Green	490 – 570nm
Blue	440 – 490nm
Indigo	420 – 440nm
Violet	380 – 420nm

Now a star does not emit a single frequency of light, but emits a range of frequencies. Not all of the frequencies of light are emitted with equal intensity. These two points are important, as we will see later on. Stars emit a spectrum that is close to what is called blackbody radiation, which is the ideal radiation of a black body (a hypothetical body that absorbs all of the radiation falling on it) of a specific temperature. Black bodies are also perfect emitters of radiation. The diagram below shows the distribution of electromagnetic radiation intensity of black body radiation at various temperatures.



This is how we relate a star's spectrum to its temperature. Note that the spectra for a star will look similar to the curves shown above, but will have a lot more "noise" in them as shown below. This is due to various elements absorbing certain frequencies of light.

According to Wien's Law, the peak of the curve is directly related to the object's temperature. Using this temperature, we can classify stars into different spectral types as shown below:

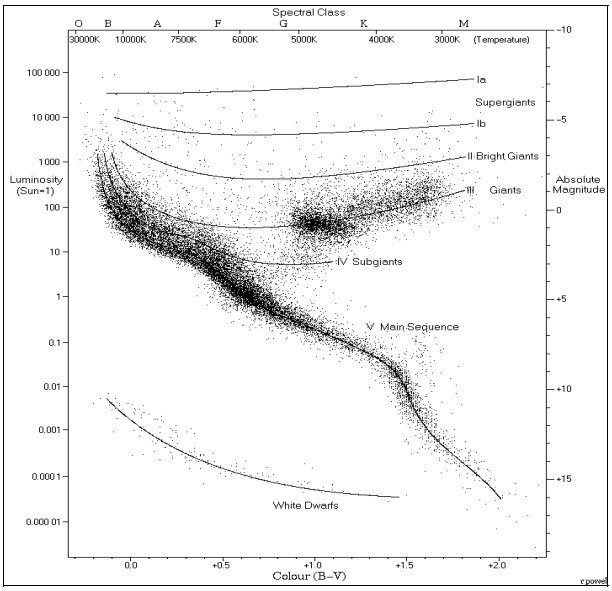


Type	Color	Temperature	Example
O	Blue	> 30,000 K	10 Lacerta
B	Blue	10,000 – 30,000 K	Rigel or Spica
A	Blue	7,500 – 10,000 K	Sirius or Vega
F	Blue to White	6,000 – 7,500 K	Canopus or Procyon
G	White to Yellow	5,000 – 6,000 K	Sun or Capella
K	Orange to Red	3,500 – 5,000 K	Arcturus or Aldebaran
M	Red	< 3,500 K	Betelgeuse or Antares

Note that the spectral type of a star is also dependent on various characteristics of the absorption lines. There are further refinements where each spectral type is divided into ten subclasses, numbered 0 through 9 and is also based on the star's spectra. That is the number that directly follows the lettered type, for example, an M3, a B5 or a G2 type of star. Again, you can think of this subtype as a further refinement of the letter type of the star by temperature. An M3 star is hotter than an M8 star. And there are also further divisions as to the type of star (supergiant (Ib), giant (III), main – sequence (V), …). For example, our sun is a G2V type star. Note that on an HR diagram that the x-axis is the temperature, or type, of star.

So now that we have all of this information, we can figure out its color. Given the type of star, we know its temperature. From the temperature, we can figure out the black body radiation curve. From this curve, we can figure out the color of the star.

In the color/temperature table, we see the colors listed with the type. But what do those colors



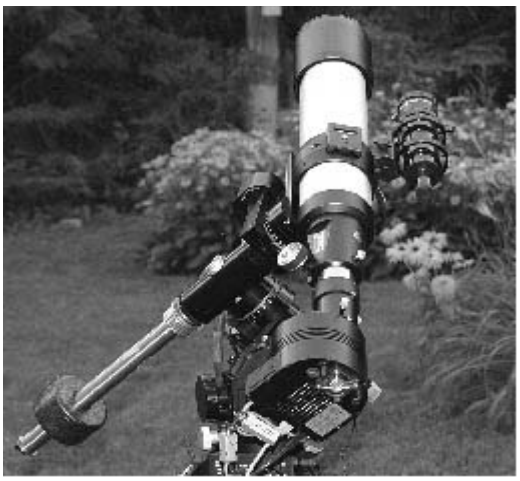
really look like? I found a web page that shows the colors of stars based on their type at www.vendian.org/mncharity/dir3/starcolor/. *

The first thing that I noticed is that the colors are more washed out or pale than what I imagined. If you are like me, when someone tells you that something is red, you think of the crayon color red. But an M type of star is really closer to a pale orange and an O type of star is close to a sky blue. This makes sense when you remember that a star emits light in a broad range of the spectrum.

So why is this important? When you want to see a good color comparison of stars, the double star Albireo for example, it is helpful to know the colors of the stars when looking at a double star catalog. We can know this by looking at the stars' spectral types. And hopefully this article has given you enough information to understand what type and color a star is when you see a star's spectral type listed as F3III.

* Editor's Note: For those of you who don't have Internet access, Astronomy magazine ended up doing a similar article in the Ask Astro section of the October, 2005 issue, pages 78 and 79. You can also view a color chart there.

Tele Vue NP-101 Telescope
Is smaller better?
(Part 2) - Astrophotography



In a previous article I described my newest telescope, the Tele Vue NP-101. This scope is a 4-inch apochromatic refractor. One of the main reasons for buying it is deep sky imaging. I had been using a 6-inch Maksutov-Newtonian for imaging. While usable, it had a number of limitations.

At this point I have had a pretty good chance to try out the 4-inch telescope for its imaging prowess and will describe its suitability for that task.

Advantages

Using this telescope for imaging at prime focus results in a field of view that is about equal to the Moon's diameter. This is wider than my previous setup and will allow a new set of targets to be imaged. This is a good size for many bright nebulas and the larger galaxies, but is not too wide to preclude photography of some of the smaller galaxies.

The design of the NP-101 provides a very flat field of view. This results in the image being sharp from edge to edge, as well a having very little light fall-off near the CCD chip edges. The 6" Mak-Newt had considerable light fall-off at the edges of the image, which needed significant image processing effort to overcome.

The Mak-Newt also had very limited focus range. The image just barely came to focus with my ST-7XME camera when the focuser was all the way in. The NP-101 provides 5 inches of focus from the back of the focuser to the image plane. This gives me plenty of space for imaging acces-

sories, such as a color filter wheel. In fact, I have just started taking color images using the tri-color (Red, Green, Blue) filter method.

Since the CCD chip is quite sensitive in the near infrared region I was a bit concerned that using a refractor could result in stars having halos of unfocussed light around them, but I have seen no evidence of this. So, the color correction must be very good even beyond the visual range.

Disadvantages
There are always trade-offs involved with every telescope, this one is no exception.

The wider field of view comes at the expense of a lower magnification for the smaller object such as planets and planetary nebulae.

The smaller aperture means that the exposures need to be somewhat longer. I find the focuser of the NP-101 to be a bit too touchy to make it easy to find critical focus for imaging. I have recently installed a fine focus accessory, which appears to fix this problem.

Also, the scope is pretty expensive for its aperture. This is generally true for high quality refractors

Deep-sky photos
Using this scope for CCD imaging has been quite enjoyable. Its small size makes it easy to handle. It's wide field of view makes finding the deep sky object fairly easy, and the lower magnification means that the mount's ability to track is not quite as critical.

Above is an image of the Orion Nebula taken with this scope. This is a stack of 40 30-second images.

My recent attempts at color imaging have been better than I expected, although I still have a lot to learn. Needing to take images through three color filters greatly increases the time it takes to get the necessary exposures. This requires careful planning of the imaging session to ensure that the desired object will be in the tree-free part of my backyard for a long enough time. Color imaging sessions of the dimmer objects will need to extend over more that one night. So it's important to be able to get the camera on the scope at the same angle each time.

Conclusions
I find the NP-101 telescope has been a good next step in my progress as an astro-imager.
You can see some examples if the results on my web page at:
www.cloudtrap.com

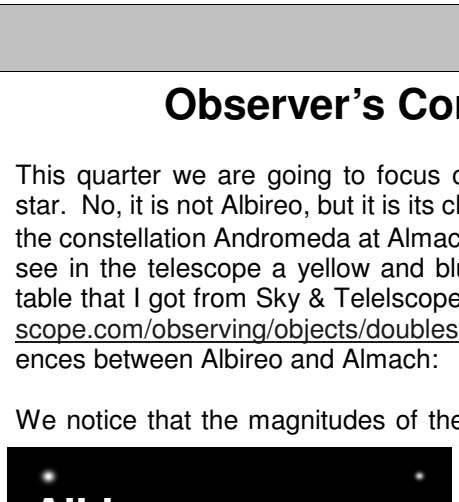
-Phil Schumacher

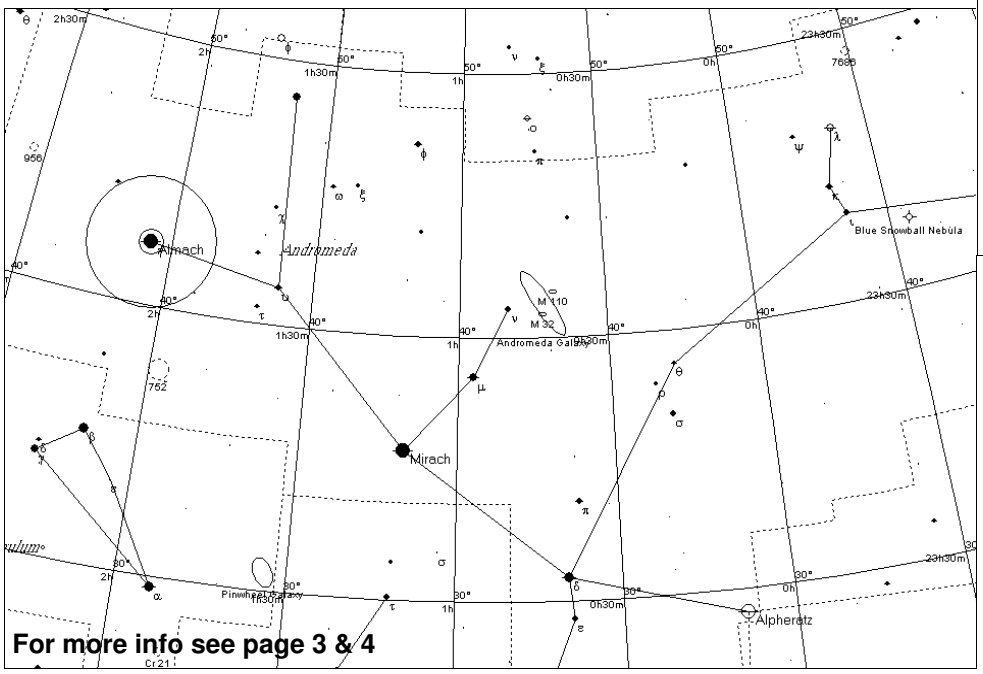
For part one to this article see Volume 24 Issue 2, www.wehrastro.org/newsletter/2005_2Q.pdf

Observer's Corner - Almach

This quarter we are going to focus our telescopes at a colorful double star. No, it is not Albireo, but it is its close cousin. If we look at the end of the constellation Andromeda at Almach (Gamma (γ) Andromedae) we will see in the telescope a yellow and blue double star. Below is part of a table that I got from Sky & Telelscope's (S&T) website (http://skyandtelescope.com/observing/objects/doublestars/) where I compare the differences between Albireo and Almach:

We notice that the magnitudes of the stars are roughly about the same with the main star of Almach being a little bit brighter. The separation of Almach is closer together than Albireo by a factor of 3.5 to 1. So, be prepared to magnify Almach a little more. The optimum magnification at the end of the table is from a calculation that the author of the S&T article used that he felt that the double star looked its best, which is 750 divided by the separation of the stars. The position angle is the direction that the line connecting the stars points in relation to celestial north.





For more info see page 3 & 4

Lunar Phases

●	**October 3**	**New**
◐	**October 10**	**First Quarter**
○	**October 17**	**Full**
◑	**October 24**	**Last Quarter**
●	**November 1**	**New**
◐	**November 8**	**First Quarter**
○	**November 15**	**Full**
◑	**Nvember 23**	**Last Quarter**
●	**December 1**	**New**
◐	**December 8**	**First Quarter**
○	**December 15**	**Full**
◑	**December 23**	**Last Quarter**
●	**December 30**	**New**

The color-difference rating is the number of letters between stars on the spectral classes of the stars, ordered by O, B, A, F, G, K and M. For example, Almach's components are B and K, so Almach rates a 4. Albireo is composed of a K3 star and a B8 star and Almach is composed of a K3 star and a B9.5 star. So, the colors of Almach and Albireo will look very similar. Note that Almach's dimmer, blue companion is also a close double star whose stars orbital period is 61 years. Albireo is 386 light years away and Almach is 355 light years away. So, these two double stars are

Star	(2000.0) R.A.	Dec.	Magnitudes		Sep.	P.A.	Color diff.	Optimum mag.
β Cyg (Albireo)	19h 30.8m	+27° 58'	3.1	5.1	34.4"	54°	4	22x
γ And (Almach)	2h 03.9m	+42° 20'	2.1	4.8	9.8"	64°	4	77x

SCHEDULED ACTIVITIES

FOR

THE WEHR ASTRONOMICAL SOCIETY

http://www.wehrastro.org

REGULAR MEETINGS

(FREE AND OPEN TO THE PUBLIC)

Tuesday, October 11
Wehr Nature Center
Michael Bakich, Associate Editor for Astronomy Magazine, will present an observing program titled ""Delights of the Fall Sky", which will range from easy-to-see to challenging objects.

Tuesday, November 8
Wehr Nature Center
Starting out Right in Astronomy: What you need to know before you purchase a telescope for Christmas. Understanding telescope terminology is difficult. Tim Grunewald, Wehr Astronomical Society's Observatory Director, will help you make sense of it all.

Tuesday, December 13
No meeting due to holiday activities.

OBSERVATORY ACTIVITIES

(FREE AND OPEN TO THE PUBLIC)

October 7	7:30	Deep sky observing. See a crescent moon and the brighter deep sky objects.
October 21	7:00	Deep sky observing. The Minor Constellations.
November 4	7:00	Deep sky observing. Locate the Andromeda Galaxy. See Mars (closest to Earth October 29th).
November 11	7:00	Oberving the moon and deep sky objects. See a gibbous moon and the brighter deep sky objects. See Mars
December 2	7:00	Deep sky observing. Locate Pegasus, the Winged Horse. See Mars.
Decemebr 9	7:00	Observing the moon and deep sky objects. See a 1st quarter moon and the brighter deep sky objects. See Mars.

Note: All observatory dates fall on a Friday, and are held at Froemming Park, on 51st Street between Ryan Rd. and Puetz Rd.

WEHR ASTRONOMICAL SOCIETY, INC.
9701 WEST COLLEGE AVE.
FRANKLIN, WI 53132

October, November, December **Volume 24, Issue 4**

W.A.S. Board of Directors and Officers

President:	**Joe Carlone**
Vice-President:	**Mike Nugent**
Secretary:	**Jackie Mau**
Treasurer:	**Sandy Dombeck**
Observatory Director:	***Tim Grunewald**
Newsletter Editor:	**Adam Machajewski**
Membership:	***Sandy Dombeck**
Proofreading:	**Donna Grunewald**
Distribution:	**Charlotte & Gene DuPree**

Wehr Astronomical Society
Phone: (414) 425-8550
http://www.wehrastro.org

*** Signifies the position is available and the name represents the acting volunteer. Contact a board member if you are interested in the position.**

Starrynights

The official newsletter of the Wehr Astronomical Society.

We are a group of amateur astronomers organized to promote the study of astronomy and further public and members' interest in astronomy. We have been serving the Milwaukee area since 1981 and welcome the public to our meetings. Our aim is to give guidance and information to those who want help in the pursuit of stargazing.

Back issues of starrynights can be requested or downloaded from our website at: www.wehrastro.org