



The Night Sky

A Publication of The Astronomy Club of Akron
Akron, OH USA

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2004 ACA Calendar	Summary
8/7/04 Sat 9:00 p.m.	The Autumn Constellations— ACA Observatory
8/14/04 Sat	MVAS OTAA convention
8/21/04 Sat 6:00 p.m.	Solar/Lunar/Hot Dog Roast— ACA Observatory
9/11/04 Sat 5:30 p.m.	Dedication of the New Club Telescope; The planets Uranus & Neptune— ACA Observatory
9/18/04	Black River OTAA convention
9/24/04 Fri 8:00 p.m.	ACA General Membership Meeting— Kiwanis Club
10/16/04 Sat 7:30 p.m.	ACA Observatory Open House— ACA Observatory
10/22/04 Fri 8:00 p.m.	ACA General Membership Meeting—Kiwanis Club
11/6/04 Sat 7:30 p.m.	ACA Observatory Open House—ACA Observatory
12/11/04 Sat 7:30 p.m.	ACA Observatory Open House—ACA Observatory

2004 ACA Calendar -Detail

Saturday, August 7

ACA program at the observatory featuring the Autumn constellations Andromeda, Aquarius, Capricornus, Pegasus and Delphinus. The program begins at 9:00 p.m. Please bring your telescopes for the public star party which follows the talk.

Saturday, August 21

ACA annual Solar/Lunar event. Solar viewing begins at 6:00 p.m. for the public followed by a Hot Dog culinary feast at 7:30 p.m. Lunar viewing begins at 9:00 p.m. for the public. All members are encouraged to bring their scopes and appropriate filters for this event.

**Saturday, September 11
Dedication of the New Club Telescope.**



Details forthcoming! For more information, contact John Crilly jcrilly@neo.rr.com or Ray Paul raymonpaul@brightdsl.net. **ACA program featuring the planets Uranus and Neptune beginning at 7:30 p.m.** Come view the gas giants as they appear as tiny blue green disks in the southern night sky. Please bring your telescopes for the public star party which follows the program.

Friday, September 24

General membership meeting beginning promptly at 8 pm at the Portage Lakes Kiwanis Club. Speaker to be announced.

Sky Events for August 2004

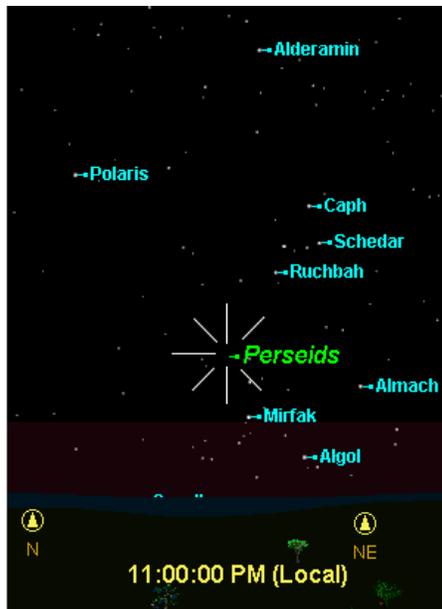
- Aug 7** Last Quarter Moon at 22:01 UT.
- Aug 11** Moon at apogee (furthest from Earth) at 10h UT (distance 405,292 km; angular size 29.5').
- Aug 12** Perseid meteor shower peaks at 11h UT. The best known of all the meteor showers. Active from July 17 to August 24.
- Aug 16** New Moon at 1:24 UT. Beginning of lunation 1010.
- Aug 23** First Quarter Moon at 10:12 UT.
- Aug 27** Moon at perigee (closest to Earth) at 6h UT (distance 365,105 km; angular size 33.7').
- Aug 30** Full Moon at 2:22 UT. The full Moon of August is called the "Green Corn Moon" or "Grain Moon".

All times Universal Time (UT). (USA Eastern Summer Time = UT - 4 hours)

August Sky Events: Detail

The point from where the Perseid meteors appear to radiate is located within the constellation Perseus and is referred to as the radiant. The radiant is located in the northern portion of that constellation.

lation, almost midway between Perseus and the constellation Cassiopeia. The following chart will help you find it:



The radiant of the Perseid meteor shower is above the horizon throughout the night for mid-northern latitudes. Decent numbers of Perseids can be seen beginning around 10 p.m. local time, but the best show picks up after midnight and continues until dawn.

To best observe the Perseids wear appropriate clothing for the weather and lie outside in a reclining lawn chair. In the Northern Hemisphere, the display is best observed if you lie with your feet pointing somewhere between the southern and eastern horizon and look straight up. Do not look directly at the radiant, because meteors directly in front of you will not move much and fainter ones might be missed. When you see a meteor, mentally trace it backwards and if you arrive at Perseus it is probably a Perseid.

The duration of this meteor shower covers the period of July 23 to August 22. Maximum currently occurs on August 12/13 (solar longitude=140.0 deg), from an average radiant of RA=47°, DEC=+57°. The maximum hourly rate typically reaches 80.

-From Abrams Planetarium

Upcoming Astronomy Events

August 14

Mahoning Valley Astronomical Society OTAA convention at MVCO, registration begins at 5:30 pm.

<http://www.mvobservatory.com/events.htm>

August 14

Toledo Astronomical Summer Star Party, Pioneer Scout Reservation, Pioneer, Ohio. Registration begins at 4:00 pm. This year celebrating the re-location of the TAA's 25-inch scope.

<http://www.toledoastronomy.org/gpage.html>

August 17 thru August 22

AstroBlast 2004
Oil City, Pennsylvania

<http://www.oras.org>

September 18

Black River Astronomical Society's OTAA convention, Birmingham Methodist Church Hall, Birmingham, Ohio, 4:30 pm

<http://junior.apk.net/%7earstar50/otaaconvention.htm>

September 25

Scope Out 2004
Cincinnati, Ohio

www.cincinnatiobservatory.org

Board Meeting Minutes: July 2004

1. ACA Board meeting was held 7/27/04. The meeting started at 7:30pm. In attendance were David Jessie, John Crilly, Gary Smith, Pete Flohr, Rosaelena Villasenor, Ray Paul, Glenn Cameron, Lynn Laux, Tom Mino, Jim Anderson and Mark Kochheiser.
2. ACA "Contents" insurance has been increased from \$5,000.00 to \$15,000.00.
3. ACA membership dues are to be increased by \$10.00 across the board with the only exception being that junior memberships will remain the same as they are currently. This is to be voted on by ACA members at the September 24th meeting.
4. An inventory is to be done of the ACA assets - especially observatory contents.
5. Receipts will be handed out to all who donated funds for the new MEADE 14" LX200GPS telescope which now resides in our observatory at the Portage Lakes State Park.
6. The next board meeting will be Tuesday October 19th at 7:30pm.
7. The observatory director is waiting for the "ok" from the state park officials to begin construction on the ACA storage shed.

8. September 11th will be the "First Light" ceremony for the ACA's new MEADE LX200GPS UHTC telescope. John Crilly is heading the effort.

-Pete Flohr, ACA Secretary

Treasurer's Report: 7/1/04—7/31/04

Total Beginning Assets	\$5625.00
<i>Income</i>	
Donations from Outreach	\$ 50.00
Dues	\$ 245.00
Magazine Subscription Paid to ACA	\$ 32.95
Misc Income (\$5.00 Bank bonus + interest)	\$ 6.55
<i>Expenses</i>	
ACA Newsletter	\$ (34.65)
ACA Picnic	\$ (126.84)
Magazine Subscription paid by ACA	\$ (32.95)
Total Ending Assets	\$ 5,765.06

Submitted 8-02-2004 Gary Smith

Vice President's Corner

CREATING A YAHOO ACCOUNT

I'm surprised at how few ACA members have joined the Club's Yahoo Group. It was brought to my attention that many Club members aren't members of Yahoo and may not be sure how to join Yahoo in order to gain access to the Group.

Yahoo membership is free and no personal information must be provided. It does ask for a first and last name but anyone concerned about privacy can use Fred Flintstone or whatever. Of course, that'll make it more difficult for us on the Group to know to whom we are talking.

Following these instructions should get you there; we'll be looking for you on the Group!

BEGIN HERE:

<http://tinyurl.com/azbj>

Click on the link to the left labelled "**Sign up now**"

Choose a screen name you will use on Yahoo - it must be one word and must not already be in use by another person. You might try your first and middle initials followed by your last name - that's what I use (jrcrilly). Type that into the box labeled "Yahoo ID". If this is rejected you might add a number to the end to make yours unique.

Choose a password that will prevent others from using your ID. It must be at least 6 characters long and may contain letters or numbers or both. Upper or lower case matter - if you use any upper case characters now you will always have to use them. Type this password into the next two boxes, labeled "password" and "retype password". This is done to eliminate the possibility of making a typing mistake and selecting a password you don't intend (and won't know).

If you don't want to create a new email address, uncheck the box marked "Activate my free Yahoo! email address." If you don't uncheck this, an email address will be created for you at no cost.

Fill in the rest of the form. The only item which must be accurate is the email address, as they will email a confirmation to you which you will need to receive.

Be sure to **uncheck** the box marked "Send me special offers, promotions, and research surveys from selected Yahoo! partners through Yahoo! Deliverers. Interests (optional): "

Read the strange-looking letters and numbers in the box toward the bottom and type into the empty box. This is done to make it so automatic systems can't create logins - it requires a "real" person.

Click "submit"

If anything is incorrect at this point, it will tell you what to fix. If it's all OK, you will get to the next screen, titled "**Registration: Please Activate Your Account**".

Make sure you **uncheck** the box marked "Yes, personalize my browser with Yahoo! Companion toolbar."

Now check your email at the address you gave them earlier - you will have received an email from Yahoo with the subject line, "Welcome to Yahoo! Please Activate Your Account".

In that email there will be a link entitled "**Important! Click here to activate your new account.**"

Click that link and your Yahoo ID will be up and running.

Look in the same email for another link like this:

"Click here to review your Marketing Preferences. You can select and customize the categories of communications you receive about Yahoo! Products and services, or choose to opt-out of each."

Go ahead click on the highlighted word "here". A new browser screen will open.

Make sure ALL the yes/no boxes are checked "NO". .Make sure the last two boxes (do not contact me) ARE CHECKED. .Click "Save changes" at the bottom.

Now open this URL in your browser:

<http://groups.yahoo.com/group/astronomyclubofakron>

or use this shortcut:

<http://tinyurl.com/5rwe2>

and click the link labelled "JOIN" and you will be in as soon as a moderator approves your membership.

The first time you log into the Group, click on the "[Edit My Membership](#)" link at the top right so you can select how you will be notified of new messages on the Group. You can choose to receive a copy of each message by email, to receive a daily digest of messages, or no email from the Group at all. If you choose to receive no email, it will be necessary for you to log into the Group regularly to see if there is new traffic of interest.

Once you are all set, take a look at the "Photos" and "Links" sections to the left; there may items of interest to you in there. The "Messages" link will show you a list of all messages previously posted to the Group.

Try it and let us know what you think!

-John Crilly

From the President

Wow, there's so much to write about this month! If you haven't been in the observatory lately, you're in for a surprise...the pier is no longer the home of the 12.5" f/8 reflector we've used and loved for so many years. In its place there's a new state-of-the-art 14" f/10 computerized

GOTO Schmidt-Cassegrain worth over \$7,000.00! It's a Meade LX200GPS that has received the 'Supercharge' service from Dr. Clay Sherrord for even higher performance. This switch-over occurred on Friday, July 16th at zero expense to the club...but rather as a gift from a consortium of local amateur astronomers (who, just incidentally, happen to all be members of the ACA and most of them ACA Board members). One exception being a very generous donation by **Mrs. Peter Mino** donated to the memory of **Peter** who passed away on April 14th this year.

The new telescope will be dedicated in a gala public event orchestrated by VP (and VIP!) **John Crilly** on September 11 which coincides with our scheduled 'The Planets Uranus and Neptune' public program. <please! no 'Neptune' jokes!> For additional information, please see this month's articles: 'Observatory Director's Report' - by **Ray Paul** and 'ACA Board Meeting Minutes' - by **Pete Flohr**. It's exciting times at the ACA!

Also, several members deserve special thanks. I'd like to thank **Jim Anderson** for his work in setting up and coordinating the outreach programs at Craftsman's Park. Well done, Jim!

As many of you know, the club picnic was held at the home of **Carl and Betti Hervol** and what a tremendous time we had! The food was great, the accommodations were outstanding and better hospitality one could not hope for. Thank you, Carl and Betti...you've now raised the bar so high I don't think we can ever top it!

-Dave Jessie, Future Past President

Observatory Director's Report

On Friday, July 16, **Dave Jessie, Ted Faix, Jim Anderson**, and I installed the club's new LX200GPS 14" telescope in the observatory. Yes, it is finally here and it is up and running. I would like to thank the members of the consortium who made this acquisition possible: **Jim Anderson, Kurt Bauch, John Crilly, Peter Flohr, Dave Jessie, Tom Mino, Mr. & Mrs. Peter Mino, Ray Paul, Louis Poda, Ted Seman, Gary Smith, Peggy Stabholz, and Rosa Villasenor. Bravo!**

After a week of running it through its paces and educating myself on its use, we held our first public program

on Saturday, July 24, using the new scope. We had a respectable turnout and the scope performed fairly well, with a few minor glitches.

We quickly determined that the mounting plate we used was not up to the task based on the amount of vibration we witnessed in the eyepiece. Thanks to Pete Flohr, I hope to have a new mounting assembly of substantially heavier construction fabricated and installed by Saturday, July 31.

We have also ordered an Astrozap aluminum dew shield and cap which we should receive sometime during the first week of August. Upon its receipt, we will install it and the piggyback 102mm f/6 Orion refractor and will proceed with balancing the entire assembly. If all goes according to plan, this should all be done by Aug 7.

I am also in the process of obtaining a two or three step ladder with hand-rails similar to the larger version we had been using with the old scope.

I will be conducting training sessions on the use of the scope for those qualified sometime during the second or third week of August. Contact me @ 658-3125 or raymonpaul@brightdsl.net if you have an interest.

Don't forget the next Observatory program on Aug 7. From what I have seen so far, you'll be delighted by the views through the new scope.

-Ray Paul

Outreach

Once again, we had two more successful outreach programs for the month of July at Craftsman's Park (Portage Lakes) Masonic Boy's Camp and Eastern Star Girl's Camp. On July 23rd, we had good clear skies, but the outside viewing session was rained out on the 30th.

Lenny Ludwig, Camp Director, and **Joe Van Syol**, Head Counselor, said, "The kids enjoyed the A.C.A. program so much that's all they talked about for the rest of the time they were here."

As a result, Camp Coordinator **Mike Bailey** booked us for next year's Camps. He also indicated that he would be adding us to their list for the boy's and girl's camp activities permanently. Additionally, the **staff** at Craftsman's Park donated **fifty dollars** to the A.C.A. for a job well done.

Once again good job A.C.A. members for coming out and giving your best! I would like to thank the following mem-

bers for helping on July 23rd: **Lynn Laux, Ray Paul, Jennifer Robinson, Mr. Robinson, Paul Woodward, John Shulan, Paul Martin, John Crilly, Dave Owen, and myself.** And my thanks again for helping on the 30th: **Lynn Laux, Rich Jones, Ray Paul, Fred Huffman, Paul Martin, Glen Cameron, John Crilly and myself.**

My sincere gratitude to all for making our outreach programs so successful for the campers!

-Jim Anderson

Enviro Outreach Program

The Enviro Outreach Organization and Portage Lakes Advisory Council is sponsoring the **2nd annual Northeast Ohio Enviro Expo on Saturday, September 25, 2004 from 10:00 AM - 5:00 PM at Coventry High School North Campus**, 3089 Manchester Road, Akron, Ohio. It will be an environmental awareness fair consisting of everything from Astronomy to the Zoo.

There will be alternative energy products and exhibits, environmental education exhibits, nature and environmental group contacts, recycling information, speakers giving talks on various environmental issues, live radio remote broadcasts and food vendors. **Free parking and admission.**

The ACA will be having an exhibit at this event. We will be able to sell merchandise. This will be a great opportunity to spread the word about the problem of light pollution! **Mark Kochheiser** is the ACA contact and he is **requesting assistance in manning a booth for the event.** He especially needs people to bring telescopes with solar filters in order to observe the Sun. If you can help, please give him a call at **330-882-3713.**

6th Annual ScopeOut Astronomy Fair

Dear Fellow Astronomical Society,

I am writing to invite your members to our sixth annual Cincinnati Observatory Center Astronomy Fair - "ScopeOut 2004" on Saturday, September 25, 2004. ScopeOut is held at the historic Cincinnati Observatory and is geared toward children, families, teachers and amateur astronomers of all levels.

Tour our nation's first professional observatory! Lectures and presentations throughout the day. Astrophotography and telescope making displays. Local and regional vendors of astronomical merchandise. Door prizes and raffle. Marvel at our recently restored astronomical clocks. Help celebrate our 16" Clark refracting telescope's centennial. Activities for all ages and experience levels!

ScopeOut 2004 is held rain or shine. 6th Annual ScopeOut Astronomy Fair The Cincinnati Observatory Center, 3489 Observatory Place, Cincinnati, OH 45208

Date & Time: Saturday, September 25, 2004, 12-10:30 p.m.

Activities Run 12-5pm.

Vendors and Exhibitors 12-10pm
Dinner and Keynote Lecture at 6pm.
Viewing follows (weather permitting) through our historic 1842 11" Merz & Mahler & 1904 16" Clark refracting telescopes.

Admission:

General \$7.00

Student (13-18) \$5.00 Under 13 Free

Add the Lecture & Dinner \$15.00

For more information, directions, or to pre-register for the Dinner and Keynote Lecture, contact the Cincinnati Observatory Center: (513) 321-5186, or visit www.cincinnatiobservatory.org

We hope to see you in Cincinnati, September 25th!

Craig Niemi, Chair ScopeOut 2004
craig_niemi@yahoo.com

NASA Space Place

Waiting for Cassini's "Safe Arrival"
Call

By Diana K. Fisher



Right after entering Saturn orbit, Cassini sent this image of the part of the Encke Gap in Saturn's rings. Image credit NASA/JPL/Space Science Institute.

The evening of June 30, 2004, was nail-biting time at Cassini Mission Control. After a seven-year journey that included gravity assist flybys of Venus, Earth, and Jupiter, Cassini had finally arrived at Saturn. A 96-minute burn of its main engine would slow it down enough to be captured into orbit by Saturn's powerful gravitational field. Too short a burn and Cassini would keep going toward the outer reaches of the solar system. Too long a burn and the orbit would be too close and fuel reserves exhausted.

According to Dave Doody, a Cassini Mission Controller at the Jet Propulsion Laboratory (JPL) in Pasadena, California, there was a good chance the Earth-bound Cassini crew would have to wait hours to learn whether or not the burn was successful. Of the three spacecraft-tracking Deep Space Network (DSN) complexes around the globe, the complex in Canberra, Australia, was in line to receive Cassini's signal shortly after the beginning of the burn. However, winds of up to 90 kilometers per hour had been forecast. In such winds, the DSN's huge dish antennas must be locked into position pointed straight up and cannot be used to track a tiny spacecraft a billion miles away as Earth turns on its axis. "The winds never came," notes Doody.

The DSN complex at Goldstone, California, was tracking the carrier signal from Cassini's low-gain antenna (LGA) when the telltale Doppler shift in the LGA signal was seen, indicating the sudden deceleration of the spacecraft from the successful ignition of the main engine. Soon thereafter, however, Goldstone rotated out of range and Canberra took the watch.

After completion of the burn, Cassini was programmed to make a 20-second "call home" using its high-gain antenna (HGA). Although this HGA signal would contain detailed data on the health of the spacecraft, mission controllers would consider it a bonus if any of that data were actually captured. Mostly, they just wanted to see the increase in signal strength to show the HGA was pointed toward Earth and be able to determine the spacecraft's speed from the Doppler data. If possible, they also wanted to try to lock onto the signal with DSN's closed-loop receiver, a necessary step for extracting engineering data.

Normally it takes around one minute

to establish a lock on the HGA signal once a DSN station rotates into range. Having only 20 second's worth of signal to work with, the DSN not only established a lock within just a few seconds, but extracted a considerable amount of telemetry during the remaining seconds.

"The DSN people bent over backwards to get a lock on that telemetry signal. And they weren't just depending on the technology. They really know how to get flawless performance out of it. They were awesome," remarks Doody.

Find out more about the DSN from JPL's popular training document for mission controllers, Basics of Space Flight (www.jpl.nasa.gov/basics) and the DSN website at deep-space.jpl.nasa.gov/dsn. For details of the Cassini Saturn orbit insertion, see www.jpl.nasa.gov/basics/soi. Kids can check out The Space Place at space-place.nasa.gov/en/kids/dsn_fact1.shtml to learn about the amazing ability of the DSN antennas to detect the tiniest spacecraft signals.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

-Contributed by Rich Ruggles

Did You Know?



The scientific name for the twinkling of stars is stellar **scintillation** (or astronomical scintillation). Stars twinkle when we see them from the Earth's surface because we are viewing them through thick layers of turbulent air in the Earth's atmosphere.

Stars (except for the Sun) appear as tiny dots in the sky; as their light travels through the many layers of the Earth's atmosphere, the light of the star is bent (refracted) many times and in random directions (light is bent when it hits a change in density - like a pocket

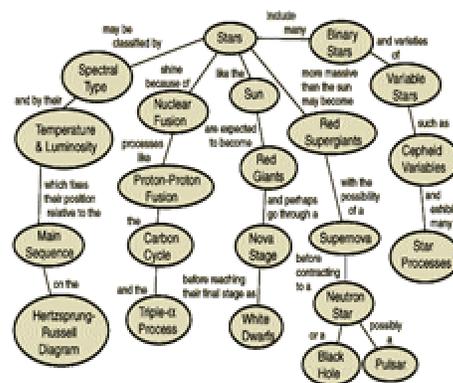
of cold air or hot air). This random refraction results in the star winking out (it looks as though the star moves a bit, and our eye interprets this as twinkling).

Stars closer to the horizon appear to twinkle more than stars that are overhead - this is because the light of stars near the horizon has to travel through more air than stars overhead and subject to more refraction. Also, planets do not usually twinkle - they are big enough that this effect is not noticeable (except when the air is extremely turbulent).

Stars would not appear to twinkle if we viewed them from outer space (or from a planet/moon that didn't have an atmosphere).

-From Zoom Astronomy

Stellar Properties By Lynn Laux



Apparent versus Absolute Magnitude

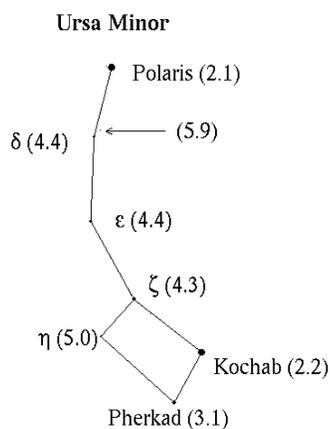
A basic observable quantity for a star is its brightness. Because stars can have a very broad range of brightness, astronomers commonly introduce a logarithmic scale called a magnitude scale to classify the brightness. This method was devised originally by the Greeks, who classified the stars as first magnitude (brightest) to sixth magnitude (dimmiest). This rough method was altered in the 1800's so that magnitude (mag.) 1 stars were defined as being exactly 100 times brighter than mag. 6 stars. Thus magnitude could be expressed as varying logarithmically with the stars brightness. With the advent of accurate modern photometry the scale was extended in both directions.

There are several ways in which we could specify the brightness and this leads to several different magnitudes that astronomers define. One important distinction is between whether we are talk-

ing about the apparent brightness of an object, or its "true" brightness. The former is a convolution of the true brightness and the effect of distance on the observed brightness, because the intensity of light from a source decreases as the square of the distance.

The apparent magnitude of an object is the "what you see is what you get" magnitude. It is determined using the apparent brightness as observed, with no consideration given to how distance is influencing the observation. Obviously the apparent magnitude is easy to determine because we only need measure the apparent brightness and convert it to a magnitude with no further thought given to the matter.

Thus at one extreme the Sun is magnitude (mag.) -27 and some of the faintest observed stars around mag +24. The full moon is mag -12.5, Sirius the brightest star in the night sky mag -1.5, whilst the faintest stars visible to the naked eye under good seeing conditions are around mag +6. A quick guide to seeing conditions may be gleaned from examining a suitable constellation. In the Northern hemisphere Ursa Minor (the 'Little Bear') is ideal. Circumpolar and thus often visible, it contains stars covering magnitudes +2 down to +6. The diagram below indicates the magnitudes of the component stars of Ursa Minor



Clearly, a star that is very bright in our sky could be bright primarily because it is very close to us (the Sun, for example), or because it is rather distant but is intrinsically very bright (Betelgeuse, for example). It is the "true" brightness, with the distance dependence factored out, which is of most interest to astronomers. Therefore, it is useful to establish a convention whereby we can compare two stars

on the same footing, without variations in brightness due to differing distances complicating the issue.

Astronomers define the **absolute magnitude** to be the apparent magnitude that a star would have if it were (in our imagination) placed at a distance of 10 parsecs (which is 32.6 light years) from the Earth. I can do this if I know the true distance to the star because I can then use the inverse square law to determine how its apparent brightness would change if I moved it from its true position to a standard distance of 10 parsecs. There is nothing magic about the standard distance of 10 parsecs. We could as well use any other distance as a standard, but 10 parsecs is the distance astronomers have chosen for this standard. A common convention, and one that we will mostly follow, is to use a lower-case "m" to denote an apparent magnitude and an upper-case "M" to denote an absolute magnitude.

Notice the very important point that I can determine the **apparent magnitude m** of a star simply by measuring how bright it appears to be, but to determine the **absolute magnitude M** the distance to the star must also be known.

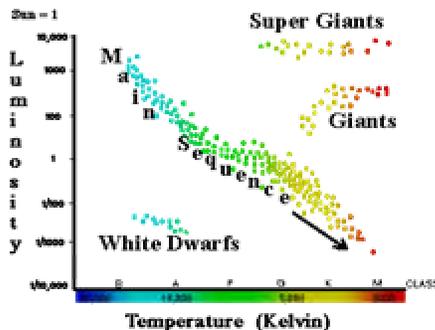
Colors of Stars: Spectroscopy

Spectroscopy is a scientific technique in which the visible light coming from objects (like stars) is examined to determine the object's composition, temperature, density, and velocity. A spectral line is a bright or dark line found in the spectrum of some radiant source. Bright lines indicate emission, dark lines indicate absorption. A bright spectral line represents light emitted at a specific frequency by an atom or molecule. Each different element and molecule gives off light at a unique set of frequencies. Astronomers can determine the composition of gases in stars by looking for characteristic frequencies. For example, carbon monoxide (CO) has a spectral line at 115 Gigahertz (equal to a wavelength of 2.7 mm). The spectral type of stars is a system of classification of stars based on the stars' spectra, emission lines that correlate with each star's surface temperature (and color).

There are seven major spectral types. In order of decreasing temperature, they are: O - He II absorption; B - He I absorption; A - H absorption; F - Ca II absorption; G - strong metallic lines; K - bands developing; M - very red. O and B stars are uncommon but very bright; M stars are common but dim. The Sun is a

G star, about average.

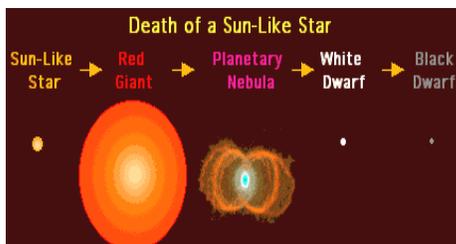
The standard mnemonic for remembering the classes is: **Oh Be A Fine Girl Kiss Me**. It is supplemented by the giants and supergiants: R- and N-type stars (also known as carbon stars or C-type stars) and S-type stars. The Hertzsprung -Russell (H-R) Diagram is a graph that plots stars color (spectral type or surface temperature) vs. its luminosity (absolute magnitude). On it, astronomers plot stars' color, temperature, luminosity, spectral type, and evolutionary stage.



This diagram shows that there are 3 very different types of stars: Most stars, including the sun, are "main sequence stars," fueled by nuclear fusion converting hydrogen into helium. For these stars, the hotter they are, the brighter. These stars are in the most stable part of their existence; this stage generally lasts for about 5 billion years.

As stars begin to die, they become giants and supergiants (above the main sequence). These stars have depleted their hydrogen supply and are very old. The core contracts as the outer layers expand. These stars will eventually explode (becoming a planetary nebula or supernova, depending on their mass) and then become white dwarfs, neutron stars, or black holes (again depending on their mass).

Smaller stars (like our Sun) eventually become faint white dwarfs (hot, white, dim stars) that are below the main sequence. These hot, shrinking stars have depleted their nuclear fuels and will eventually become cold, dark, black dwarfs.



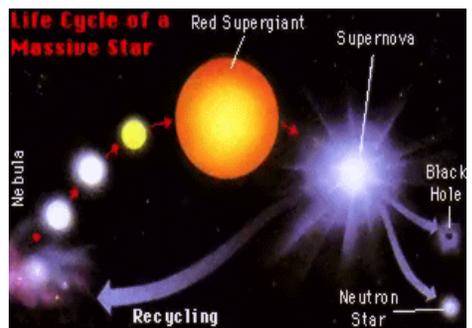
Star Type	Color	Approximate Surface Temperature	Average Mass (The Sun = 1)	Average Radius (The Sun = 1)	Average Luminosity (The Sun = 1)	Main Characteristics	Examples
O	Blue	over 25,000 K	60	15	1,400,000	Singly ionized helium lines (H I) either in emission or absorption. Strong UV continuum.	10 Lacerta
B	Blue	11,000 - 25,000 K	18	7	20,000	Neutral helium lines (H II) in absorption.	Rigel, Spica
A	Blue	7,500 - 11,000 K	3.2	2.5	80	Hydrogen (H) lines strongest for A0 stars, decreasing for other A's.	Sirius, Vega
F	Blue to White	6,000 - 7,500 K	1.7	1.3	6	Ca II absorption. Metallic lines become noticeable.	Canopus, Procyon
G	White to Yellow	5,000 - 6,000 K	1.1	1.1	1.2	Absorption lines of neutral metallic atoms and ions (e.g. once-ionized calcium).	Sun, Capella
K	Orange to Red	3,500 - 5,000 K	0.8	0.9	0.4	Metallic lines, some blue continuum.	Arcturus, Aldebaran
M	Red	under 3,500 K	0.3	0.4	0.04 (very faint)	Some molecular bands of titanium oxide.	Betelgeuse, Antares

The previous chart gives an example of various bright stars and the stellar class that they fall into. Additionally, within each stellar type, stars are placed into subclasses (from 0 to 9) based on its position within the scale.

In the Yerkes classification scheme, shown in the table below, stars are further assigned to groups according to the width of their spectral lines. For a group of stars with the same temperature, the luminosity class differentiates between their sizes (supergiants, giants, main-sequence stars, and subdwarfs). In this case, luminosity is the total amount of energy that a star radiates each second (including all wavelengths of electromagnetic radiation).

TYPE	Star
Ia	Very luminous supergiants
Ib	Less luminous supergiants
II	Luminous giants
III	Giants
IV	Subgiants
V	Main sequence stars (dwarf stars)
VI	Subdwarf
VII	White Dwarf

Some of this is a bit misleading: the "dwarfs", spectral class V, are actually normal, "adult" stars, if you will. Most stars will spend most of their life-spans in spectral class V. A few stars, unusually massive stars, will start out in spectral classes I, II, or III. Especially low-mass stars will start out as class VI stars. However, stars which begin at V will tend to age into class II or III, and then drop down to class D at the very end of their life-spans.



AstroHumor

The ~~Ten~~ Twelve Commandments for Amateur Astronomers:

1. Thou shalt have no white light before thee, behind thee, or to the side of thee whilst sharing the night sky with thy fellow stargazers.
2. Thou shalt not love thy telescope more than thy spouse or thy children; as much as, maybe, but not more.
3. Thou shalt not covet thy neighbor's telescope, unless it exceeds in aperture or electronics twice that of thy wildest dreams.
4. Thou shalt not read "Astronomy" or "Sky & Telescope" on company time, for thine employer makes it possible to continue thine astronomical hobby.
5. Thou shalt have at least two telescopes so as to keep thy spouse interested when the same accompanies thee under the night sky or on eclipse expeditions to strange lands where exotic wild animals doth roam freely.
6. Thou shalt not allow either thy sons or thy daughters to get married during the Holy Days of Starfest.
7. Thou shalt not reveal to thy spouse the true cost of thy telescope collection; only the individual components, and that shall be done with great infrequency.
8. Thou shalt not buy thy spouse any lenses, filters, dew shields, maps, charts, or any other necessities for Christmas, anniversaries, or birthdays unless thy spouse needs them for their own telescope.
9. Thou shalt not deceive thy spouse into thinking that ye are taking them for a romantic Saturday night drive when indeed thou art heading for a dark sky site.
10. Thou shalt not store thy telescope in thy living room, dining room, or bedroom, lest thou be sleeping with it full time.
11. Verily, observe not through thy neighbor's AP or Tak, lest thee be utterly consumed by the lust of apo-fever, and thy brain and thy bank account shall shrivel and wither like branches in a flame.
12. Verily, observe not through thy neighbor's Dob of Goliath, lest thee be lain bare to the fires of aperture-fever, and thy sanity, thy sacroiliac and thy life savings be crushed as ye grapes of wrath.

-Contributed by Dave Jessie

Welcome!

Welcome, new ACA Members!

The ACA wishes to extend a warm welcome to new members...

Jeff Haren, July 9th
Jeri Rinehart, July 12th

and a belated warm welcome to the following new members who joined before the new ACA Database was in place:

Orin Falb, April 23rd
Kristy Gault, April 23rd,
Richard & Merry Jones, April 23rd,
Sue Richey, April 23rd
Chaz & Laura Villwock, April 23rd
Paul Woodward, April 23rd
Scott Horstman, April 28th.

We look forward to seeing you at ALL club meetings and events!

Special Recognition!

The Club would like to recognize, and thank, the following members for their 'Over 20' years of service:

Harold Brock, 32 years (now an honorary member)
George Cheney, 21 years
Phil Hegenderfer, 25 years (now an honorary member)
Emerick Hranilovich, 27 years (now an honorary member)
Mark Kochheiser, 23 years
Tom Mino, 28 years
Louis Poda, 30 years (now an honorary member)
Peggy Stabholz, 20 years.

Many of these 'Over 20' year veterans have held, or are currently holding, positions on the Board and continue to contribute experience and service to the Club. We can not possibly thank you enough for your continued service to the community of amateur astronomers.



For Sale

8 inch Dob, many extras

10 inch Dob, many extras

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Article Submission

Please note the change in the deadline for article submission. All articles are due **12 days after the last meeting**. In the summer months, when there is no meeting, the deadline is **12 days after the fourth Friday of the month**. This has been revised in order to get the newsletter into the mail **2 weeks after the last meeting or 4th Friday of the previous month**. All word processing files should be saved in any version of **Word** to minimize import problems. If you don't have access to a computer, don't hesitate to write something out long hand.

Send in your articles, items for sale, and comments to:

Lynn M. Laux
14274 Bridle Trail
Strongsville, OH 44136

Or email:
gemmalady@msn.com



If you have any pictures of club events, astronomical images, rig pictures and the like, please submit them to:

<http://groups.yahoo.com/group/astronomyclubofakron>



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An aid to enjoying the changing sky

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Planets at dusk: Jupiter, of mag. -1.7, is the brightest evening "star," and still noticeable early in month, low in W in twilight. From lat. 40° N, it follows the Sun over the horizon by 1½ hours on Aug. 1, to just 40 minutes at month's end. Mercury, fading from mag. +0.8 on Aug. 1, can be spotted during first week, 13° to 12° lower right of Jupiter. Binoculars are recommended to help pick it out in twilight; it's higher and easier to see from southern states.

Dawn: Venus, at mag. -4.3, rises spectacularly in a dark sky over three hours before sunrise and is well up in east as twilight brightens. In August, Venus shifts eastward about 1° per day against the background stars of Taurus (passing 2° S of Zeta on Aug. 1) and Gemini (passing S of Pollux and Saturn at month's end). On Aug. 17, Venus attains greatest elongation, 46° upper right of the rising Sun, and displays a disk 0.4 arcminute across, about half illuminated. Saturn, of mag. +0.2 in Gemini, begins August low in E, 25° lower left of Venus. By month's end Saturn climbs well up in east and appears only 2° north of Venus.

Will there be an enriched Perseid meteor shower this year? According to meteor shower expert Esko Lylyinen, the Perseid meteors may produce a strong but brief shower centered on August 11 near 20:54 UT, as Earth passes 180,000 km from the center of a trail of dust released by Comet Swift-Tuttle in 1862. If the outburst materializes, it will be best seen in Europe (except far west, where it's evening twilight) and Asia (except far east). Unfortunately it's daytime in N. America, but the broader main Perseid meteor shower may also be stronger than usual this year and is best seen from North America in late evening of August 11 through predawn darkness hours of August 12. (Lylyinen expects a real Perseid storm for most of the U.S. on the morning of Aug. 12, 2028, from comet dust released in 1479.) For more information, visit <http://www.scifil-fmbb/astro/Perseids.htm> and <http://www.jmo.net>

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
<p>Sunday, Aug 1 Week of August 1-7 45 minutes after sunset: each evening this week. Ju to Me = 13°; On Sunday Aug. 1 it rises in ESE within 1-1/4 hours after sunset. Each night this week, it rises farther N along horizon, by less than half an hour nightly from N states. On Tues it rises 5°-6° S of E, and on Wed it rises 3° N of E. What causes the red color?</p> <p>Regulus Mercury W Jupiter Denebola (tail of Leo)</p>	<p>Tuesday Aug 3, 1½ hours before sunrise Zeta Tauri, Bull's S horn Venus ORION Betelgeuse Rigel E ESE</p>	<p>Wednesday Aug 11, 1½ hours before sunrise Moon Castor's foot Venus GEMINI Castor Pollux Saturn ENE</p>	<p>Thursday Aug 12, 1½ hours before sunrise Moon Castor Pollux Saturn ENE</p>	<p>Friday Aug 13, 1½ hours before sunrise Castor Moon Saturn ENE</p>	<p>Saturday Aug 14, one hour before sunrise Venus Castor Pollux Last easy old Moon ENE</p>	<p>Saturday Aug 14, one hour after sunset Aug 19 & 20, one hour after sunset Fri 20 Spica WSW Tues Aug 31 Castor Pollux Saturn Venus 1½ hours before sunrise: Venus-Saturn 2.0° apart; see box below. ENE</p>
<p>Sunday, Aug 8-14 Follow waning Moon in morning sky this week as it passes two planets and Look before first light of dawn for Perseid meteors. Shower is expected to be best in predawn on Thurs Aug 12 for North American observers. For more, see left margin.</p> <p>Aug 9-11, 1½ hours before sunrise Platides Mon 9 Hyades Aldebaran Tues 10 Bull's S horn Wed Aug 11 Venus</p>	<p>Tuesday Aug 10, 1½ hours before sunrise Castor Pollux Saturn ENE</p>	<p>Wednesday Aug 11, 1½ hours before sunrise Moon Castor's foot Venus GEMINI Castor Pollux Saturn ENE</p>	<p>Thursday Aug 12, 1½ hours before sunrise Moon Castor Pollux Saturn ENE</p>	<p>Friday Aug 13, 1½ hours before sunrise Castor Moon Saturn ENE</p>	<p>Saturday Aug 14, one hour before sunrise Venus Castor Pollux Last easy old Moon ENE</p>	<p>Saturday Aug 14, one hour after sunset Aug 19 & 20, one hour after sunset Fri 20 Spica WSW Tues Aug 31 Castor Pollux Saturn Venus 1½ hours before sunrise: Venus-Saturn 2.0° apart; see box below. ENE</p>
<p>Sunday, Aug 15, 1½ hours before sunrise: Saturn 15° lower left of Venus. Watch Venus close in on Saturn for rest of month, they'll be within 10° apart at end of this week. 30 minutes before sunrise in New England; Binoculars may show very thin old Moon, 16 hours before New, rising in ENE. New Moon 9:29 p.m. EDT.</p> <p>Sun Aug 22 Castor Pollux Saturn Venus Ve-Sa = 9° Procyon ENE</p>	<p>Tuesday Aug 24 Antares approaching First Qtr SSW SW</p>	<p>Wednesday Aug 25 Tail of Taurus SAGITTARIUS S SSE</p>	<p>Thursday Aug 26 Antares approaching First Qtr SSW SW</p>	<p>Friday Aug 27 Castor Pollux Saturn Venus 1½ hours before sunrise Ve-Sa 4.5° apart, same as Po-Ca. ENE</p>	<p>Saturday Aug 28 Saturn Venus 1½ hours before sunrise: Venus-Saturn 2.0° apart; see box below. ENE</p>	<p>Saturday Aug 28 Saturn Venus 1½ hours before sunrise: Venus-Saturn 2.0° apart; see box below. ENE</p>
<p>Sunday, Aug 29 Watch Moon rise 15°-20° S of E about 10-20 minutes after sunset tonight for most of U.S.</p> <p>Full Moon occurs at 10:22 p.m. EDT. Moon rises less than 30 minutes later each night this week from northern U.S. Again, as in first week, note the reddened color of the Moon at moonrise.</p> <p>Gamma in Pegasus Della Aqr ESE</p>	<p>Monday Aug 30, morning sky: Saturn is 7° S of Pollux this morning. This is the first of three occasions within nine months when Saturn passes that star (next times in January and May 2005): A triple conjunction. Then, the next Saturn-Pollux conjunction will be single, in July 2034.</p>	<p>Tuesday Aug 31 Castor Pollux Saturn Venus 1½ hours before sunrise: Venus-Saturn 2.0° apart; see box below. ENE</p>	<p>Wednesday Aug 31 Castor Pollux Saturn Venus 1½ hours before sunrise: Venus-Saturn 2.0° apart; see box below. ENE</p>	<p>Thursday Aug 31 Castor Pollux Saturn Venus 1½ hours before sunrise: Venus-Saturn 2.0° apart; see box below. ENE</p>	<p>Friday Aug 31 Castor Pollux Saturn Venus 1½ hours before sunrise: Venus-Saturn 2.0° apart; see box below. ENE</p>	<p>Saturday Aug 31 Castor Pollux Saturn Venus 1½ hours before sunrise: Venus-Saturn 2.0° apart; see box below. ENE</p>

Subscription: \$10.00 per year, starting anytime, from Sky Calendar, Abrams Planetarium, Michigan State University, East Lansing, MI 48824

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ISSN 0733-6314