The Prairie Astronomer

January, 2013 Volume 54, Issue #1

The Official Newsletter of the Prairie Astronomy Club

January Program

How to Use a Telescope

Getting a telescope for Christmas can be as frustrating as it is exciting. If you know of someone who recently purchased or you have had one in your closet for years and would like to learn the basics of using a telescope. Feel free to bring your telescope along for some help from our club members if you wish. Some topics we will discuss are how to align the optics, accessories to buy, and how read and understand star charts.

In This Issue:

This new view of the historical supernova remnant Cassiopeia A, located 11,000 light-years away, was taken by NASA's Nuclear Spectroscopic Telescope Array, or NuSTAR. Blue indicates the highest energy X-ray light, where NuSTAR has made the first resolved image ever of this source. Red and green show the lower end of NuSTAR's energy range, which overlaps with NASA's high-resolution Chandra X-ray Observatory. Light from the stellar explosion that created Cassiopeia A is thought to have reached Earth about 300 years ago, after traveling 11,000 years to get here. While the star is long dead, its remains are still bursting with action. The outer blue ring is where the shock wave from the supernova blast is slamming into surrounding material, whipping particles up to within a fraction of a percent of the speed of light. NuSTAR observations should help solve the riddle of how these particles are accelerated to such high energies X-ray light with energies between 10 and 20 kiloelectron volts are blue; X-rays of 8 to 10 kiloelectron volts are green; and X-rays of 4.5 to 5.5 kiloelectron volts are red.
Image credit: NASA/JPL-Caltech/DSS

Featured Photo

The Bad Astronomer Fact of the Month

The Red Dwarf that Roared!

EV Lacertae is a dinky star, a cool red dwarf about 16 light years away. It really is small; its diameter is about 0.4 times that of the Sun, and it's so faint that if it weren't one of the closest stars to us we wouldn't be able to see it at all. Even though it's a close neighbor, it's still too faint to see with the naked eye, and is tough even in binoculars. So it's not very interesting, right? Heh. Bzzzzt.

EV Lac is almost fully convective, which means that the heat from hydrogen fusion in its core is transported upwards almost entirely due to hot gas rising. In more massive stars like the Sun, that heat is transported through radiation, literally through light. What this means is that almost all the gas inside EV Lac is moving up and down, rising and falling like water boiling in a pot. The gas is ionized, meaning it has an electric charge. Moving electric charges generate magnetic fields, so little red dwarfs like EV Lac can have pretty strong magnetic fields. Bear with me. We're almost there…

EV Lac is also rapid rotator; literally, it spins quickly, taking only about 4 days to rotate once (the Sun, for comparison, takes a month). This means the gas inside it doesn't just rise and fall in beautiful convection cells; it gets twisted up, tangled like a mass of string. But the magnetic fields hold a huge amount of energy. Twisting them up builds that energy, and eventually something's gotta give. On the surface of the star the field lines suddenly reconnect, and the energy stored inside is released. A lot of energy.

BANG.

The energy erupts out in the form of a flare: heat, light, particles all flash out of the reconnecting regions. On the Sun these flares can release as much as 10% of the Sun's total energy — the equivalent of 15 billion one-megaton bombs — all concentrated in one spot. But on EV Lac, the flares get even bigger… On April 25, several satellites detected a huge flash of X-rays. WIND was the first, but NASA's Swift mission picked up on the flare two minutes after it erupted. The flare was so bright that Swift's UV/Optical Telescope actually shut down to protect itself! The flare continued for eight hours, pouring energy from this tiny star into the cosmos. The energy of the flare was immense, thousands of times more powerful than a normal solar flare on the Sun. To put this in scale, that means that the flare from this tiny red dwarf star was actually more luminous than the Sun. If you had been looking at the right spot in the sky, you would have been able to actually see the normally invisible red dwarf, it got so much brighter than usual. This is the brightest flare ever seen from EV Lac, even though it's been monitored for a long time — it's a known flare source, blasting them out all the time, but none has ever been detected like this one. For astronomers, it's a boon. EV Lac is young (less than half a billion years old) which gives us insight into how stars behave when they're still fresh off the vine. It's a testbed for models of magnetically active stars, and bright flares are good for pushing the limits of both what the star can do and how our physics can model them.

Plus, it's just cool. A flare this big on the Sun — which, as far was we know, is currently impossible — would do some major hurt on the Earth. It would blast away our ozone layer, fry our satellites, create electromagnetic pulses that would take down our power grids and wipe out electronics, and cause all sorts of havoc on Earth… and maybe even a mass extinction*. Mind you, the Sun can't put out flares like the one from EV Lac, because the Sun is in middle age and has a more settled magnetic field (despite sometimes acting up). But when it was younger flares like that may have been common, sending out particle and electromagnetic radiation which slammed into the planets. Studying stars like EV Lac give us a handle on what our own star was like back in its raucous youth.

You can read more from the Bad Astronomer at his blog: http://www.slate.com/blogs/bad_astronomy.html

Club Events

Newsletter submission deadline January 15, 2012

PAC Meeting
Tuesday January 29, 2013 @Hyde Observatory
How to use a Telescope

PAC Meeting
Tuesday February 26th, 2013 @Hyde Observatory
Professor Jack Gable of Creighton University

2013 PAC Star Party Dates - Dates in bold are closest to the new moon

January	Jan 4th	**Jan 11th**
February	Feb 1st	**Feb 8th**
March	Mar 1st	**Mar 8th**
April	Apr 5th	**Apr 12th**
May	May 3rd	**May 10th**
June	May 31st	**Jun 7th**
July	Jun 28th	**Jul 5th**
NSP	**Aug 4-9**	
August	Aug 2nd	**Aug 9th**
September	Aug 30th	**Sep 6th**
October	Sep 27th	**Oct 4th**
November	Oct 25th	**Nov 1st**
December	Nov 29th	**Dec 6** and 27th

Lunar Party Dates:

Apr 19th
May 17th

Aug 16th
Sep 13th
Oct 11th

Internet Links of Interest

http://www.universetoday.com/

http://www.thespacereview.com

http://www.thespacereview.com/article/1945/1

http://space.flatoday.net/

http://www.spaceportamerica.com/

http://www.planetary.org/home/

http://www.nasaspaceflight.com/

http://www.spacex.com

ON THE NET

PAC:
www.prairieastronomyclub.org

PAC E-Mail:
info@prairieastronomyclub.org

NSP:
www.nebraskastarparty.org

NSP E-Mail:
info@nebraskastarparty.org

OAS
www.OmahaAstro.com

Hyde Observatory
www.hydeobservatory.info

Panhandle Astronomy Club
Panhandleastronomyclub.com

PAC-LIST: You may subscribe to the PAC listserv by sending an e-mail message to: imailsrv@prairieastronomyclub.org. In the body of the message, write "Subscribe PAC-List your-email-address@your-domain.com"

For example:
Subscribe pac-list me@myISP.com

To post messages to the list, send to the address

pac-list@prairieastronomyclub.org

PAC can also be found on Twitter and Facebook.

Buy club apparel through the club website. Shirts, hats, mugs, mouse pads and more.

January/February Observing: What to View--Jim Kvasnicka

Planets

Jupiter: Look for Jupiter between the Pleiades and Aldebaran. It will fade a little in February from -2.5 to -2.3.

Mercury: Low in the WSW at magnitude -0.6. After February 16th it fades and sinks out of view.

Mars: Dim and very low. Look for it with binoculars below the brighter Mercury.

Uranus and Neptune: Both are very low in the west and difficult to see.

Saturn: Rises about two hours before Jupiter sets. The rings are tilted a wide 19.3º from edge on.

Venus: Can be seen very low in the ESE just before sunrise in early February. It will then disappear in the Sun's glow later in the month.

Messier List

M1: The Crab Nebula in Taurus.
M35: Open cluster in Gemini.
M36/M37/M38: Open clusters in Auriga.
M42: The Orion Nebula.
M43: Emission nebula just north of M42.
M45: The Pleiades in Taurus.
M78: Emission nebula in Orion.
M79: Class V globular cluster in Lepus.
Last Month: M33, M34, M52, M74, M76, M77, M103
Next Month: M41, M44, M46, M47, M48, M50, M67, M81, M82, M93

NGC and Other Deep Sky Objects

H3945: Intense blue and orange double star in Canis Major.
NGC 2244: Open cluster in Monoceros.
NGC 2264: The Christmas Tree Cluster in Monoceros.
NGC 2362: The Tau Canis Majoris Cluster in Canis Major.
NGC 2392: The Eskimo Nebula in Gemini.

Double Star Program List

32 Eridani: Yellow and white pair.

55 Eridani: Yellow primary with a pale yellow secondary.

Gamma Leporis: Pair of yellow stars.

Epsilon Monocerotis: White primary with a pale yellow secondary.

Beta Monocerotis: Three bluish white stars.

Kappa Puppis: Equal white pair.

Alpha Ursa Minoris: Polaris, yellow-white and white stars.

N Hydrae: Equal yellow stars.

Comets in 2013

If the expectation for comets holds true for 2013 this will be a great year for comet observing. We have two bright comets expected in 2013. The first one is Comet PanSTARRS (C/2011 L4) which is coming in March. The second and most anticipated is Comet ISON (C/2012 S1) coming at the end of 2013.

PanSTARRS (C/2011 L4)

Comet PanSTARRS was discovered in June, 2011 by the automated PanSTARRS sky survey in Hawaii. The comet will pass close to the Sun (0.30 a.u.) on March 10th. It's expected to grow a large bright tail by that time. Its best showing from our location will be from March 8-22, especially the week of March 12-18. Comet PanSTARRS will be quite low at dusk in the WNW. PanSTARRS was a magnitude 19.5 when it was discovered. During January and February it's expected to brighten from magnitude 8 to magnitude 4. If it stays as predicted it will shine at magnitude 0 low in the western twilight in March with a large bright tail visible to the naked eye.

ISON (C/2012 S1)

Comet ISON was discovered in September by two amateur Russian astronomers, Vitali Nevski and Artyom Novichonok. From the beginning Comet C/2012 S1 (known as ISON after the International Scientific Optical Network involved with its discovery) was tied to wild speculation and controversy. Internet sites were calling it the brightest comet in all history, 100 times brighter than the full moon! Be careful of what you read. Keep in mind that comets are extremely unpredictable. Remember Comet Elenin in 2011 which had much hype and fizzled out. Never the less the indications are for a grand display by comet ISON late in 2013. We will have more reliable predictions in autumn for the comet. As November starts ISON should be visible to the naked eye in the morning sky shinning at magnitude 2.0 with a 10º tail. It reaches perihelion on November 28th. In December as it emerges from the bright twilight, in both the morning and evening skies, it may shine at a magnitude -1 to -2 with a short tail that gets longer each day. The most impressive views may come in mid-December just before dawn. On those mornings the tail from ISON is expected to span an incredible 40º to 60º!

This is a long way off and we have to wait and see if it happens.

ANNUAL MEMBERSHIP

REGULAR MEMBER - $30.00 per year. Includes club newsletter, and 1 vote at club meetings, plus all other standard club privileges.

FAMILY MEMBER - $35.00 per year. Same as regular member except gets 2 votes at club meetings.

If you renew your membership prior to your annual renewal date, you will receive a 10% discount.

Club members are also eligible for special subscription discounts on Sky & Telescope Magazine.

Club Telescopes

To check out one of the club telescope contact **Ben Rush.** If you keep a scope for more than a week, please check in with Jason once a week, to verify the location of the telescope and how long you plan to use it. The checkout time limit will be two weeks, but can be extended if no one else has requested use of a club scope.

100mm Orion refractor:
Available

10 inch Meade Dobsonian:
Available

13 inch Truss Dobsonian:
Available

I am not kidding when I say this is the official White House response to the petition called "Secure resources and funding, and begin construction of a Death Star by 2016"

This Isn't the Petition Response You're Looking For
By Paul Shawcross

The Administration shares your desire for job creation and a strong national defense, but a Death Star isn't on the horizon. Here are a few reasons:

-The construction of the Death Star has been estimated to cost more than $850,000,000,000,000,000. We're working hard to reduce the deficit, not expand it.
-The Administration does not support blowing up planets.
-Why would we spend countless taxpayer dollars on a Death Star with a fundamental flaw that can be exploited by a one-man starship?

However, look carefully (here's how) and you'll notice something already floating in the sky -- that's no Moon, it's a Space Station! Yes, we already have a giant, football field-sized International Space Station in orbit around the Earth that's helping us learn how humans can live and thrive in space for long durations. The Space Station has six astronauts -- American, Russian, and Canadian -- living in it right now, conducting research, learning how to live and work in space over long periods of time, routinely welcoming visiting spacecraft and repairing onboard garbage mashers, etc. We've also got two robot science labs -- one wielding a laser -- roving around Mars, looking at whether life ever existed on the Red Planet. Keep in mind, space is no longer just government-only. Private American companies, through NASA's Commercial Crew and Cargo Program Office (C3PO), are ferrying cargo -- and soon, crew -- to space for NASA, and are pursuing human missions to the Moon this decade.

Even though the United States doesn't have anything that can do the Kessel Run in less than 12 parsecs, we've got two spacecraft leaving the Solar System and we're building a probe that will fly to the exterior layers of the Sun. We are discovering hundreds of new planets in other star systems and building a much more powerful successor to the Hubble Space Telescope that will see back to the early days of the universe. We don't have a Death Star, but we do have floating robot assistants on the Space Station, a President who knows his way around a light saber and advanced (marshmallow) cannon, and the Defense Advanced Research Projects Agency, which is supporting research on building Luke's arm, floating droids, and quadruped walkers.

We are living in the future! Enjoy it. Or better yet, help build it by pursuing a career in a science, technology, engineering or math-related field. The President has held the first-ever White House science fairs and Astronomy Night on the South Lawn because he knows these domains are critical to our country's future, and to ensuring the United States continues leading the world in doing big things.

If you do pursue a career in a science, technology, engineering or math-related field, the Force will be with us! Remember, the Death Star's power to destroy a planet, or even a whole star system, is insignificant next to the power of the Force.

Paul Shawcross is Chief of the Science and Space Branch at the White House Office of Management and Budget

Here is the link to the petition: https://petitions.whitehouse.gov/petition/secure-resources-and-funding-and-begin-construction-death-star-2016/wlfKzFkN

Challenge Observing Objects for January/February

Each month I will have two objects, one for the more seasoned observer and one for the beginning observer. Each object I hope will challenge you just a little bit. I will provide you with a little bit of information about the object. It is your job to find it and if you would write a little report or draw what you see. The first person to report back on each object will have their report published in the next issue of the newsletter. Happy Hunting!

Advanced Object

NGC 2280

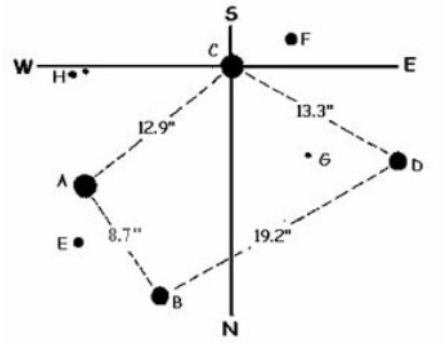
A faint elongated galaxy 2' x 1' NNW-SSE in Canis Major. It has a weak extended core. It lies around 75 million light years and has a magnitude of around 12.

Image Credit: European Southern Observatory

Beginner Object

The Trapezium

This is probably the best know multiple stars in the sky. In many double star catalogs it has become customary to designate the fours stars A, B,C, and D in order of right ascension rather than in the usual order of brightness. The star called C is the true primary of the group with a visual magnitude of about 5.4. Star D is the second in brightness at 6.3. A is third at about 6.8. The faintest star, B, is an eclipsing binary with a period of 6 days.



The 11th magnitude stars E and F are a well know observational challenge since both of these dim stars are separated from their brighter companions by only 4"

Image Credit: Jerry Lodriguss/Asttropix.com

Biggest Structure in Universe: Large Quasar Group Is 4 Billion Light Years Across

Sciencedaily.com

An international team of astronomers, led by academics from the University of Central Lancashire (UCLan), has found the largest known structure in the universe. The large quasar group (LQG) is so large that it would take a vehicle travelling at the speed of light some 4 billion years to cross it.

The team publish their results in the journal Monthly Notices of the Royal Astronomical Society.

Quasars are the nuclei of galaxies from the early days of the universe that undergo brief periods of extremely high brightness that make them visible across huge distances. These periods are 'brief' in astrophysics terms but actually last 10-100 million years.

Since 1982 it has been known that quasars tend to group together in clumps or 'structures' of surprisingly large sizes, forming large quasar groups or LQGs.

The team, led by Dr Roger Clowes from UCLan's Jeremiah Horrocks Institute, has identified the LQG which is so significant in size it also challenges the Cosmological Principle: the assumption that the universe, when viewed at a sufficiently large scale, looks the same no matter where you are observing it from.

The modern theory of cosmology is based on the work of Albert Einstein, and depends on the assumption of the Cosmological Principle. The Principle is assumed but has never been demonstrated observationally 'beyond reasonable doubt'.

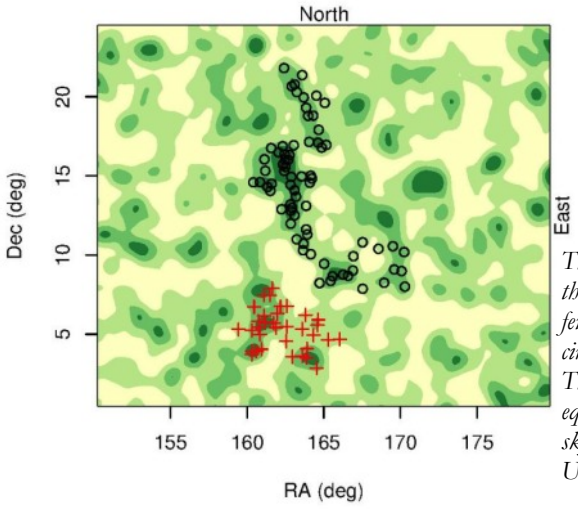
To give some sense of scale, our galaxy, the Milky Way, is separated from its nearest neighbour, the Andromeda Galaxy, by about 0.75 Megaparsecs (Mpc) or 2.5 million light-years.

Whole clusters of galaxies can be 2-3 Mpc across but LQGs can be 200 Mpc or more across. Based on the Cosmological Principle and the modern theory of cosmology, calculations suggest that astrophysicists should not be able to find a structure larger than 370 Mpc.

Dr Clowes' newly discovered LQG however has a typical dimension of 500 Mpc. But because it is elongated, its longest dimension is 1200 Mpc (or 4 billion light years) -- some 1600 times larger than the distance from the Milky Way to Andromeda.

Dr Clowes said: "While it is difficult to fathom the scale of this LQG, we can say quite definitely it is the largest structure ever seen in the entire universe. This is hugely exciting -- not least because it runs counter to our current understanding of the scale of the universe.

“Even traveling at the speed of light, it would take 4 billion ... years to cross. This is significant not just because of its size but also because it challenges the Cosmological Principle, which has been widely accepted since Einstein. Our team has been looking at similar cases which add further weight to this challenge and we will be continuing to investigate these fascinating phenomena."



The colored background indicates the peaks and troughs in the occurrence of quasars at the distance of the LQG. Darker colors indicate more quasars, lighter colors indicate fewer quasars. The LQG is clearly seen as a long chain of peaks indicated by black circles. (The red crosses mark the positions of quasars in a different and smaller LQG). The horizontal and vertical axes represent right ascension and declination, the celestial equivalent of longitude and latitude. The map covers around 29.4 by 24 degrees on the sky, indicating the huge scale of the newly discovered structure. (Credit: R. G. Clowes / UCLan)

NASA's GALEX Reveals the Largest-Known Spiral Galaxy

Sciencedaily.com

The spectacular barred spiral galaxy NGC 6872 has ranked among the biggest stellar systems for decades. Now a team of astronomers from the United States, Chile and Brazil has crowned it the largest-known spiral, based on archival data from NASA's Galaxy Evolution Explorer (GALEX) mission, which has since been loaned to the California Institute of Technology, Pasadena, Calif.

Measuring tip-to-tip across its two outsized spiral arms, NGC 6872 spans more than 522,000 light-years, making it more than five times the size of our Milky Way galaxy. "Without GALEX's ability to detect the ultraviolet light of the youngest, hottest stars, we would never have recognized the full extent of this intriguing system," said lead scientist Rafael Eufrasio, a research assistant at NASA's Goddard Space Flight Center in Greenbelt, Md., and a doctoral student at Catholic University of America in Washington. He presented the findings January 10 at the American Astronomical Society meeting in Long Beach, Calif.

The galaxy's unusual size and appearance stem from its interaction with a much smaller disk galaxy named IC 4970, which has only about one-fifth the mass of NGC 6872. The odd couple is located 212 million light-years from Earth in the southern constellation Pavo. Astronomers think large galaxies, including our own, grew through mergers and acquisitions -- assembling over billions of years by absorbing numerous smaller systems. Intriguingly, the gravitational interaction of NGC 6872 and IC 4970 may have done the opposite, spawning what may develop into a new small galaxy. "The northeastern arm of NGC 6872 is the most disturbed and is rippling with star formation, but at its far end, visible only in the ultraviolet, is an object that appears to be a tidal dwarf galaxy similar to those seen in other interacting systems," said team member Duilia de Mello, a professor of astronomy at Catholic University. The tidal dwarf candidate is brighter in the ultraviolet than other regions of the galaxy, a sign it bears a rich supply of hot young stars less than 200 million years old.

The researchers studied the galaxy across the spectrum using archival data from the European Southern Observatory's Very Large Telescope, the Two Micron All Sky Survey, and NASA's Spitzer Space Telescope, as well as GALEX. By analyzing the distribution of energy by wavelength, the team uncovered a distinct pattern of stellar age along the galaxy's two prominent spiral arms. The youngest stars appear in the far end of the northwestern arm, within the tidal dwarf candidate, and stellar ages skew progressively older toward the galaxy's center. The southwestern arm displays the same pattern, which is likely connected to waves of star formation triggered by the galactic encounter.

A 2007 study by Cathy Horellou at Onsala Space Observatory in Sweden and Baerbel Koribalski of the Australia National Telescope Facility developed computer simulations of the collision that reproduced the overall appearance of the system as we see it today. According to the closest match, IC 4970 made its closest approach about 130 million years ago and followed a path that took it nearly along the plane of the spiral's disk in the same direction it rotates. The current study is consistent with this picture. As in all barred spirals, NGC 6872 contains a stellar bar component that transitions between the spiral arms and the galaxy's central regions. Measuring about 26,000 light-years in radius, or about twice the average length found in nearby barred spirals, it is a bar that befits a giant galaxy. The team found no sign of recent star formation along the bar, which indicates it formed at least a few billion years ago. Its aged stars provide a fossil record of the galaxy's stellar population before the encounter with IC 4970 stirred things up. "Understanding the structure and dynamics of nearby interacting systems like this one brings us a step closer to placing these events into their proper cosmological context, paving the way to decoding what we find in younger, more distant systems," said team member and Goddard astrophysicist Eli Dwek.

The study also included Fernanda Urrutia-Viscarra and Claudia Mendes de Oliveira at the University of Sao Paulo in Brazil and Dimitri Gadotti at the European Southern Observatory in Santiago, Chile.

This composite of the giant barred spiral galaxy NGC 6872 combines visible light images from the European Southern Observatory's Very Large Telescope with far-ultraviolet (1,528 angstroms) data from NASA's GALEX and 3.6-micron infrared data acquired by NASA's Spitzer Space Telescope. A previously unsuspected tidal dwarf galaxy candidate appears only in the ultraviolet, indicating the presence of many hot young stars. IC 4970, the small disk galaxy interacting with NGC 6872, is located above the spiral's central region. The spiral is 522,000 light-years across from the tip of one outstretched arm to the tip of the other, which makes it about 5 times the size of our home galaxy, the Milky Way. Images of lower resolution from the Digital Sky Survey were used to fill in marginal areas not covered by the other data. (Credit: NASA's Goddard Space Flight Center/ESO/JPL-Caltech/DSS)

THE *Prairie Astronomy Club*

Amateur Astronomy --
A Hobby as Big as the Universe

The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: **Regular $30/yr, Family $35/yr**. Address all new memberships and renewals to: **The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585**. For other club information, please contact one of the club officers listed to the right. Newsletter comments and articles should be submitted to: **Jason Noelle at jason.noelle@gmail.com,** no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.

FIRST CLASS MAIL

Next PAC Meeting
Tuesday
January 29, 2012
7:30 PM
Hyde Observatory