First Light

The Newsletter of the Cape Cod Astronomical Society

November 2006 **Vol. 17 No. 7**

Mooncusser's 21st Century Almanac

By Jim Carlson

Full Moon – Sun. November 05 at 08:01 EST
Last Quarter – Sun. November 12 at 12:47 EST
New Moon – Mon. November 20 at 17:19 EST
First Quarter – Tue. November 28 at 01:30 EST

Object	Nov. 01 (EST)	Nov. 15 (EST)	Nov. 30 (EST)
Sun	R: 06:12 S: 16:35	06:29 16:20	06:47 16:11
Mercury	R: 07:39 S: 17:04	05:19 15:48	05:07 15:18
Venus	R: 06:18 S: 16:41	06:54 16:35	07:30 16:40
Moon	R: 14:32 S: 01:11	01:14 13:52	13:21 01:27
Mars	R: 05:58 S: 16:27	05:52 15:57	05:47 15:28
Jupiter	R: 07:34 S: 17:22	06:55 16:37	06:13 15:49
Saturn	R: 23:45 S: 13:40	22:54 12:47	21:56 11:49
Uranus	R: 14:14 S: 01:23	13:18 00:27	12:20 23:25
Neptune	R: 13:11 S: 23:18	12:16 22:23	11:17 21:25
Pluto	R: 09:33 S: 19:37	08:40 18:44	07:44 17:46

November 2006 Events (UT)

01 – Uranus 0.5° north of the Moon.
02 – **Meeting of the CCAS** at 7:30 EST at D-Y**.** CCAS charter members **Harry Hammond** and **Michael Petrasko** will discuss the design and construction of a backyard observatory they built on Michael's property in Cotuit, MA. They will also display and discuss the various uses of the observatory.
04 – Moon at perigee (224,063 miles).
05 – Southern Taurid meteors peak at about1600 UT or 1100 EST.
06 – Moon 0.6° north of M45
08 – Mercury at inferior conjunction. **Transit of Mercury. First contact at approx. 14:12 EST and continuing through sunset at 16:25 EST on the Cape.**
09 – Mercury at ascending node.
12 – Northern Taurid meteors peak at approx. 1200 UT or 0700 EST.
13 – Mercury at perihelion. Saturn 1.6° south of the Moon.
14 – (7) Iris at opposition.
15 – Moon at apogee (251,776 miles).
17 – Mercury stationary. Leonid meteors peak at 2100 UT or 1600 EST.
18 – Spica 0.6° north of the Moon.
19 – Mercury 6° north of the Moon.
20 – Uranus stationary.
21 – Jupiter in conjunction with the Sun.
23 – Venus at descending node.
24 – Mercury at greatest northern heliocentric latitude.
25 – Mercury at greatest western elongation, rising before the Sun in the morning and setting before it in the evening.
26 – Neptune 3° north of the Moon.
28 – Uranus 0.3° north of the Moon.

Sources: TheSky6, Software Bisque
Observer's Handbook 2006 Royal Astronomical Society of Canada

The times of rise, transit, and set are for the days listed. On November 1st, for example, Uranus will set at 01:23 EST, rise at 14:14 EST, and transit the meridian at 19:47 EST.

November 2nd Meeting

The evening's program will be about the Mascot, Mike Petrasko's backyard observatory in Cotuit. Mike and Harry Hammond will discuss the design and construction of the observatory. This should be a very useful and informative presentation. While observatories like The Schmidt are too expensive most amateurs, an observatory that provides a permanent mount and shelter for a scope can be had for under $50. Come a listen to Mike and Harry and see what they have to offer.

The meeting will be held in the newly renovated Dennis-Yarmouth High School library. Future monthly meetings will held either in the library or in the school's new auditorium, depending on which venue best fits the program for the evening.

Astro Trivia

The October trivia question was "What is the Equation of Time?" Somehow, we skipped this

item at the October. We will discuss and answer this question at the November meeting. The November trivia question is "What is sidereal time?"

Two Reminders

Mercury will transit the Sun on November 8. The timing will be good for Cape Cod with the transit occurring shortly before sunset. A good view of the horizon from southwest to west will be important

Society member Ed Swiniarski is selling stone tiles with the **society's logo** laser etched into the surface. The 5 ½" square slate tiles have the etching highlighted with either gold or silver colored paint. Slate tiles sell for ten dollars each. All proceeds from the sales will be donated to the Cape Cod Astronomical Foundation. You can contract Ed at efswin@c4.net or 508-896-7270.

A Reintroduction

Several years ago, I had a bookmark for a web site which I visited every morning right after checking the email, news, and weather. That bookmark became lost somehow. Maybe it was when the CPU got fried on the old computer. The other day, I got an email from a friend that said "check this out". So I did. Wow!

I had been reintroduced to the NASA Picture of the Day. See it for yourself at: http://antwrp.gsfc.nasa.gov/apod/

Black Hole Paradox Solved By NASA's Chandra

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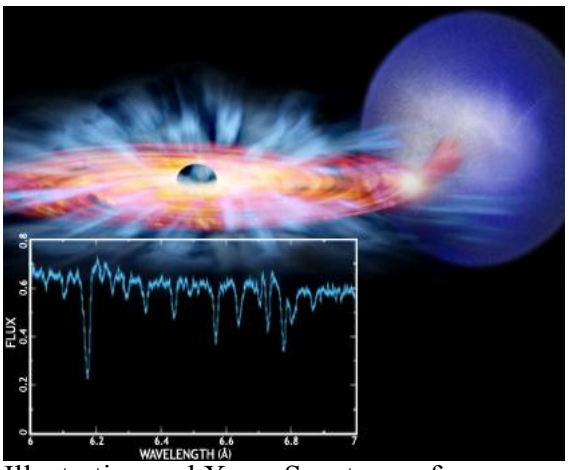

Illustration and X-ray Spectrum of GRO_J1655-40

Black holes are lighting up the Universe, and now astronomers may finally know how. New data from NASA's Chandra X-ray Observatory show for the first time that powerful magnetic fields are the key to these brilliant and startling light shows.

It is estimated that up to a quarter of the total radiation in the Universe emitted since the Big Bang comes from material falling towards supermassive black holes, including those powering quasars, the brightest known objects. For decades, scientists have struggled to understand

how black holes, the darkest objects in the Universe, can be responsible for such prodigious amounts of radiation.

New X-ray data from Chandra give the first clear explanation for what drives this process: magnetic fields. Chandra observed a black hole system in our galaxy, known as GRO J1655-40 (J1655, for short), where a black hole was pulling material from a companion star into a disk

"By intergalactic standards J1655 is in our backyard, so we can use it as a scale model to understand how all black holes work, including the monsters found in quasars," said Jon M. Miller of the University of Michigan, Ann Arbor, whose paper on these results appears in this week's issue of Nature.

Gravity alone is not enough to cause gas in a disk around a black hole to lose energy and fall onto the black hole at the rates required by observations. The gas must lose some of its orbital angular momentum, either through friction or a wind, before it can spiral inward. Without such effects, matter could remain in orbit around a black hole for a very long time.

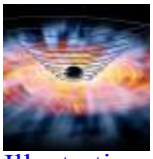

Illustration of Magnetic Fields in GRO J1655-40

Scientists have long thought that magnetic turbulence could generate friction in a gaseous disk and drive a wind from the disk that carries angular momentum outward allowing the gas to fall inward.

Using Chandra, Miller and his team provided crucial evidence for the role of magnetic forces in the black hole accretion process. The X-ray spectrum, the number of X-rays at different energies, showed that the speed and density of the wind from J1655's disk corresponded to computer simulation predictions for magnetically-driven winds. The spectral fingerprint also ruled out the two other major competing theories to winds driven by magnetic fields.

"In 1973, theorists came up with the idea that magnetic fields could drive the generation of light by gas falling onto black holes," said co-author John Raymond of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass. "Now, over 30 years later, we finally may have convincing evidence."

This deeper understanding of how black holes accrete matter also teaches astronomers about other properties of black holes, including how they grow.

"Just as a doctor wants to understand the causes of an illness and not merely the symptoms, astronomers try to understand what causes phenomena they see in the Universe," said co-author Danny Steeghs also of the Harvard-Smithsonian Center for Astrophysics. "By understanding what makes material release energy as it falls onto black holes, we may also learn how matter falls onto other important objects."

In addition to accretion disks around black holes, magnetic fields may play an important role in disks detected around young sun-like stars where planets are forming, as well as ultra-dense objects called neutron stars.

NASA's Marshall Space Flight Center, Huntsville, Ala., manages the Chandra program for the agency's Science Mission Directorate. The Smithsonian Astrophysical Observatory controls science and flight operations from the Chandra X-ray Center, Cambridge, Mass.

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The **Cape Cod Astronomical Society** meets at 7:30 pm on the first Thursday of every month at the Dennis-Yarmouth Regional High School in Yarmouth, Massachusetts. Meetings are open to the public. Membership dues are $30 for adults, $15 for students in two year colleges, no charge for students in K-12 schools.