



News-Scope

The Newsletter of the Birmingham Astronomical Society
Volume 30, Issue 6

2010 Star Parties

BAS monthly Star Parties are open to the public. For more information, go to our website: www.bas-astro.com.

Chandler Mountain

January 16
 February 13
 March 13
 April 10
 May 15
 June 12
 July 10
 August 07

September 11
 October 09
 November 06
 December 04

Oak Mountain

January 09
 February 06
 March 06
 April 17
 May 08
 June 05
 July 03
 August 14
 September 04
 October 02
 November 13
 December 11

April Meeting: Black Holes

Speaker: Dr. Jimmy Irwin, The University of Alabama
Topic: *Black Holes and other "stuff"*
Tuesday, April 20 at 7:00 p.m.
Christenberry Planetarium, Samford University

BAS meets at 7:00 p.m. on the third Tuesday of each month at Samford University's Christenberry Planetarium. The Planetarium is located in the ScienCenter on Montague Drive. On entering the Samford campus, turn right onto Montague. Follow it around the curve to the left until you see the ScienCenter on the right.

Upcoming Meetings:

May 18

Stars: Shedding Some Light
 Scott Pellet, BAS President

June 15

Something Wonderful
 Mystery Speaker

Star Parties

BAS monthly Star Parties are open to members and the general public. The Parties are free but there is a \$3.00 entrance fee to Oak Mountain State Park. The Oak Mountain parties are at the park's Wild Life Refuge Center.



IMPORTANT DATES:

- 4/21–4/22 Lyrids Meteor Shower**
- 4/19–4/25 Astronomy Week**
- 4/24 ASTRONOMY DAY**
- 5/7 - 5/9 Embrace Space**
 (McWane Science Center)
- 5/14 STS-132 Launch**
- 5/21 Summer Solstice**

What next for US?

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As you read this, there are three (count 'em, THREE) remaining flights of the Space Transportation System, AKA "The Space Shuttle." Once those flights are over with, what happens?

In the near future, the United States will be paying Russia for rides on Soyuz spacecraft. Soyuz is reliable transportation, but it's not ours.

The White House is still fleshing out the details of future space policy. The glimmer of hope is private enterprise.

That's right - private enterprise. There are companies out there like SpaceX who are on the cusp of providing commercial support for the ISS "milk runs" but aren't human rated—yet.

Also, don't count out the "Big Boys" of the defense industry. If development of the Orion capsule coincides with man-rating a Delta IV Heavy launch vehicle, the United States could be back in the game sooner, than later.

What do you think?
 Clear skies! – James

Dropping a Bomb About Exoplanets

by Nancy Atkinson, *Universe Today*

Not all exoplanets are created equal, and new discoveries about the orbits of newly found extrasolar planets could challenge the current theories of planet formation. The discoveries also suggest that systems with exoplanets of the type known as hot Jupiters are unlikely to contain Earth-like planets. "This is a real bomb we are dropping into the field of exoplanets," said Amaury Triaud, a PhD student at the Geneva Observatory who led an observational campaign from several observatories.

Six exoplanets out of twenty-seven were found to be orbiting in the opposite direction to the rotation of their host star—the exact reverse of what is seen in our own

Solar System. The team announced the discovery of nine new planets orbiting other stars, and combined their results with earlier observations. Besides the surprising abundance of retrograde orbits, the astronomers also found that more than half of all the so-called "hot Jupiters" in their survey have orbits that are misaligned with the rotation axis of their parent stars.

Hot Jupiters are planets orbiting other stars that have masses similar to or greater than Jupiter, but which orbit their parent stars much more closely.

Planets are thought to form in the disc of gas and dust encircling a young star, and since this proto-planetary

disc rotates in the same direction as the star itself, it was expected that planets that form from the disc would all orbit in more or less the same plane, and that they would move along their orbits in the same direction as the star's rotation.

"The new results really challenge the conventional wisdom that planets should always orbit in the same direction as their stars spin," said Andrew Cameron of the University of St Andrews, who presented the new results at the RAS National Astronomy Meeting (NAM2010) in Glasgow, Scotland this week.

At this writing, 454 planets have been found orbiting other stars, and in the 15 years since the first hot Jupiters were discovered, astronomers have been puzzled by their origin. The cores of giant planets are thought to form from a mix of rock and ice particles found only in the cold outer reaches of planetary systems. Hot Jupiters must therefore form far from their star and subsequently migrate inwards to orbits much closer to the parent star. Many astronomers believed this was due to gravitational interactions with the disc of dust from which they formed. This scenario takes place over a few million years and results in an orbit aligned with the rotation axis of the parent star. It would also allow Earth-like rocky planets to form subsequently, but unfortunately it cannot account for the new

observations.

To account for the new retrograde exoplanets an alternative migration theory suggests that the proximity of hot Jupiters to their stars is not due to interactions with the dust disc at all, but to a slower evolution process involving a gravitational tug-of-war with more distant planetary or stellar companions over hundreds of millions of years. After these disturbances have bounced a giant exoplanet into a tilted and elongated orbit it would suffer tidal friction, losing energy every time it swung close to the star. It would eventually become parked in a near circular, but randomly tilted, orbit close to the star. "A dramatic side-effect of this process is that it would wipe out any other smaller Earth-like planet in these systems," says Didier Queloz of Geneva Observatory.

The observatories for this survey included the Wide Angle Search for Planets (WASP), the HARPS spectrograph on the 3.6-metre ESO telescope at the LaSilla Observatory in Chile, and the Swiss Euler telescope, also at La Silla. Data from other telescopes was also used to confirm the discoveries.

Source: ESO



Artist's impression of an exoplanet in a retrograde orbit.
Credit: ESO

Cassini Eavesdrops on Orbit-Swapping Moons

By Phil Plait, *Bad Astronomy*

The Cassini spacecraft just had a few close encounters with some of the odder moons in the Saturn system... and given how weird Saturn is, that's saying something. I was particularly enthralled with these two small worlds:

The low angle of sunlight on the side accentuates the craters there, making this almost a caricature of what an asteroid looks like. Technically it's not an asteroid; it's a moon. And even if it weren't orbiting Saturn we might not call it an asteroid; it has a high reflectivity indicating a lot of ice on

slightly on Epimetheus, and Epimetheus pulls Janus forward. In other words, Janus steals orbital energy Epimetheus! This means Epimetheus drops into a slightly lower orbit, and Janus gets boosted into a slightly higher one, effectively swapping the orbits of

gravitational effects, leaving these two square-dancing satellites on slightly different but still interacting paths.

However, the actual cause of this still isn't known for sure. Cassini observations like this one may help astronomers figure out how it is these two little moons came to be, and why it is that although they can always approach each other, they can never actually touch.

NOTE: This content distributed by Discover.

Janus and Epimetheus image courtesy of the Cassini imaging team (NASA's Jet Propulsion Laboratory).



On the left is the moon Janus and on the right is Epimetheus. The scales are not quite the same; Janus is roughly half again as big as Epimetheus' size of 135 x 110 x 105 km (81 x 66 x 63 miles). Cassini was a little over 100,000 km from Epimetheus and 75,000 km from Janus when these images were taken.

These are raw images, so they haven't been processed yet to remove cosmic ray hits, brightness variations, and so on. But they are still fascinating. Epimetheus looks to me exactly how I picture a big asteroid; beaten, battered, looming.

the surface (and a low density consistent with that too). If it orbited the Sun on an elliptical path, we might very well call it a comet!

But there's more to these moons. Amazingly, Janus and Epimetheus are on almost — but not *quite* — the same orbit around Saturn! Currently, Janus is a bit closer to Saturn than Epimetheus.

I say "currently", because every four years *these moons swap orbits!* Since Janus has an orbit slightly closer to Saturn, it is moving faster around the planet than Epimetheus. It slowly but eventually catches up to the outer moon. As they approach, Janus pulls back

the two moons. Although the two orbital paths are separated by only about 50 km (30 miles) — smaller than the radii of either moon — they never collide. The swap takes place when the moons are still more than 10,000 km apart, so they never get a chance to bump uglies.

How did this weird situation arise? Perhaps, in the distant past, there was one bigger moon orbiting Saturn, and it got whacked by an interloper. The moon disrupted, breaking into two big pieces and lots of littler ones. The debris got cleaned up by the gravity of the two big pieces and other

Things Aren't What They Used to Be (Especially in Galaxies)

By C. C Petersen, *The Spacewriter*

NOTE: This content distributed by the AAVSO Writer's Bureau

One of the hot topics in astronomy these days focuses on star formation in the early universe and the formation of galaxies. We do know that the first stars began to form a few hundred million years after the birth of the universe in the Big Bang. The first galaxies assembled themselves shortly thereafter. Astronomers are searching out those first galaxies to figure out their star-formation rates (essentially, how many stars were born in them in a given time period), and — just as importantly — what those galaxies were made of. The first stars were made of hydrogen (and some helium) that was created in the Big Bang. Stars like the Sun (which have more metals in them) weren't around at that time. That's because Sun-like stars are of a later generation than the first stars. Those early stars had to be born, live, and die before Sun like stars could exist.

Why is this? Because the first massive stars had to evolve through all the stages of stellar life and then explode as supernovae. As they evolved, they created heavier elements in their nuclear furnaces and when those stars exploded, they scattered those elements (plus a few that got cooked up in the explosion) out to space. Those elements mixed with hydrogen gas clouds and eventually, new generations of stars were born. THOSE stars had more heavy elements in them. The galaxies that contained them ALSO had more heavy elements in them (and by heavy elements, I mean heavier than hydrogen and helium and lithium, which were abundant from the Big Bang forward).

So, astronomers looking back at the earliest epochs they can see, can observe galaxies forming lots of stars, but those stars aren't very metal-heavy. Fast-forward to today (in cosmic time), and they see that "current" galaxies aren't forming stars at quite the rate the early ones did. Why is this? It's been a mystery. Do earlier galaxies crank out stars more efficiently? Or, do they have more raw material in the form of gas and dust available to make more stars? And, if so, do huge

rates of star formation in the early galaxies mean that when they get older, they've run out of fuel and therefore don't make stars as much?

Astronomers at the University of Arizona, led by Michael Cooper, looked at swaths of the early universe. They used data from an earlier study, where they surveyed about 50,000 galaxies. They then winnowed out a group of "average" galaxies and looked at them through a number of telescopes, including Hubble and Spitzer, and radio telescope arrays in France and California. By using this "multiwavelength" method of studying the early galaxies, the astronomers were able to find the cold gas clouds that supply the "stuff" of stars. Their data tell them that the early galaxies that were ancestors to our own Milky Way had a much greater supply of gas than the Milky Way does today. This means that they have been making stars according to the same laws of physics that govern the star-making machinery in the Milky Way. But, they're making more of them in a given time because they had a greater supply of material.

One typical galaxy, named EGS 1305123, seen in this image as it appeared only 5.5 billion years after the Big Bang, has a huge rotating disk that measures about 60,000 light years across. That disk is stuffed full of cold gas and dust (the stuff of stars). The galaxy looks like how the Milky Way probably appeared more than eight billion years ago.

So, typical galaxies in the early universe were crammed with three to ten times more molecular gas than today's galaxies have. Over time, they gave birth to stars, thus depleting the starbirth nurseries of the building blocks of stars. Star birth formation rates slowed down to the rates we see in today's galaxies because they are running out of gas and dust.

Want to read more about this finding? Check out the University of Arizona news page:
<http://www.uanews.org/node/30062>



Viewed through the Hubble Space Telescope at visible light (left), a galaxy does not reveal its full secret underlying star formation. Only when observed using a combination of radio emission and infrared wavelengths, the galaxy reveals a massive, rotating disc measuring about 60,000 light years across (right). This disc consists of cold molecular gas and dust, the raw materials from which stars are born. Courtesy University of Arizona and Michael Cooper.

Guide Stars

By James Moore, Editor

Each issue I'm going share a few items of interest that may serve to heighten your experiences as an amateur astronomer or merely serve as worthwhile distractions. This time around we're looking at astronomy/planetarium programs for iPhones/iPods.

Some of the choices for the iPhone/iPod Touch are:

Pocket Universe - The first iPhone astronomy app to use the built-in compass and also the first to add a true "augmented reality" view using the built-in iPhone camera. You can use the camera view in the evening or morning sky to overlay the labeled view over the real sky.

SkyVoyager - From the folks at Carina Software, it has everything but the kitchen sink built in to it. Improvements keep coming for this one, too! They also offer a "beginner version" called SkyGazer.

Distant Suns - This desktop stalwart is now available for the iPhone as well. Robust. Includes a "What's Up?" feature.

Starmap Pro - Has an eyepiece mode. Also has a feature that will show you the best objects for observing on a given night.

StarMap 3D - A complete pocket star atlas, in your pocket! Features overlays of constellations drawn by H. A. Rey.

In addition to these apps, there are some other cool things that are either free or "cheap" that you may find useful:

Astronomy Picture of the Day

Satellite Flybys

Satellite Tracker (ProSat)

3D Sun

Moon Globe

Mars Globe

As you can see, there are lots of choices. In addition to all of the apps, of course, there is a multitude of podcasts and vodcasts to choose from as well. You can turn your iPhone or iPod Touch into a portable astronomy reference library!

Have a favorite astronomy iPhone app? Know one that you despise? Trying to justify buying an iPhone/iPod Touch/iPad? Come on over to the BAS Pirate Blog and state an opinion or ask a question:

<http://bas-astro.com/blog/>

Next Issue: Astronomy apps for smartphones!

Messier Marathon/Astronomy Day/Embrace Space

The news is sad and brief concerning the Messier Marathon. It didn't happen. As most of you know, we have been plagued for months with some bad weather at inconvenient times (for us). That doesn't mean that you can't keep working on your Messier Club pin! For more information on the Messier Club, go here:

<http://www.astroleague.org/al/obsclubs/messier/mess.html>

We also have Astronomy Day coming up on 04/24/2010. This is the icing on the cake for Astronomy Week (04/19–04/25). In years past the BAS has partnered with the McWane Science Center for Astronomy Day activities, but this year they're saving their ammo for their Embrace Space weekend (5/7–5/9).

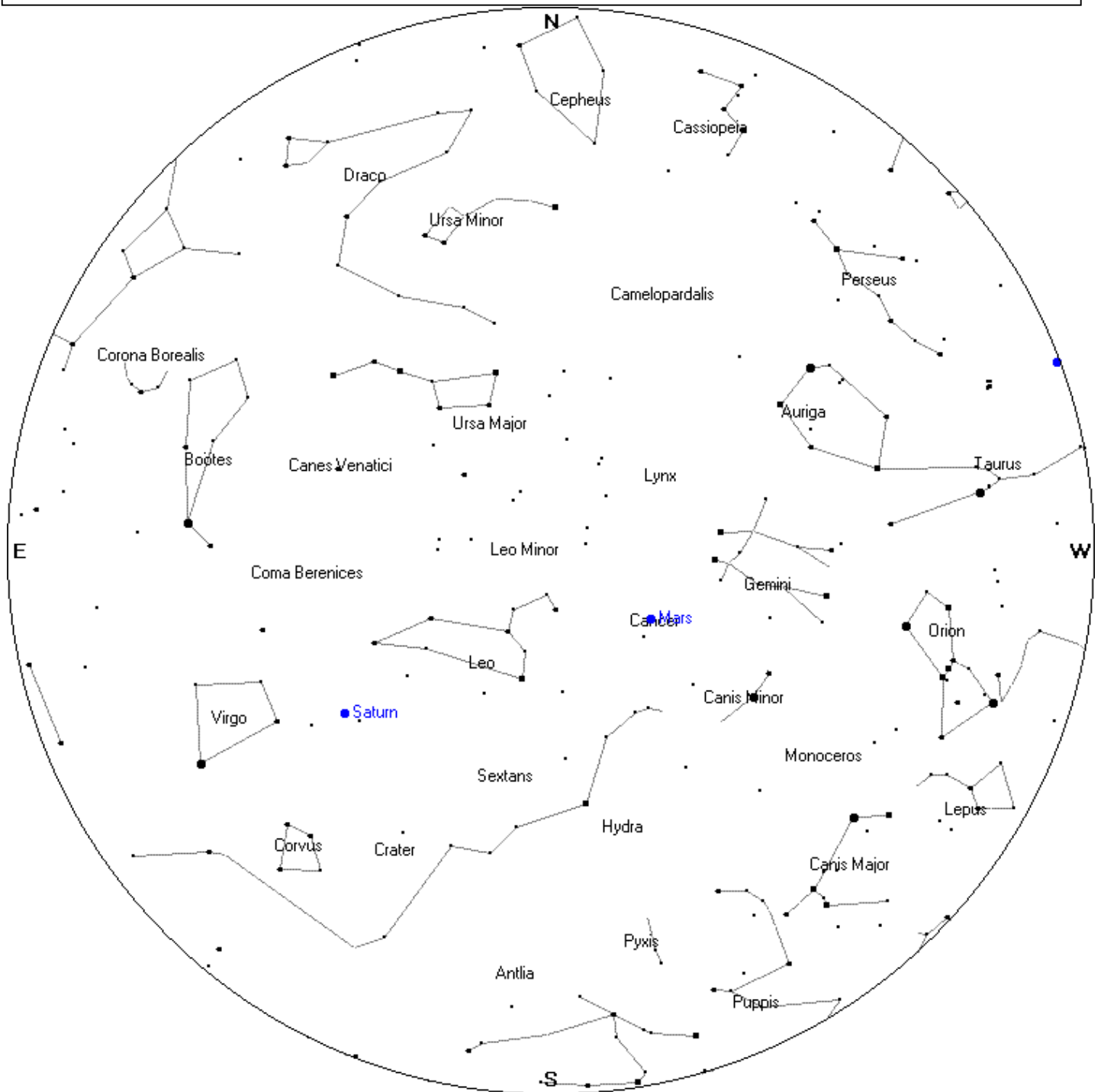
If you have never been to the McWane Science Center, you're in for a treat. McWane is the premiere science venue in the south-east (author's bias), with four floors of science education excellence. It also houses the local Challenger Center, which encourages space education and teambuilding activities.

Embrace Space will include NASA exhibits, Science on a Sphere programs and the new portable planetarium system purchased by McWane. If you would like to help with the Embrace Space activities, please contact one of the club officers or Ben Moon.

A room with a view! The cupola on the ISS offering a view of the west coast of Algeria.
(Image courtesy of NASA)



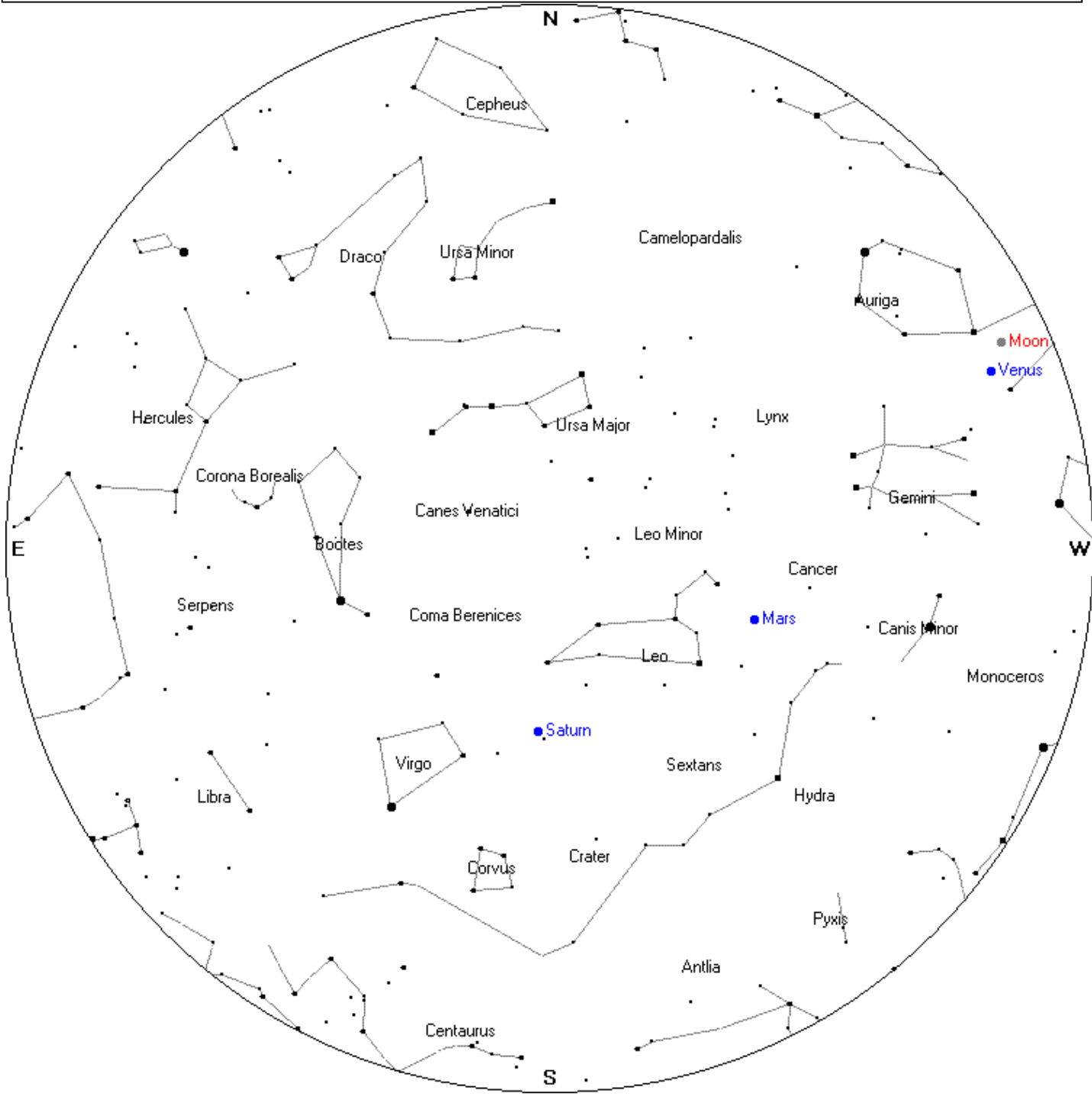
April 2010 Star Chart



This chart is produced for the middle of the month at 9:00pm.

Acknowledgement: This chart was generated at the Heavens-Above astronomy site for Chandler Mountain at <http://heavens-above.com/main.asp?Session=kebgccdoioolefjijmcbffbog>. Their web page at <http://www.heavens-above.com/skychart.asp> can be used to generate sky charts of varying sizes for other locations, dates and times, or to show up-to-the-minute planetary / lunar positions. Their web site also has many other very useful charting features and is well worth a visit.

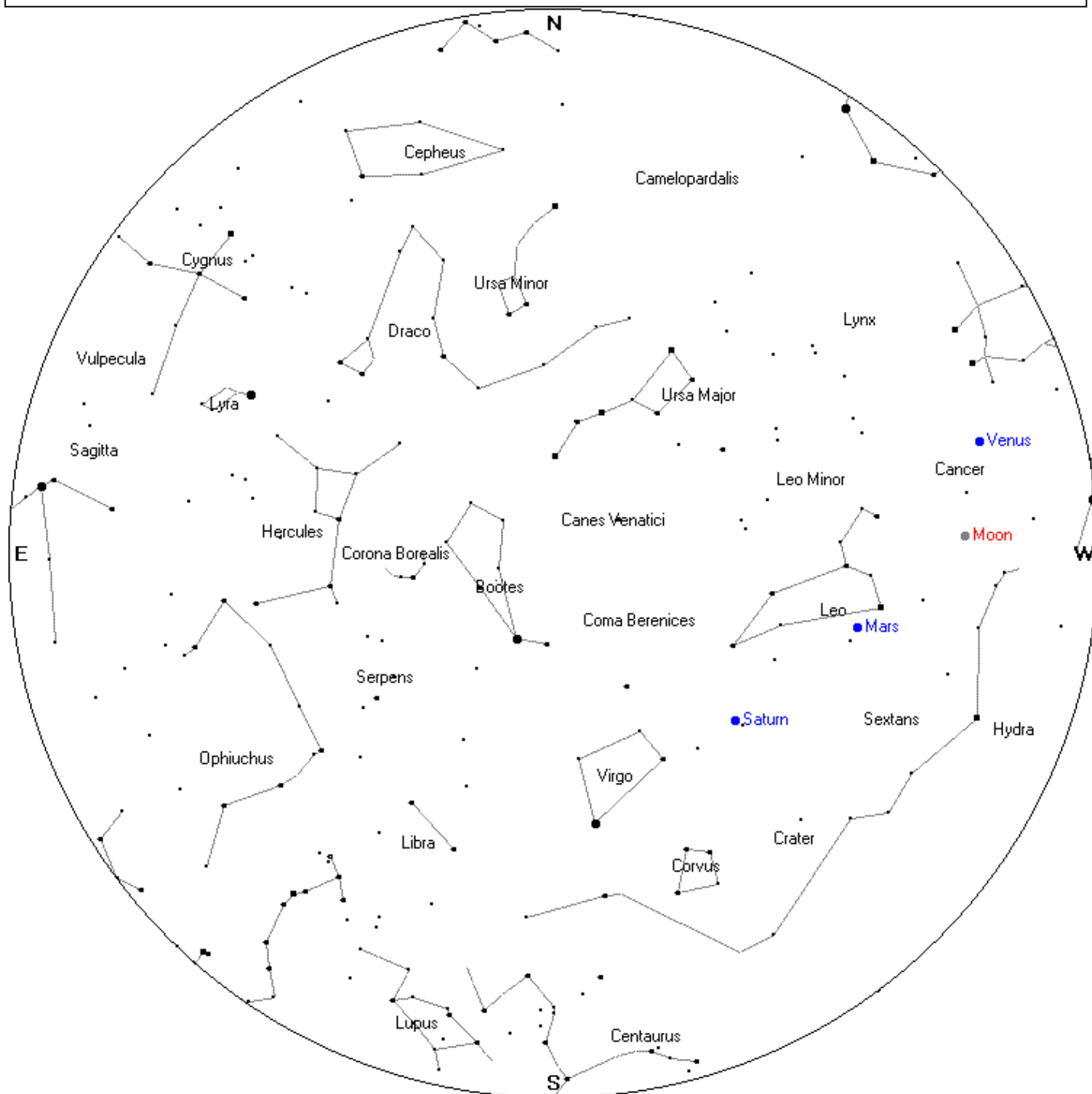
May 2010 Star Chart



This chart is produced for the middle of the month at 9:00pm.

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June 2010 Star Chart



This chart is produced for the middle of the month at 9:00pm.

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News-Scope is the quarterly newsletter of the Birmingham Astronomical Society.

Article Submission: Article(s) or photo(s) for publication in the BAS News-Scope or for the BAS website must be submitted by the 15th of each month to Webmaster Ed Knight at ejknight@ejknight.com or News-Scope Editor James Moore at jasmoores@aol.com.

If you would prefer to receive this publication electronically email : WEBMASTER@BAS-ASTRO.COM

We are on the web @

Bas-Astro.com

Dues Reminder

Our annual dues are due to be paid in January. Please contact BAS Treasurer Steve Pickens if you have any questions.

Dues:

Family Membership—\$30 annually

Individual Membership—\$25 annually

Student Membership—\$12 annually

Dues may be paid in person at the January or February meeting or may be mailed to the club treasurer at:

Birmingham Astronomical Society

115 Merrimont Road

Hueytown, AL 35023

The membership year runs January 1 — December 31. Annual dues are due by January 31. Members not paying by March 31 are dropped from the rolls as inactive. Dues will be prorated for members joining after the annual renewal period.

Please feel free to contact any BAS officer with questions regarding membership or dues.



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