



COLUMBUS
ASTRONOMICAL
SOCIETY

Prime Focus

Volume 58 Number 4 April 2009
The Columbus Astronomical Society Newsletter

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Wired for Astronomy

As temperatures moderate, grass grows green and robins invade our lawns, telescope fever spreads. CAS members have a number of resources that will help them survive:

<http://www.the-cas.org/> is our official web site. Go here for information, activities, and member contact list. You will need a password to access some features. Just ask a member if you don't know it.

http://tech.groups.yahoo.com/group/The_CAS/ is our mailing list. If you do a Yahoo group search you will not find us because we are a private group. To join, send a letter to the moderator, and once your membership is confirmed, you can post, look at pictures, and have fun with the gang.

We have two dark sites available to us. One of them is in Hocking Hills, the other in AEP reclaimed lands south of Zanesfield. For information about their use policies, go to the CAS website or contact a club member.

Here is Perkins Observatory home page: <http://www.perkins-observatory.org/> Here you can read about the latest programs and activities. Tom Burns always needs all the help he can get, so check out what's going on at Perkins and volunteer your time!

From the President

Greetings fellow stargazers:

Happy April!

This month we're going to do things a bit different for our monthly meeting at Perkins. April 11th falls on Easter weekend. It's possible that we'll have a poor turnout for the meeting, so we moved the scheduled speaker to May. The April meeting presentation will feature the ATM group's *State of the ATM*.

ATM SIG members will show off their latest projects, gadgets, and neat-cool stuff they are doing in the Perkins basement. A walk-through tour of the ATM facilities will be provided that includes the Bill Herbert Mirror Lab, the coating chambers, and Gordon's massive mirror-making machine in the shop area.

Everyone is welcome to bring an astro-gadget or astronomy/telescope related project to the meeting to share with the group. Bring an eyepiece or telescope you want to swap. The meeting will have semi-formal format—just keep the noise down if we have a speaker in the lecture hall.

Next month, we will have a special meeting at Perkins for the dedication of the Perkins' Library to Ron Ravneberg. We may have visitors from the Cincinnati and Mansfield clubs who knew Ron.

Get out and observe! Make a telescope campfire for the neighborhood kids and show them the sky. My neighbors thought I was having some sort of mental problem until they found out I belonged to CAS. They observed me in the wee hours of the morning walking down the middle of the street in my bare feet with my head tilted back and my shirt open. Now they watch for the ISS and the Shuttle and often ask me about the bright objects in the sky. "Why that's the Sun, our closest star." ;<)

Best Regards,
Tom Beck
President, CAS

What's Up Brad Hoehne

What's Near

From the middle of April until the middle of summer, bleary eyed morning observers (you are bleary-eyed in the morning, aren't you?) will find a close grouping of five planets- and dwarf planet Pluto, to boot- lined up before them.

In the twilight before sunrise of April 16th, **Mars** and **Uranus** will pass within a degree of each other. This will occur near the ESE horizon, and may be difficult to observe if the weather is not sharp and clear. As the weeks progress, the two will rise out of the morning twilight and become easier to observe, but will no longer be close companions.

Easier to view is an even closer conjunction which occurs between **Jupiter** and **Neptune** in mid-May. For roughly a week, beginning on May 12th or so, the two will be visible in the same medium power field of view.

Venus is once again the morning star. Watch over late April as she and Mars perform a quick little do-si-do.

Watching Venus in the morning sky, gives observers a good chance to repeat an observation that Galileo reported in his *Siderius Nuncius*. He wrote: *...stars emerging from first twilight at sunset appear very small, even if they are of first Magnitude, and Venus herself, when she presents herself to us in broad daylight is perceived so small that she hardly appears to equal a little star of 6th magnitude.*

An early riser, with no pressing place to be, can spend a quiet morning hour or so repeating Galileo's observation in reverse. With Venus against a velvety morning sky, note how large she appears. This should be quite a bit larger than her actual diameter, due to the scattering effect of imperfections in our eyes. As the planet rises higher in the sky, and morning twilight gloams, watch how Venus appears to shrink as the brightness of the sky overwhelms the scatter and shrinks our pupil slightly. If your vision is keen, and you don't lose track of her position, you may be able to watch as she shrinks to a tiny near-pinprick in the clear morning sky. If one is to try to make the plausible, but empirically difficult to test, judgement as to whether or not one can truly discern that Venus can appear elongated to the naked eye, the brightest pre-dawn twilight would seem to be the best time. Give it a try!

Pluto lingers, a 14^h magnitude speck, near the border of Serpens Cauda and Sagitarius. A finder chart can be found at: <http://www.rasnz.org.nz/SolarSys/Pluto.htm>

What's Far

Springtime turns the evening sky into a cornucopia of bright, rich, galaxies from which to pluck. In late evening, high overhead are the nearby Virgo cluster and many small galaxy groups, mainly lumped together in the adjacent constellations Ursa Major, Canes Venatici, Coma Berenices, Leo, and Virgo.

In 1927, soon after he confirmed that M31 was indeed a galaxy and not some strange cloud ejected by our own milky-way, Hubble published a classification system

for galaxies (which would be extended by future astronomers.). Hubble divided galaxies into two main types, based on their photographic appearance: *Spirals* and *Ellipticals*. In addition, astronomers now recognize two further types of galaxies: *Irregular* (or *peculiar*) and *dwarf* galaxies.

Elliptical Galaxies are classified according to how round or elongated and flat they appear. In his classification scheme, Hubble called a very round elliptical galaxy E0 and an elongated, pancake or cigar shaped one E7. An in-between galaxy is given an in-between number. Elliptical galaxies are primarily made up of old stars, and their overall color is often dominated by the orange tint of bloated and brilliant red giants. Ellipticals rarely have much apparent dust or structure to observe. The cores of many giant clusters of galaxies, such as the Virgo, Coma, Perseus, and Hercules superclusters, are dominated by giant ellipticals which grow by absorbing other galaxies in the crowded inner regions of these enormous structures.

Let's make an exploration across Hubble's famous "tuning fork" diagram, from right to left, or, in his somewhat misleading terminology, from *early type* to *late type*. We begin with the elliptical galaxies. The best place to start looking for them is in the heart of the Virgo Cluster:

E0: It is appropriate that the largest, brightest galaxy in the brightest large cluster visible from Earth, **M87**, should be an E0- the "earliest" galaxy type in Hubble's classification system. This trillion-solar-mass galaxy, with its thousands of globular clusters and hundred-thousand-light-year long jet spewing from its 3 billion solar mass central black hole, can be seen in 10x50 binoculars on a clear night as a very faint smudge. In small telescopes, M87 appears like a small round puff, not unlike an unresolved globular cluster. In larger scopes, not much more detail is seen. Ellipticals, unfortunately, are rather uniform in appearance.

E1: A short star hop from M87 is a tight knot four bright galaxies in a configuration roughly resembling a face. The left eye of this face is the E1 galaxy **M84**. Another E1 in this region is **NGC 4168**- a challenge at magnitude 12.8.

E2: **M60** shares a field with a much dimmer, less massive spiral galaxy- **NGC 4647**. Consider that the two are approximately the same distance, and consider that the spiral is roughly the size of our milky way, and you get a sense of how enormous the giant ellipticals are.

E3-4: The right eye of "the face" (see above) is **M86**, just a bit brighter than M84. In medium sized telescopes, one should be able to make its slight elongation. Almost as bright as M87, is this elongated E4 galaxy M49 that doesn't look as elongated as it really is. Because we look along it lengthwise, it was difficult for astronomers to discern just how stretched out its shape really is. This is the second brightest galaxy in the Virgo cluster.

E5: **M59** is thought to be on the far side of the Virgo cluster and is being drawn into it. It therefore crawls towards us, canceling a bit of the Virgo cluster's movement away from us due to expansion of the universe.

E7 and S0: As elliptical galaxies get flatter and more drawn out, they begin to resemble very simple spiral galaxies in

(Continued on page 3)

appearance. When this happens, different authorities often disagree which category- spiral or elliptical- a given object should be put into. A few of these fence-straddlers include: The somewhat faint **NGC 4570**, **NGC 4958**, and the spindle-like **NGC 5084**. The bright **NGC 3115**, the best of this class, is worth a side trip to Sextans (under the belly of Leo.)

Spiral Galaxies usually are more complex in appearance than ellipticals. They consist of a large spherical mass of stars called *the halo* or *bulge*- not unlike an elliptical in shape and content- surrounded by a large flat disk of dust, gas, and stars, many of which are hot, young and bright. Hubble divided spirals into two subgroups: *Regular Spirals*, and *Barred Spirals*. Both are further divided into categories according to how “wound-up” their spiral structure appears. An Sa galaxy would have a very tightly wound spiral structure, whereas an Sb galaxy would appear looser, and an Sc (the end of the scheme) looser still. Barred Spirals are dubbed SBa, SBb, and SBc, in the same manner. Here is a sampling of some spirals from around the spring sky:

Sa: The most spectacular Sa galaxy is “*the Sombrero*”- **M104** in the southern reaches of Virgo a few degrees from *Algorab* the upper left star of Corvus. In an 8” telescope, M104 shows a sharp dust lane and a broad central bulge. In photographs, M104 is clearly a spiral galaxy, as the plane of dust and stars is clearly visible, but the spiral itself is difficult to trace. M104 earns its tightly-wound “a” classification. A second Sa to look for is **NGC 5838**. At magnitude 12, a large scope is required to make out the rough shape of this distant gem.

Sb: **M90** is a bright spiral in the midst of the chaos of the Virgo Cluster. A side trip to **M81**, in Ursa Major, shows us a galaxy roughly halfway between an Sa and an Sb.

Sc: **M99** was first detected as a spiral in 1846 by Lord Rosse. (Rosse observed through his 72” telescope dubbed, not quite affectionately, *the Leviathan* by local townsfolk, most of whom were suffering from what came to be called the Irish Potato Famine.) Rosse’s drawing shows a loose sweeping spiral. Owners of medium to large telescopes can get very similar impressions under clear skies. Another nearby Sc is **M100**, the first major target of the Hubble Space Telescope. It, too, gives up hints of its loose spiral structure in scopes larger than 12 inches or so. In smaller scopes its bright inner core is surrounded by a squarish halo of light fading into the background.

SBa: Bright SBa galaxies are fairly rare in the Virgo cluster, and there are really no galaxies of this type which readily give up their structure through even large amateur scopes. Here are a few of the dimmer ones: **NGC 4064**, **NGC 4260**, and the brightest of the three, **NGC 4460**. All three are roughly magnitude 12 and show moderately bright halos surrounded by an indistinct glow.

SBb: Though striking in photos, Virgo’s **M91** is pretty hard to explore with the eye. Even its bar has a low surface brightness. However, in a large

telescope, some structure can be seen. A side trip over to Leo’s belly, to spot the very similar, but somewhat brighter, **M95** is worthwhile. Our own galaxy, the Milky-way, is considered an SBb type under Hubble’s classification scheme.

SBc: **M58** is an excellent barred spiral in Virgo. In small telescopes, the rectangular bar of the galaxy is easy to discern. In large scopes, hints of the loose spiral arms can be detected- first as a dim halo, and then, with increasing aperture, as condensations of light from the bright, young, star clusters along the arms. The dim **M109**, near the bowl of the Big Dipper, is another Sc, though its structure is exceedingly difficult to discern- even in photos.

Irregular galaxies are, just that, irregular. Most often the result of recent collisions, these galaxies come many shapes, from indistinct blobs (Sextans A), to warped spirals (ESO 513-10) to striking warped structures in mid-collision (the “cartwheel” galaxy, the “antennae”). Being relatively rare, there are but a few within reach. Here are some to look for at this time of year:

In the southern reaches of Canes Vanatici, near the star cluster in Coma Berenices, is **NGC 4656**. We see this galaxy in mid-collision with the smaller **NGC 4657**. The two, together, from a long warped shape reminiscent of a *hockey stick*. An 8” telescope will show this “L” shape quite clearly.

The famous **M82** is often called “the cigar galaxy” after its appearance in small telescopes. In the smallest scopes, or large binoculars, it appears as a ghostly grain of rice. In scopes larger than about 8 inches, one can begin to detect a mottling across the face of this elongated 8th magnitude blob. This dark obscuring material is evidence of the violent tidal forces from nearby M81 that are warping and churning this galaxy’s material to life to produce new stars at a blinding rate. So dramatic is the effect of this interaction, that M82 is one of the brightest galaxies, for its size, known. About half the size of our own milkyway, M82 is five times as bright.

Pan about four degrees to the west of the M81-M82 and, if conditions permit, you’ll encounter a large, dim patch of light. This light comes from the irregular galaxy **IC 2574**, also called “Coddington’s Nebula” after its American discoverer, Edwin Foster Coddington. Under the clearest skies, at medium power, one can see a large rectangular patch of light overlaid by a small elliptical patch. CAS member Isaac Cruz recently suggested to me that this irregular galaxy appears somewhat whale-shaped. And, indeed it does look quite a bit like a sidelong view of a giant sperm whale.

Have fun exploring the skies!

Apollo Upgrade

The flight computer onboard the Lunar Excursion Module, which landed on the Moon during the Apollo program, had a whopping 4 kilobytes of RAM and a 74-kilobyte “hard drive.” In places, the craft’s outer skin was as thin as two sheets of aluminum foil.

It worked well enough for Apollo. Back then, astronauts needed to stay on the Moon for only a few days at a time. But when NASA once again sends people to the Moon starting around 2020, the plan will be much more ambitious—and the hardware is going to need a major upgrade.

“Doing all the things we want to do using systems from Apollo would be very risky and perhaps not even possible,” says Frank Peri, director of NASA’s Exploration Technology Development Program.

So the program is designing new, more capable hardware and software to meet the demands of NASA’s plan to return humans to the moon. Instead of staying for just a few days, astronauts will be living on the Moon’s surface for months on end. Protecting astronauts from harsh radiation at the Moon’s surface for such a long time will require much better radiation shielding than just a few layers of foil. And rather than relying on food and water brought from Earth and jettisoning urine and other wastes, new life support systems will be needed that can recycle as much water as possible, scrub carbon dioxide from the air without depending on disposable filters, and perhaps grow a steady supply of food—far more than Apollo life-support systems could handle.

Next-generation lunar explorers will perform a much wider variety of scientific research, so they’ll need vehicles that can carry them farther across the lunar surface. ETDP is building a new lunar rover that outclasses the Apollo-era moon buggy by carrying two astronauts in a pressurized cabin. “This vehicle is like our SUV for the Moon,” Peri says. The Exploration Technology Development Program is also designing robots to help astronauts maintain their lunar outpost and perform science reconnaissance. Making the robots smart enough to take simple verbal orders from the astronauts and carry out their tasks semi-autonomously requires vastly more powerful computer brains than those on Apollo; four kilobytes of RAM just won’t cut it.

The list goes on: New rockets to carry a larger lunar lander, spacesuits that can cope with abrasive moon dust, techniques for converting lunar soil into building materials or breathable oxygen. NASA’s ambitions for the Moon have been upgraded. By tapping into 21st century technology, this program will ensure that astronauts have the tools they need to turn those ambitions into reality.

Learn more about the Exploration Technology Development Program at www.nasa.gov/directorates/esmd/aboutesmd/acd/technology_dev.html. Kids can build their own Moon habitat at spaceplace.nasa.gov/en/kids/exploration/habitat.

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



The Chariot Lunar Truck is one idea for a vehicle equal to the lunar terrain. Each of the six wheels pivot in any direction, and two turrets allow the astronauts to rotate 360°.

April 2009

Columbus Astronomical Society Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Please volunteer for Perkins Observatory programs. As the weather warms up, more people attend these events.			1	2 Moon at perigee	3	4
5	6	7	8	9 	10	11 CAS Meeting 8 PM Mercury at perihelion
12 Easter	13	14	15	16 Moon at apogee	17 	18
19	20	21 Asteroid Irene (8.9 mag) at opposition Mars at perihelion	22 Lyrids meteor shower	23	24 	25
26 Moon at perigee	27	28	29 PF Articles deadline	30	Editor's note: I will be out of the state from May 2 through May 16. Please send your submissions for the PF no later than the 25th of April. Thank you.	

May 2009

Columbus Astronomical Society Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 Venus at its brightest in the morning sky	2 Astronomy Day
3	4	5 Eta Aquarids peak	6	7 Space Day	8	9 CAS Meeting 8 PM
10	11	12	13 Moon at apogee	14 Perkins New Vistas program	15	16
17 	18 Mercury at inferior conjunction	19	20	21	22	23
24 	25 Moon at perigee	26	27 PF Articles deadline	28	29	30
31						

Make Your Own 2-D Flying Nanosat!



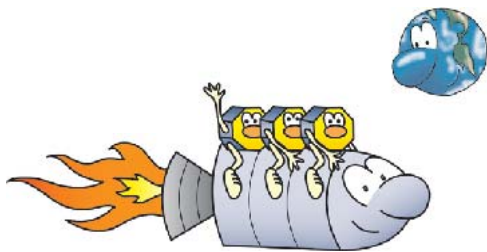
Something whizzes past your ear. You turn, leap, and snatch the disk from the air. It's a Frisbee! Frisbees flying through the air are fun to catch and watch. One young Frisbee fan, Pete Rossoni, watched them fly and dreamed of spacecraft flying past planets and stars.

Pete took those dreams and his Frisbee with him to college. At college he studied to become an engineer. Pete wanted to design cars, airplanes and spacecraft. After finishing school, Pete got a job at NASA. "Sometimes your dreams do come true," he says.

At NASA, Pete is working on launching satellites like he used to throw Frisbees. These satellites are small, about the size of a birthday cake. "This wouldn't work with big satellites or heavy spaceships like the shuttle," he says.

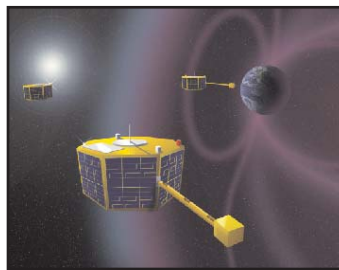
Pete has a special name for these cake-sized satellites. "Nano" means tiny, so he calls them "nanosatellites" or "nanosats" for short.

Nanosats are a new idea. Usually satellites are big and they cost a lot of money. Sometimes scientists have to save their money for a long time before they can send a satellite into orbit. Nanosats are much cheaper. Because they are so small, one rocket can carry many of them into space. Nanosats ride piggy-back on the rocket. When they reach space, they are flung from the rocket and go spinning into orbit.



This is where Frisbee meets science. Pete has invented a gadget that can fling a nanosat from a rocket. "It's a lot like throwing a Frisbee," explains Pete. "You need to spin the satellite and release it cleanly—all in fraction of a second."

NASA hopes to launch the first nanosats into Earth orbit in 2004. This mission is called Space Technology 5. Three 8-sided nanosats will ride to space on the back of a rocket, and Pete's invention will throw them off. The nanosats will gather data for scientists about Earth's magnetic field. But this is just extra-credit.



The Space Technology 5 nanosats will test their miniaturized technologies as they study Earth's magnetic field.

Their main mission is to answer some questions: Can nanosats fly in formation? Will their tiny computers (nano-computers!) work? Is Frisbee tossing as much fun in space? NASA plans to find out.

You can make your own 8-sided flying "nanosat" disc out of paper. It also doubles as a "Ninja" 8-pointed star! Instructions are on the next page.

Learn More: Books:

Northern Lights (Nature in Action), by D.M. Souza (ages 4-8), ISBN 0876146299. (The Northern Lights are caused by Earth's magnetic field, which Space Technology 5 will study.)

Aurora: A Tale of the Northern Lights, by Mindy Dwyer (ages 4-8), ISBN 0882405497.

Web Sites:

Ask the Space Scientist: Earth's Magnetic Field and Auroras— image.gsfc.nasa.gov/poetry//ask/aearth.html

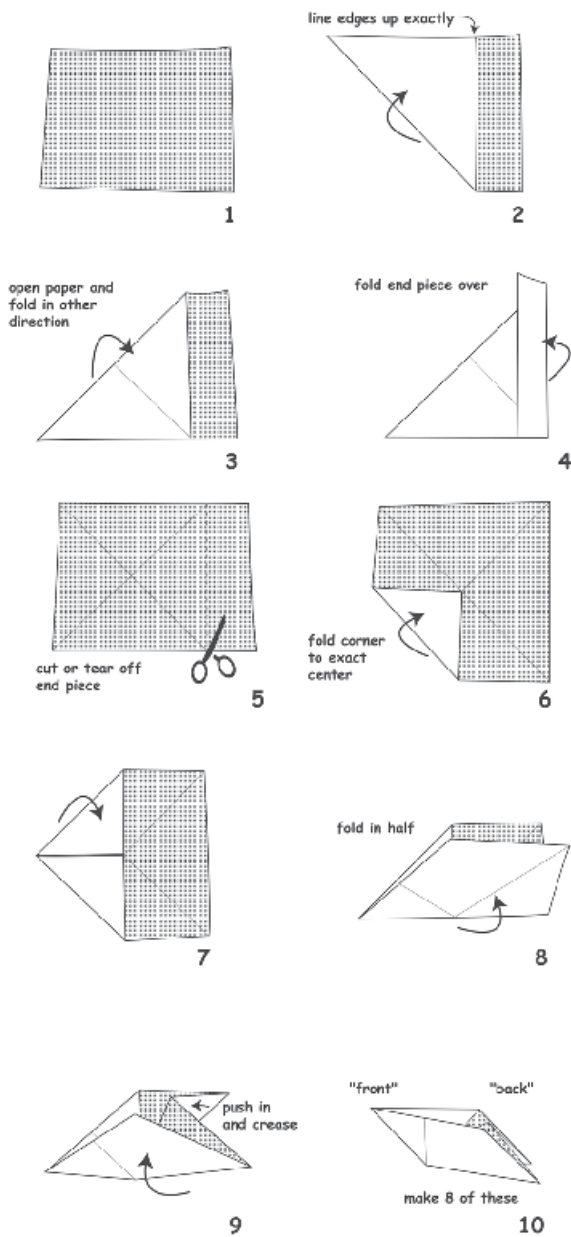
The Space Place: Play the Nanosat Flingman Game! spaceplace.nasa.gov/st5/flingman.htm

Space Technology 5 Web site: nmp.nasa.gov/st5

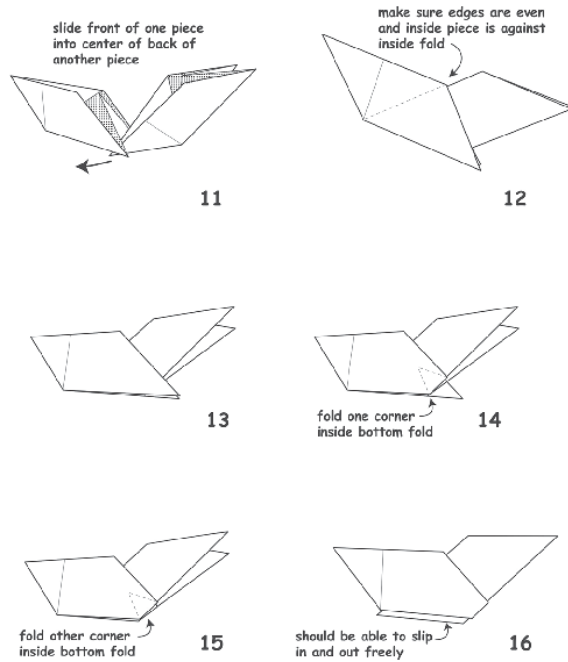
How to Make Your Flying Nanosat and Star

All you really need are 8 sheets of plain 8-1/2x11-inch paper. Recycled photocopy or printer paper is fine. To make a smaller "Nanosat," you can use 4 sheets of paper, cutting each one in half width-wise first to make 8 smaller sheets. (Where the drawing below shows scissors cutting off one end of the paper, you can crease the paper a few times, then carefully tear off the end piece.)

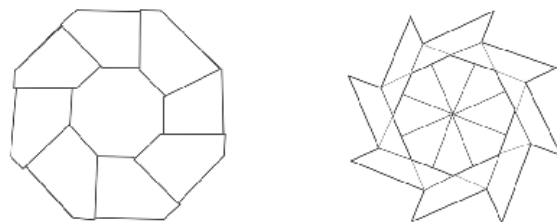
Fold each of the 8 sheets carefully as shown in these pictures. Fold on a table or desk and make those creases sharp!



Connect the 8 folded sheets like this:



When all the folded sides are connected, you will end up with an 8-sided disk. If you push in on opposite sides, the points slide out and you can also have an 8-pointed star!



Have fun spinning the "Nanosat" and the star just as the Space Technology 5 nanosats will be tossed into space like Frisbees.

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

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The Prime Focus is the monthly newsletter of the Columbus Astronomical Society, a not for profit group of amateur astronomers interested in the night sky. Information can be obtained by writing to the address below. Society members build telescopes, observe the splendors of the universe, contribute to scientific research and educate the public at public programs around the city and at Perkins Observatory.
 CAS web site - <http://www.the-CAS.org/>.
 For Advertising info contact the editor.

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*Must be a club member to qualify for discount magazine subscription rates. If you are renewing a magazine subscription please send your magazine renewal notice from the publisher along with this form and your check to ensure proper credit toward your subscription.

Columbus Astronomical Society
Membership Application/Renewal Form

Please indicate whether a new member membership renewal magazine subscription magazine subscription renewal.

I have checked the class of membership and magazine/s subscription/s desired and enclosed a check made payable to the Columbus Astronomical Society for:

Annual Regular Membership Fee: \$20 _____

Annual Student Membership Fee: (under 18) \$10 _____

Annual Family Membership Fee: \$25 _____

Annual Patron Membership Fee: \$50 _____

Annual Corporate Membership Fee: \$150 _____

Astronomy Magazine: \$34.00/1 year * _____

Sky & Telescope: \$32.95/1 year * _____

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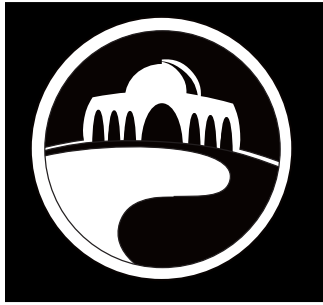
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NIGHTTIMES

The Newsletter of Perkins Observatory Apr. 2009

Spring Programs at Perkins!

We know what they say about April showers, but we still get a fair share of clear nights for our springtime programs at Perkins. Besides, on cloudy nights, we do our famous ghost story, a tour of the Observatory, and a brief description of all the wonderful sky stuff you can see from your backyard if you happen to have a working pair of binoculars (or even just the binoculars you were born with -- your own two eyes.)

On a clear night in April, you can still see Saturn -- rings, no extra charge -- and the Great Nebula in Orion -- a glorious, swirling, glowing cloud where stars are born -- sink below the horizon in the evening until next year.

Now is an especially good time to come. Saturn's rings are "edge-on," an event that happens only every 15 years.

Rising in the east are the glorious globular star cluster M3 and the beautiful binary star Cor Caroli. Add an open cluster or two, like the famous Double Cluster in Perseus, and you'll leave the place with stars in your eyes, we guarantee.

And hey. If the sky is cloudy, we'll regale you with a tour of the "O" and our infamous Perkins ghost story.

Members of the public may purchase tickets by calling (740) 363-1257. Friends of Perkins are most cordially invited to take advantage of your season-pass badges to explore the wonders of the sky.

Join Friends of Perkins Observatory

Or renew your membership! Members of the Friends of Perkins receive a badge that entitles them to free admission to all our Friday and Saturday night Guest Nights, a free subscription to this newsletter, and occasional special programs for members.

Longtime friend Floyd McInturff recently renewed his individual membership, \$50.

Gifts

Continuing kudos go to Jim Pace, longtime member of the Columbus Astronomical Society, who gave his monthly gift

of \$40 to the Endowment and \$40 to the operating fund.

Kathy Shaw of Johnstown, \$50 to the operating fund and an additional gift in memory of Ron Ravneberg. As a Perkins volunteer and member of the Columbus Astronomical Society, she doesn't have to, but she does anyway. Many thanks!

Thanks go to those folks who contributed to the "O" in memory of the beloved Ron

Ravneberg. All gifts will be placed in the Perkins Observatory Endowment Fund.

John and Mary Skubik

Nancy Chase

Kathy Shaw

Loren McBride of Surfside, SC.

Tora Robinson, "In memory of the Ravneberg family."

(over please)

Taurus, the Bulletin Board

Note to CAS members: Please bring your telescopes to clear, weekend programs!

Note to teachers: Time is running out to schedule end-of-the-year field trips.

- ★ April 9 (Thursday) 11 - 2 P.M. 8th graders.
- ★ April 10 (Friday) 8 P.M. Guest Night. Some tickets available.
- ★ April 11 (Saturday) 10 A.M. CAS Amateur Telescope Making group.
- ★ April 12 (Saturday) 8 P.M. Regular meeting of the Columbus Astronomical Society.
- ★ April 14 (Tuesday) 9:30 A.M. Blacklick Elementary 5th graders.
- ★ April 15 (Wednesday) 8 P.M. Ohio Dominican education majors.
- ★ April 16 (Thursday) 9:30 A.M. More Blacklick Elementary 5th graders.
- ★ April 16 (Thursday) 8 P.M. New Vistas in Astronomy, featuring Jennifer Johnson on "A History of Supernovae in the Milky Way."
- ★ April 17 (Friday) 8 P.M. Guest Night. Some tickets available.
- ★ April 18 (Saturday) 10 A.M. CAS Amateur Telescope Making group.
- ★ April 21 (Tuesday) 9 P.M. Todd Kraus's OWU astronomy class.
- ★ April 24 (Friday) 8 P.M. Guest Night. Sold out!

Please note: Starting May 1, weekend evening programs begin at 9:00 P.M.

- ★ May 1 (Friday) 9 P.M. Guest Night. Sold out!
- ★ May 2 (Saturday) 10 A.M. CAS Amateur Telescope Making group.
- ★ May 2 (Saturday) 8 P.M. Linda and Jim Pace's Clintonville Academy Extravaganza
- ★ May 7 (Thursday) 9:30 A.M. St. Agatha's School
- ★ May 8 (Friday) 9 P.M. Guest Night. Plenty of tickets available.
- ★ May 9 (Saturday) 10 A.M. CAS Amateur Telescope Making group.
- ★ May 9 (Saturday) 8 P.M. Regular meeting of the Columbus Astronomical Society.
- ★ May 13 (Wednesday) 9:30 A.M. Harrison Street Elementary 5th graders.
- ★ May 14 (Thursday) 1 P.M. Enrichment Day at Wyandot Elementary.
- ★ May 14 (Thursday) 8 P.M. New Vistas in Astronomy, featuring Eric Herbst on "Chemistry Meets Astronomy: The Role of Molecules in Understanding Stellar and Planetary Formation."
- ★ May 15 (Friday) 8 A.M.? Enrichment Day at Tyler Run Elementary.
- ★ May 15 (Friday) 9 P.M. Guest Night. Plenty of tickets available.
- ★ May 16 (Saturday) 10 A.M. CAS Amateur Telescope Making group.
- ★ May 19 (Tuesday) 9:30 A.M. 90 Jefferson Elementary 2nd graders. Help!
- ★ May 21 (Thursday) 7:30 P.M. Lincoln Way Elementary
- ★ May 22 (Friday) 1 P.M. Guest Night. Plenty of tickets available.
- ★ May 23 (Saturday) 10 A.M. CAS Amateur Telescope Making group.
- ★ May 26 (Tuesday) 10 A.M. Central College Elementary 2nd graders.
- ★ May 27 (Wednesday) 1 P.M. Clintonville Academy kindergartners.
- ★ May 29 (Friday) 1 P.M. Guest Night. Plenty of tickets available.

Vic Stover contributed \$20 to the operating fund and a book on Newtonian Collimation.

Margaret Ann Samuels contributed \$40 to the Perkins Endowment.

Special thanks to the members of the Columbus Astronomical Society who honor Perkins by providing much-needed volunteer help at our public programs.

Please Help! (One More Time)

Besides joining the Friends of Perkins or renewing your membership, you can also help us in a variety of ways.

We're always looking to replace our old, castoff computers with slightly newer castoff computers. If you're upgrading your old computer, save it from landfill ignominy by giving it to Perkins. It will soon appear on a tabletop in the lecture room where the next generation of astronomers will use it to explore the virtual universe.

We can also use astronomical software suitable for public use, LCD monitors, and other computer add-ons.

And that last point doesn't necessarily apply just to computers. Astronomically related puzzles and games, adult and especially children's books on astronomy and space science, models, mobiles, electronic doodads, and the like will all go on public display in our children's play area.

We're also looking for good-quality telescopes to add to our stable of public instruments. Often, our stalwart volunteers from the Columbus Astronomical Society want to help with a program but don't necessarily want to haul their cherished (and sometimes unwieldy) instruments all the way up to the "O." It surely is a blessing when we can offer them a variety of telescopes to use.

Program fees and ticket sales cover only a small portion of the costs of keeping the Observatory open for public use. You can help by giving directly to our operating fund or by making a gift that keeps on giving: The income from your donation to the Perkins Endowment will continue to keep Perkins and its educational mission thriving long into the future.

★ ★ ★ ★



A public service of Ohio Wesleyan University since 1923.

Lots of Ways to Reach Us
 Phone: (740) 363-1257
 Mail: P. O. Box 449
 Delaware, OH 43015
 Email: perkins@owu.edu
 Web site: www.perkins-observatory.org/
 Fax: (740) 363-1258

1. Yes, I want to make a donation to the Perkins Endowment. Amount enclosed: _____
2. Yes, I want to be a member of the Friends of Perkins Observatory. Enroll me at the level of sponsorship checked below:
 Individual (\$50) Sponsor (\$100) Family (\$90) Family Sponsor (\$200) Corporate (\$300)

Name _____

Names of family members (for family memberships only) _____

Address _____ Phone _____

City _____ State _____ Zip Code _____

Please check here if you are currently a member of the Friends of Perkins Observatory.

(Please mail to Perkins Observatory, P. O. Box 449, Delaware, OH 43015. Make checks available to "Perkins Observatory.")

2,000 Points of Light

On any given night of the year from a dark, rural location, 2,000 stars light up the sky. If 2,000 people, 2,000 Points of Light, will contribute \$200 each, we can continue our mission unimpaired.

Half of your gift will go into the Perkins Endowment, the interest on which will keep us open for decades to come. The other \$100 will be used to make building repairs build new exhibits and displays, and help with ongoing costs.

To show our gratitude, we will associate your name (or the name of any honoree you pick) with one of the over 2,000 stars on our large publicly-displayed star map. (Sorry, we get to pick the star).

- Yes, I want to be a Point of Light (@ \$200 per "Point"). Amount enclosed: _____

Name _____

Honoree(s) for "2,000 Points of Light" _____

Address _____

City _____ State _____ Zip Code _____ Phone: _____

(Please mail to Perkins Observatory, P. O. Box 449, Delaware, OH 43015. Make checks payable to "Perkins Memorial Observatory.")