# Inside Orbit

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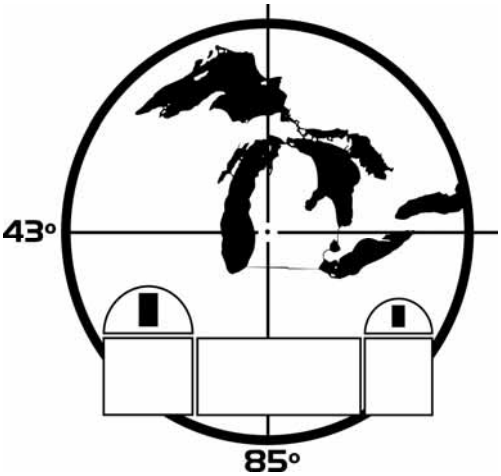
A Publication of the Grand Rapids Amateur Astronomical Association

*The usual approach of science of constructing a mathematical model cannot answer the questions of why there should be a universe for the model to describe. Why does the universe go to all the bother of existing?*

-- Stephen Hawking

## In This Issue:

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***Note:*** *Any views and opinions expressed by the authors in this publication are not necessarily those of the GRAAA or its members.*

**Inside Orbit Staff**

| | |
|---|---|
| Editor-in-Chief | Kevin Jung |
| Editing, Layout & Graphics | Kevin Jung |
| Contributing Authors | |
| Contributing Authors *(this edition)* | Patrick Bohlinger |
| Production Staff | Kevin Jung |

**GRAAA Website**

**www.graaa.org**

Images Credit:

**Mailing Address:**

Inside Orbit
3308 Kissing Rock Ave SE
Lowell, MI 49331

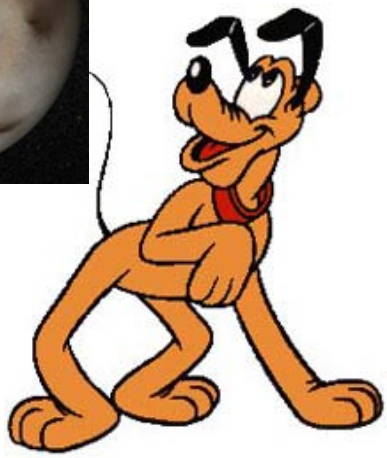
# ☆☆☆ MAY MEETING NOTICE ☆☆☆

***Saturday, May 3, 2008***
***7.30pm - James C. Veen Observatory***

## "Pluto: What's in a Name?"

### Dr. Kirk Korista

*Associate Professor of Astronomy, Western Michigan University*

Pluto has been a mystery from its discovery as the ninth "planet". A flood of data from Pluto and the realm of the outer Solar System over the past 30 years led an international body of astronomers in 2006 to redesignate Pluto as one of many "minor planets". Astronomers caught a lot of flack for this "renaming" of Pluto's status, some of it from surprising places. Dr. Korista will present a brief overview of Pluto, provide a clear rationale behind the IAU's decision, and in doing so discuss briefly some of the recent advances in our understanding of the history of our Solar System. He'll conclude with some commentary on "What's in a Name?" from science's point of view.

**About the Speaker:**

Dr. Kirk Korista is the Associate Professor of Astronomy at Western Michigan University. He received his BS in Astronomy from Illinois University and his PhD from Ohio State. His primary interests include spectroscopy of extra-galactic and Galactic emission line sources: active galaxies and Quasars, cataclysmic variables, nova shells, H II regions, planetary nebulae - observations and numerical simulations of photoionized gas. You can read more about Dr. Korista at his website.

*As usual, all members and interested individuals are welcome to attend. If clear afterwards, there will be observing.*

# News and Events

***(Latest News and Events always online at www.graaa.org)***

**THE MONTHLY MEETING OF THE GRAAA** will be held on Saturday, May 3rd at the James C. Veen Observatory. Yes, you read correctly - we're back at the observatory after a long time away!!!

The meeting begins at 7.30pm with the social period, followed by the program at 8.00pm.

The program **"Pluto: What's In A Name?"** is being presented by Dr. Kirk Korista, Associate Professor of Astronomy at Western Michigan University.

All members and guests are welcome to attend (and who knows - if you haven't been out there for a while, you might be surprised by some changes). If it's clear afterward, there will be observing. Also, there could be refreshments, if someone volunteers to bring them.☺

For more information, see the previous page, and the dedicated page on the club's website.

**PUBLIC NIGHTS FOR MAY:** The Observatory will be open - *clear skies only* - on Saturday, May 10th and Saturday May 31st. Times are 9.00pm-12.00am. Come out and help if you can. It's a fun time, and the other members will appreciate it.

**MONTHLY MEMBERS STAR PARTY:** The next one is set for Saturday, May 17th. More information is online, and via the reminder email. Pray for clear skies. Unfortunately the skies were misread for the April get-together, as it cleared up, so we'll try to "read the clouds" better this month.

**MEMBERSHIP RENEWALS:** May is the usual month for most memberships to expire (except those who joined at other times of the year). Everyone should have gotten a renewal notice in the regular mail, so now we will remind you here and via email until everyone is paid up. You can download a renewal form from the Member's Area of the website.

**JUNE INSIDE ORBIT:** The deadline for submissions to the June 2008 ***Inside Orbit*** is May 24th. If you'd like to write anything, please feel free to do so. The editorial staff is very relaxed concerning submissions, and take anything that's remotely interesting. In fact, they will almost guarantee that it will be published.

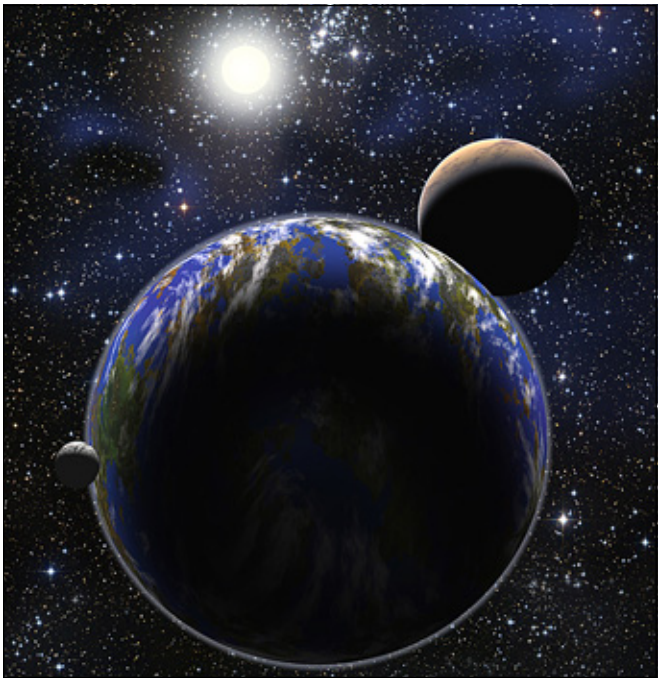
**NASA SPACECRAFT IMAGES MARS MOON IN COLOR AND IN 3D:** A new stereo view of Phobos, the larger and inner of Mars' two tiny moons, has been captured by a NASA spacecraft orbiting Mars.

The High Resolution Imaging Science Experiment (HiRISE) on NASA's Mars Reconnaissance Orbiter took two images of Phobos 10 minutes apart on March 23. Scientists combined the images for a stereo view.

**NASA SETS SIGHTS ON LUNAR DUST EXPLORATION MISSION:** NASA is preparing to send a small spacecraft to the moon in 2011 to assess the lunar atmosphere and the nature of dust lofted above the surface.

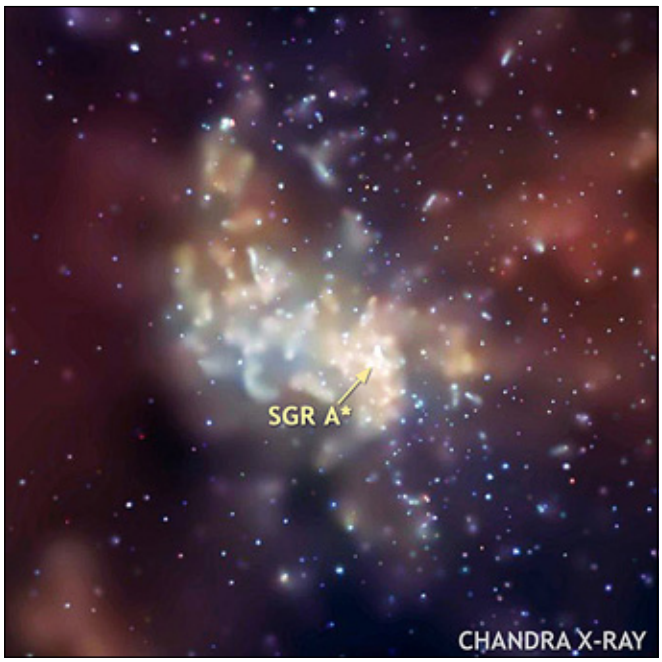
Called the Lunar Atmosphere and Dust Environment Explorer (LADEE), the mission will launch before the agency's moon exploration activities accelerate during the next decade. LADEE will gather detailed information about conditions near the surface and environmental influences on lunar dust. A thorough understanding of these influences will help researchers understand how future exploration may shape the lunar environment and how the environment may affect future explorers.

**NEW LASER TECHNOLOGY COULD FIND FIRST EARTH-LIKE PLANETS:** The leading method of finding planets orbiting distant stars spots mostly Jupiter-sized worlds. Technology limitations make it difficult to detect smaller planets. But that is about to change. A revolutionary laser technology being developed by scientists and engineers at the Harvard-Smithsonian Center for Astrophysics (CfA), with colleagues at MIT, will enable scientists to spot Earth-sized worlds in Earth-like orbits.



*"We are at the cusp of a new era in planet searches,"* said CfA astrophysicist Chih-Hao Li. *"With this technology we are developing, astronomers will finally be able to find the first truly Earth-like worlds in terms of size and orbit."*

**MILKY WAY'S GIANT BLACK HOLE AWOKE FROM SLUMBER 300 YEARS AGO:** Using NASA, Japanese, and European X-ray satellites, a team of Japanese astronomers has discovered that our galaxy's central black hole let loose a powerful flare three centuries ago.




The finding helps resolve a long-standing mystery: why is the Milky Way's black hole so quiescent? The black hole, known as Sagittarius A* (pronounced "A-star"), is a certified monster, containing about 4 million times the mass of our Sun. Yet the energy radiated from its surroundings is billions of times weaker than the radiation emitted from central black holes in other galaxies.

**NEW ONLINE MAP REVEALS EVIDENCE OF THE FORCES THAT ONCE SHAPED MARS:** A new online map lets visitors explore Mars' past through a collection of high-resolution observations from one of the most powerful spectrometers ever sent to the Red Planet. Evidence of ancient bodies of water, flowing rivers and groundwater peeks out from beneath layers of hardened magma and dust—testaments to Mars' progression through wet, volcanic and dry eras.

The data come from the Compact Reconnaissance Imaging Spectrometer for Mars (CRISM), on board NASA's Mars Reconnaissance Orbiter. CRISM's primary mission is to search for signs that liquid water once existed on Mars by identi-

fying minerals that form only in the presence of water. Molecules of water trapped in these minerals leave particular patterns in the sunlight that reflects off of them and into CRISM, which senses up to 544 “colors,” or wavelengths, of light.

**EARTHRISE OVER THE MOON:** The Japan Aerospace Exploration Agency (JAXA) and NHK (Japan Broadcasting Corporation) successfully captured a movie of the "Full Earth-Rise" using the onboard High Definition Television (HDTV) of the lunar explorer "KAGUYA " (SELENE) on April 6, 2008 (Japan Standard Time, JST, all the following dates and time are JST.) The KAGUYA is currently flying in a lunar orbit at an altitude of about 100 km.

The phenomenon expressed as a "Full Earth-Rise" can be seen from a satellite that travels around the Moon such as the *KAGUYA* (SELENE) or the Apollo manned spacecraft. The Earth is almost stationary when it is observed from the Moon, thus a Full Earth-Rise coming out from the horizon cannot be seen from the Moon.

**SUPERKICK: BLACK HOLE EXPELLED FROM ITS PARENT GALAXY:** By an enormous burst of gravitational waves that accompanies the merger of two black holes the newly formed black hole was ejected from its galaxy. This extreme ejection event, which had been predicted by theorists, has now been observed in nature for the first time. The team led by Stefanie Komossa from the Max Planck Institute for extraterrestrial Physics (MPE) thereby opened a new window into observational astrophysics. The discovery will have far-reaching consequences for our understanding of galaxy formation and evolution in the early Universe, and also provides observational confirmation of a key prediction from the General Theory of Relativity.

**IMPORTANT MARS DATE FOR MAY:** On May 25, the Phoenix mission will arrive at the Red Planet, with the lander scheduled to touch down in the north polar region of Mars at 7.36pm EDT. Stay tuned for more information, and watch NASA-TV if you can.

**INFORMATION SPOT:** The **Light Curve** is the brightness or intensity of light plotted against time on a graph. Astronomers discover dark stellar companions using the light curve of the star. As a dark orbiting object eclipses the star, the brightness falls, producing a dip on the light curve. Careful analysis of the light curve reveals the masses of the star and dark companion plus the distance to this eclipsing binary system.

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*…news to be continued next month*

# Fighting the Clear Night Guilt

*by Patrick Bohlinger*

The problem with having an obsession is that it knows no bounds. You go to sleep thinking about it, you wake up thinking about it. It pops into your head constantly until something you truly love starts to become something even more than that.

I'm talking about our favorite obsession – Astronomy, of course.

Astronomy has no season like hunting, fishing, golf or other recreational activities. Astronomy is a year-round activity, and thanks to the availability of solar scopes and filters, one that can be pursued around the clock as well. The difference between a hobby and an obsession might be best summed up this way:

If you pick up beautiful seashells at the beach, you have a hobby. If you arrange them into patterns that mimic the constellations, you have an obsession.

Other signs you may be obsessed with Astronomy:

- ☆ You start associating Michigan road names like M-45 and M-6 with their Messier designations.
- ☆ You notice swirls in your birthday cake frosting that resemble the Orion Nebula.
- ☆ You see two lone dandelions in a field and think, "Cool, a binary system."
- ☆ Cloud patterns begin to look like famous nebulas.
- ☆ You've nearly or actually crashed a vehicle while driving and looking skyward.

And lastly, you are alone at a remote observing site on one of those rare but perfect nights and suddenly the silence is shattered by the screams of an animal being killed. If you are already tossing fully extended tripods, cases and uncapped eyepieces into the car, you have a hobby. If you look up, mildly annoyed and holler into the dark, "Hey, keep it down over there, I'm trying to concentrate!" you, my friend, have an obsession!

But obsessed or not, burnout can be a distinct possibility unless you take a break every now and then. Here in West Michigan we have a few of those breaks built in for us. One is called The Cloudy Season, and it eats most of the time from November until March. Another is called "Daylight Savings Time" when we have to wait until 11:30 p.m. before it gets sufficiently dark for the real faint fuzzies to appear. That leaves us with Dew & Skeeter Season and the Frost & Flu Finale to get out and enjoy the stars.

But like some of you, I shivered through the lunar eclipse and other winter sessions and I guzzled coffee through the super-late summer viewing sessions as well. I've been out a few times this spring as well, so why do I feel guilty for staying in on a clear night? Does this happen to you too? Have you ever felt an obligation to step outside and just look up for a few minutes like it's your job? Like if you don't, someone at work will say "Did you see the Aurora last night?" and blow your street cred for being the guru of all things Astro?

I hate to waste a perfectly clear night, but I'm learning that 5 minutes in the back yard with binoculars can go a long way toward extinguishing the guilt of missing one.

Until the next clear night.

For now, if we can just get past Daylight Savings Time into the Dew & Skeeter Season, I think we'll have enough clear nights that I won't have to feel guilty for missing one.

*Until next winter…*

*Ed. Note: Pat Bohlinger has been a member of the GRAAA for five years, and gives freely of his time in helping out at various club functions, including public nights.*

*See how easy it is to write for the newsletter?*

NASA Space Place

*Note: These articles are courtesy **NASA Space Place Program** at the Jet Propulsion Laboratory.*

## Stellar Compass for Space Explorers

*by Patrick L. Barry*

In space, there's no up or down, north or south, east or west. So how can robotic spacecraft know which way they're facing when they fire their thrusters, or when they try to beam scientific data back to Earth?

Without the familiar compass points of Earth's magnetic poles, spacecraft use stars and gyros to know their orientation. Thanks to a recently completed test flight, future spacecraft will be able to do so using only an ultra-low-power camera and three silicon wafers as small as your pinky fingernail.

"The wafers are actually very tiny gyros," explains Artur Chmielewski, project manager at JPL for Space Technology 6 (ST6), a part of NASA's New Millennium Program.

Traditional gyros use spinning wheels to detect changes in pitch, yaw, and roll—the three axes of rotation. For ST6's Inertial Stellar Compass, the three gyros instead consist of silicon wafers that resemble microchips. Rotating the wafers distorts microscopic structures on the surfaces of these wafers in a way that generates electric signals. The compass uses these signals—along with images of star positions taken by the camera—to measure rotation.

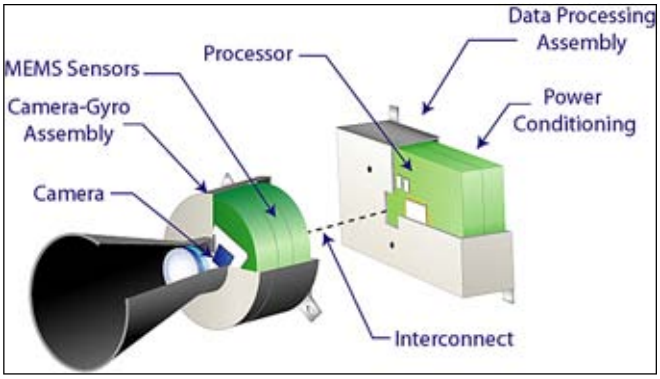
Because the Inertial Stellar Compass (ISC) is based on this new, radically different technology, NASA needed to flight-test it before using it in important missions. That test flight reached completion in December 2007 after about a year in orbit aboard the Air Force's TacSat-2 satellite.

"It just performed beautifully," Chmielewski says. "The data checked out really well." The engineers had hoped that ISC would measure the spacecraft's rotation with an accuracy of 0.1 degrees. In the flight tests, ISC surpassed this goal, measuring rotation to within about 0.05 degrees.

That success paves the way for using ISC to reduce the cost of future science missions. When launching probes into space, weight equals money. "If you're paying a million dollars per kilogram to send your spacecraft to Mars, you care a lot about weight," Chmielewski says. At less than 3 kilograms, ISC weighs about one-fifth as much as traditional stellar compasses. It also uses about one-tenth as much power, so a spacecraft would be able to use smaller, lighter solar panels.

Engineers at Draper Laboratory, the Cambridge, Massachusetts, company that built the ISC, are already at work on a next-generation design that will improve the compass's accuracy ten-fold, Chmielewski says. So ISC and its successors could soon help costs—and spacecraft—stay on target.

Find out more about the ISC at nmp.nasa.gov/st6. Kids can do a fun project and get an introduction to navigating by the stars at spaceplace.nasa.gov/en/kids/st6starfinder/st6starfinder.shtml.




*Compass is built as two separate assemblies, the camera-gyro assembly and the data processor assembly, connected by a wiring harness. The technology uses an active pixel sensor in a wide-field-of-view miniature star camera and micro-electromechanical system (MEMS) gyros. Together, they provide extremely accurate information for navigation and control.*

# ROGER B. CHAFFEE PLANETARIUM

Public Museum, Grand Rapids

**Show Schedule**
**May 2008**

**For General Audiences and Families:**

**EVERYBODY'S SKY: STAR STORIES FROM AROUND THE WORLD –** In coordination with the Museum's newest permanent exhibit, *Newcomers*, the Chaffee Planetarium presents sky stories originating from among the many cultures that are part of West Michigan. **30 minutes**

SHOWTIMES: Daily at 2:00 pm.

**UNDER STARLIT SKIES –** The planetarium operator takes the audience on a live tour of the night sky, finding the prominent stars, constellations, and planets visible tonight. Current astronomical events are also presented. **30-40 minutes**

SHOWTIMES: Saturday and Sunday at 3:00 pm.

**Added Value: This show is free with paid Museum admission; or arrive after 2:30 p.m. for the planetarium show only and pay only $3.00/ person.**

**For Families and Children:**

**SOLAR SYSTEM SAFARI –** A jungle adventurer uses his magical camera to take the audience on a safari to the major features of the Solar System. The sun, Moon and eight planets all come to life, as well as the dwarf planet Pluto, who explains its current status. **35 minutes**

SHOWTIMES: Saturday and Sunday at 1:00 pm.

*Recognize that the very molecules that make up your body, the atoms that construct the molecules, are traceable to the crucibles that were once the centers of high-mass stars that exploded their chemically-enriched guts into the galaxy. Enriching pristine gas clouds with the chemistry of life. So that we're all connected. To each other, biologically. To the Earth, chemically. And to the rest of the universe, atomically.*

*That's kinda cool. That makes me smile. And I actually feel quite large at the end of that. It's not that we are better than the universe. We're part of the universe. We're in the universe, and the universe is in us.*

-- Neil deGrasse Tyson

**Grand Rapids Amateur Astronomical Association**
**Membership Application or Renewal Form**

DATE:_____

❑ **New Membership** ❑ **Renewal**

Please fill out the information below as completely as possible.
For Family memberships, please include all persons for whom membership is desired.

**Please Print**

Name: _____Birthdate: _____

Name: _____Birthdate: _____

Name: _____Birthdate: _____

Name: _____Birthdate: _____

Name: _____Birthdate: _____

Name: _____Birthdate: _____

Address:_____

City: _____ State: _____ Zip: _____

Home Phone: _____ Cell Phone: _____

E-Mail: _____
(Note: For Family members, if more than one e-mail address, please list others on back of application)

❑ **Adult** (18 or older, a Minimum of $40.00) . . . . . $_____
❑ **Student** (through 17 yrs old, a Minimum of $25.00) . . . . . $_____
❑ **Family** (all members of one family, a Minimum of $50.00) . . . . . $_____
*(Note: Contributions greater than the minimum dues are considered a donation and are tax-deductible)*

❑ **Observatory Endowment Fund** . . . . . $_____
❑ **Miscellaneous Donations** . . . . . $_____
*(Note: Contributions to these funds are tax-deductible. Indicate amount of donation)*

❑ **OBSERVATORY USER FEE:** (a Minimum of $25.00 per user)..... $_____
*(Contributions of more than $25 will help meet repairs and upgrade of equipment costs.)*
If you are a qualified user of the Veen Observatory, and wish to remain so,
check the box for ***"User Fee."***

**TOTAL ENCLOSED** (From all categories above) . . . . . $_____

Make Check or Money Order to:
**GRAND RAPIDS AMATEUR ASTRONOMICAL ASSOCIATION (or GRAAA)**

Mail to: Jerry Persha, GRAAA Treasurer
199 Smith St.
Lowell, MI 49331

Grand Rapids Amateur Astronomical Association
3308 Kissing Rock Ave. SE
Lowell, MI 49331-8918