



# SJAA EPHEMERIS

## SJAA Activities Calendar

Jim Van Nuland

late April

- 20** Houge Park Astro Day. Sunset 7:47 p.m., 20% moon sets 0:20 a.m. Star party hours: 8:30 to 11:30 p.m.
- 21** Mirror-making workshop at Houge Park. 7:30 p.m.
- 28** **General meeting at Houge Park.** Karrie Gilbert will speak on Studies of Andromeda Galaxy Halo Stars. 8 p.m.

May

- 5** Mirror-making workshop at Houge Park. 7:30 p.m.
- 11** Astronomy Class at Houge Park. 7:30 p.m.
- 11** Houge Park star party. Sunset 8:06 p.m., 27% moon rise 3:23 a.m. Star party hours: 9:00 to midnight.
- 12** Dark sky weekend. Sunset 8:07 p.m., 17% moon rise 3:50 a.m.
- 17** Mirror-making workshop at Houge Park. 7:30 p.m.
- 19** Dark sky weekend. Sunset 8:13 p.m., 16% moon sets 11:57 p.m.
- 25** Houge Park star party. Sunset 8:17 p.m., 72% moon sets 2:52 a.m. Star party hours: 9:00 to midnight.
- 26** **General meeting at Houge Park.** 8 p.m. Dr. Jeffrey Cuzzi of NASA/Ames will tell us of the rings of Saturn.

June

- 2** Mirror-making workshop at Houge Park. 7:30 p.m.
- 7** Mirror-making workshop at Houge Park. 7:30 p.m.
- 8** Astronomy Class at Houge Park. 7:30 p.m.
- 8** Houge Park star party. Sunset 8:27 p.m., 40% moon rise 1:51 a.m. Star party hours: 9:30 to midnight.
- 9** Coyote Lake Park star party. Sunset 8:27 p.m., 29% moon rise 2:17 a.m. Star party starts at 9:30.
- 16** Dark sky weekend. Sunset 8:30 p.m., 6% moon sets 10:32 p.m.
- 22** Houge Park star party. Sunset 8:32 p.m., 57% moon sets 1:17 a.m. Star party hours: 9:30 to midnight.
- 23** Mirror-making workshop at Houge Park. 7:30 p.m.
- 30** **General meeting at Houge Park.** 8 p.m. John Dillon, science historian, will tell us of the search for the first telescope.

*The Board of Directors meets at 6:00 p.m. preceding each general meeting. All are welcome.*

## May General Meeting

**Dr. Jeffrey Cuzzi**

**May 26 at 8 p.m. @ Houge Park**

David Smith

At our May 26 General Meeting the title of the talk will be:

What Have We Learned from the Cassini/Huygens Mission to Saturn? – a presentation by Dr. Jeffrey Cuzzi of NASA Ames Research Center.

Cassini is now well into its third year at Saturn. The Huygens entry probe landed on Titan in January 2005, but since then, many new discoveries have been made on Titan's surface, and elsewhere in the system, by the orbiter as it continues its four-year tour. In addition, new understanding is emerging from analysis of the earliest obtained data.

In this talk, Dr. Jeffrey Cuzzi will review the key science highlights so far on the giant planet, its spectacular rings, its small but very diverse icy moons, and its planet-sized moon Titan.

Jeff Cuzzi's main interests are in planetary system origin and evolution. Jeff was invited to join the Voyager Imaging Team in 1978 as its "rings expert", and led the planning of all Saturn, Uranus, and Neptune encounter ring imaging observations. He received several awards from NASA and the AIAA for his research on planetary rings, and in 1989 he was selected as Interdisciplinary Scientist for Rings on the NASA-ESA Cassini-Huygens mission. Together with Ellis Miner and Randii Wessen, he authored the book, "Planetary Ring Systems". Jeff is also actively studying how fluid dynamics and turbulence might have played a role in accumulating the very earliest primitive objects (comets and asteroids) such as reflected in the meteorite record.

## **A Visit to Goldstone**

Jane Houston Jones

The DSN comprises three Deep Space Network (DSN) Communication Complexes. To compensate for Earth's rotation and allow 24-hour communication with distant spacecraft, the complexes are located about 120 degrees apart in longitude. The Jet Propulsion Laboratory, a division of the California Institute of Technology, manages the DSN for NASA.

**24 hour news and information hotline:**

**(408) 559-1221**

*Continued on page 5*

# DEEP SKY OBSERVING

by Mark Wagner

May 2007 third quarter to new moon observing list The list begins in the north and moves southward. Objects are within roughly a two hour section of right ascension that is at a comfortable elevation to the east at astronomical dark. This list is just a sampling of the full list which is at <http://www.resource-intl.com/Deep.Sky.May.07.html>.

TARGET	TYPE	SIZE	MAG.	RA	DEC
Arp 185	Galaxy	3.0'x2.4'	11.8	16h 32m 38s	78° 11' 58"
<i>NGC 6217</i>					
N5585	Galaxy	6.1' x 3.8'	11.2	14h 19d 47s	56° 43' 45"
<i>Nice sight with NGC 5982 and NGC 5981!</i>					
M 102	Galaxy	6.4'x2.8'	10.7	15h 06m 29s	55° 45' 48"
<i>NGC 5866</i>					
N5687	Galaxy	2.4'x1.6'	12.6	14h 24m 52s	54° 28' 35"
<i>Faint, irregular, mottled with dim galaxy off west end.</i>					
NGC 5676	Galaxy	4.0'x1.9'	11.9	14h 32m 46s	49° 27' 29"
<i>N5660 and two other galaxies in field.</i>					
NGC 5689	Galaxy	4.0'x1.1'	12.8	14h 35m 29s	48° 44' 35"
<i>Three galaxies.</i>					
Arp 90	Galaxy	2.2'x0.8'	13.0	15h 26m 07s	41° 40' 39"
<i>NGC 5930 and NGC 5929</i>					
Abell 39	Planetary Nebula	2.9'	13.7	16h 27m 38s	27° 54' 33"
<i>Large and dim, use an OIII filter</i>					
Arp 42	Galaxy	1.5' x 1.0'	13.9	15h 02m 42s	23° 20' 01"
<i>NGC 5829 and IC 4526, nice field!</i>					
Arp 72	Galaxy	3.2'x2.6'	13.2	15h 46m 58s	17° 53' 05"
<i>Interesting hints of detail in larger scopes.</i>					
Arp 91	Galaxy	1.6'x1.3'	12.9	15h 34m 32s	15° 11' 41"
<i>NGC 5993 and NGC 5994</i>					
Arp 49	Galaxy	2.5'x1.6'	12.7	14h 32m 25s	08° 04' 45"
<i>NGC 5665 – triangular shape, bright companion.</i>					
Arp 274	Galaxy	1.1'x0.7'	13.8	14h 35m 08s	05° 21' 32"
<i>NGC 5679A and NGC 5679B – actually a very tight triple system.</i>					
NGC 5566	Galaxy	6.7'x2.1'	11.5	14h 20m 20s	03° 56' 01"
<i>Three galaxies, two edge-on, nice trio!</i>					
N5775	Galaxy	4.2'x1.0'	12.2	14h 53m 57s	03° 32' 42"
<i>Five galaxies in field.</i>					
NGC 5576	Galaxy	3.9'x2.6'	11.0	14h 21m 03s	03° 16' 16"
<i>Close to NGC 5577 group, NGC 5566 close by field.</i>					
M 5	Globular Cluster	23.0'	5.7	15h 18m 33s	02° 04' 58"
<i>Outstanding globular with double star 5 Serpens in field.</i>					

Note: Source catalogs are Messier, Arp, Abell Planetary, Abell Galaxy Cluster (AGC), Hickson Compact Galaxy (HCG), Herschel 400-I, Herschel 400-II. Herschel 400-I are identified as NGCXXXX, Herschel 400-II as NXXXX.

## Hexagons on Saturn, Spots on Mercury

Akkana Peck

You'll find plenty to look at in the May shallow sky.

The jewel is Saturn, well up by nightfall and remaining visible through most of the evening.

Since it's at quadrature (the point when a planet is exactly 90 degrees from the sun as viewed from Earth), the shadow of

the planet on its rings will be especially prominent. That makes this month an excellent time to show Saturn to your friends and relatives. But then, when isn't a good time to show Saturn to anyone?

Alas, you probably won't be able to see the Weird and Wonderful hexagonal storm around Saturn's north pole, shown in the Cassini pictures from last month. The storm has actually been there for quite a few years: it was first seen by Voyager I in 1980. But it's tough to see from here. You really need a polar view to show the hexagonal structure of the storm.

But if you want a Saturn-related challenge that you can try from home, Iapetus' dark side is pointed toward us on May 24. Did you get a chance to look for it last month, when it was shining at magnitude 10.1 with its bright side facing our way? Now's your chance to see Iapetus' other side as it fades to a dim magnitude 11.9. Get a finder chart and more information about Iapetus from Jane Houston Jones' page at <http://www.otastro.org/iapetus/>

Meanwhile, Jupiter is rising a bit before 10 p.m. as it heads toward an opposition in early June. Start observing it now, get back in practice seeing its bands and moons and moon shadows, and you'll

be ready to observe the subtle details of the bands by opposition when the viewing really gets good. Unfortunately Jupiter is quite far south this year, and only climbs to about 30 degrees by the

time it transits. We'll have to get used to a low Jupiter, though; it won't get much better this year.

Venus continues its amazing run in the evening sky. Its phase is just barely gibbous.

Mercury is invisible early in the month, but by May's end it emerges into the early evening sky. It crosses perihelion

quite fuzzy, mostly bright and dark spots which presumably correlate to craters on Mercury's surface. Just goes to show how little we know about our own solar system!

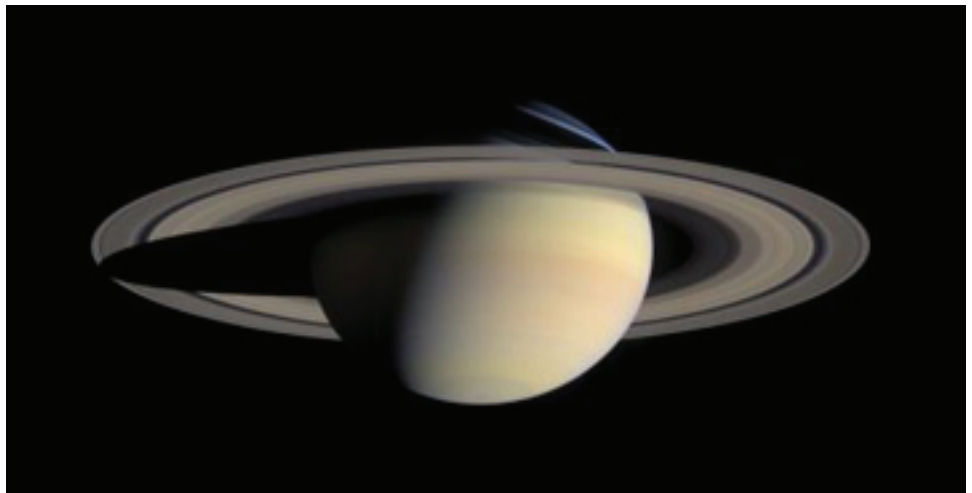
Mars, Uranus and Neptune don't rise until the wee hours of the morning, and you're best off waiting a few months unless you find yourself up just before dawn itching to look at a planet. Pluto rises earlier, just after dark, and transits a few hours after midnight. It'll get a little brighter in a few months, but if you just can't wait, it's certainly a viable target in May.

Finally, there's a comet in the sky. And not just any comet, but one discovered

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**“Since Saturn is at quadrature, the shadow of the planet on its rings will be especially prominent.”**

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(closest approach to the sun) on the 9th. Did you catch the news item last month about the new image of the unknown side of Mercury? Until now, the best images of Mercury come from Mariner 10 1974, which captured images of less than half the planet's surface. The rest of Mercury remained essentially unphotographed ... until now. Gerald Cecil of UNC-Chapel Hill used a remotely-operated telescope in Chile to shoot Mercury when it was very close to the sun, using a cloth mask to block out stray light. Cecil's photo (which I haven't been able to find online) is apparently

by an SJAA member, Don Machholz, from Loma Prieta way back in 1986. 96P/Machholz, Don's third comet, will become visible in the morning sky starting in mid April, at about 9th magnitude, and continues to be visible through the first half of May. As May opens, the comet rises a bit after 2 a.m. and will be passing a bit south of lambda Pegasi, heading gradually west. Stay up late and catch a glimpse!

## Early Bird Get the Worm or “Black Hole Breakfast”

Dr. Tony Phillips

We all know that birds eat worms. Every day, millions of birds eat millions of worms. It’s going on all around you! But how often have you awakened in the morning, stalked out in the dewy grass, and actually seen a bird having breakfast? Even though we know it happens all the time, a bird gulping a worm is a rare sight.

Just like a black hole gulping a star...

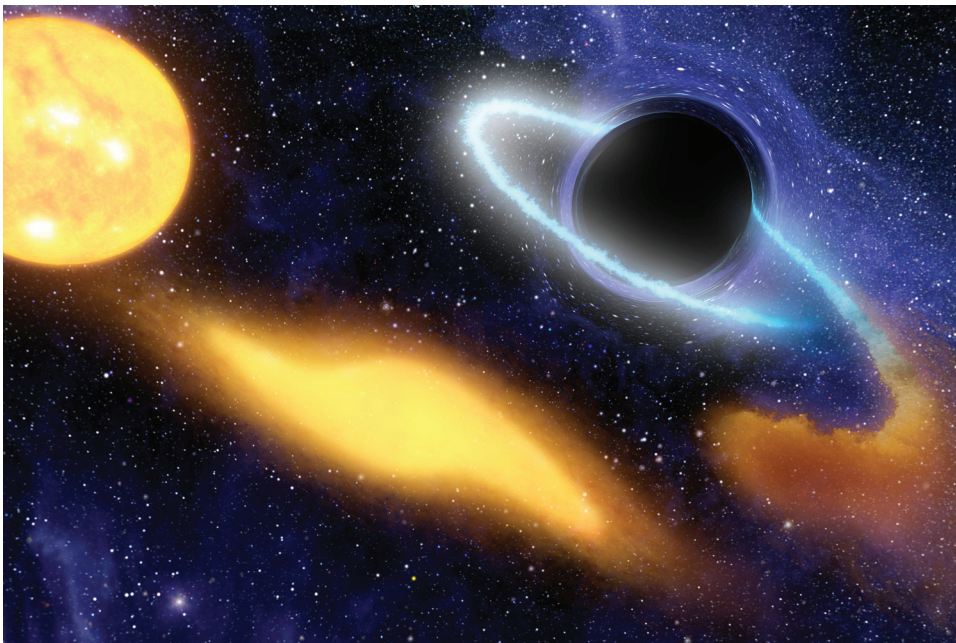
Every day in the Universe, millions of stars fall into millions of black holes. And that’s bad news for the stars. Black holes exert terrible tides, and stars that come too close are literally ripped apart as they fall into the gullet of the monster. A long burp of X-rays and ultraviolet radiation signals the meal for all to see.

Yet astronomers rarely catch a black hole in the act. “It’s like the problem of the bird and the worm,” says astronomer Christopher Martin of Caltech. “You have to be in the right place at the right time, looking in the right direction and paying attention.”

A great place to look is deep in the cores of galaxies. Most galaxies have massive black holes sitting in their pinwheel centers, with dense swarms of stars all around. An occasional meal is

inevitable.

A group of astronomers led by Suvi Gezari of Caltech recently surveyed more than 10,000 galactic cores—and they caught one! In a distant, unnamed elliptical galaxy, a star fell into a central black hole and “burped” a blast of ultraviolet radiation.



*In this artist's concept, a giant black hole is caught devouring a star that ventured too close.*

“We detected the blast using the Galaxy Evolution Explorer (GALEX), an ultraviolet space telescope,” explains Gezari. Her team reported the observation in the December 2006 issue of *The Astrophysical Journal Letters*. “Other telescopes have seen black holes devouring stars before,” she adds, “but this is the first time we have been able to watch the process from beginning to end.”

The meal began about two years ago. After the initial blast, radiation diminished as the black hole slowly consumed the star. GALEX has

monitored the process throughout. Additional data from the Chandra X-ray Observatory, the Canada-France-Hawaii Telescope and the Keck Telescope in Hawaii helped Gezari’s team chronicle the event in multiple wavelengths

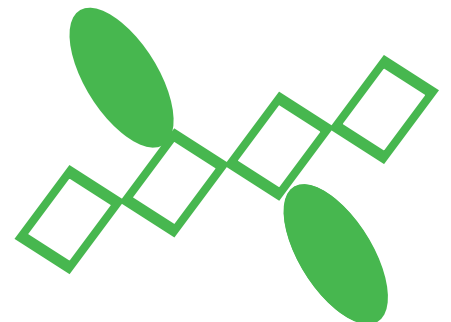
Studying the process in its entirety “helps us understand how black holes feed and grow in their host galaxies,” notes Martin.

One down, millions to go.

“Now that we know we can observe these events with ultraviolet light,” says Gezari, “we’ve got a new tool for finding more.”

For more on this and other findings of GALEX, see <http://www.galex.caltech.edu>. For help explaining black holes to kids, visit The Space Place at [spaceplace.nasa.gov](http://spaceplace.nasa.gov).

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



## A Visit to Goldstone

*Continued from page 1*

The Australian complex is located 40 kilometers (25 miles) southwest of Canberra near the Tidbinbilla Nature Reserve. The Spanish complex is located 60 kilometers (37 miles) west of Madrid at Robledo de Chavela. The Goldstone complex is located on the U.S. Army's Fort Irwin Military Reservation, approximately 72 kilometers (45 miles) northeast of Barstow, CA. Each complex is situated in semi-mountainous, bowl-shaped terrain to shield against radio frequency interference.

Recently, a group of Cassini-Huygens Mission outreach and science planning staff scheduled a visit to Goldstone. It's been on my list of things to do and places to see for a long time, so I signed up immediately.

After a two and a half hour drive from JPL, our tour began at the Goldstone museum where three large areas are dedicated to current missions, past missions, and Deep Space Network history - plus there is a hands-on activity



*Jane standing next to the 70 meter antenna. Photo courtesy of Jane Houston Jones.*

room for children. The guided tour then travels around the 53-square-mile complex to view the large antennas. Outside the administrative buildings

and museum stands DSS-12 Echo, a 34-meter antenna dish named for Project Echo, an experiment that bounced signals off the surface of a balloon-type satellite. Now decommissioned, it is used by the Lewis Center for Educational Research in Apple Valley. GAVRT, the Goldstone Apple Valley Radio Telescope project offers students in classrooms across America the opportunity to participate in radio astronomy through the internet.

The DSN has been the communications link to NASA's robotic spacecraft since 1958. These now legendary missions include five Surveyor landings on the moon in the 1960's; the Mariner journeys to Venus, Mars and Mercury from 1962 to 1973; the Pioneers' travels to Jupiter and Saturn in the 1970's; and the journeys of the twin Viking landers and

*Continued on page 6*

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## SJAA Auction Results

Rob Hawley

Thanks to everyone who donated their time and articles to the auction this year! The auction is always one of the largest sources of income for the club. The stats this year were truly amazing.

60 bidders

70 Different Items

\$8444.99 Total Merchandise Sold

\$2928.00 Donations to the club

The club receives most of its donations from goods that are donated to the club for sale. This year we also allowed bidders to split the proceeds with SJAA instead of making a full donation. So special thanks go to our largest donors Orion Telescopes, Scope City, Chuck Tollas, Tom Lakia, Terry Terman, Randy Pufahl, Darryl Stanford and James Turley.

A final thanks also for those of you that purchased goods. Without buyers there would be no sales. I hope you enjoy what you purchased at the auction. You can see my new Orion donated 100ED at the next Houge Park Star Party.

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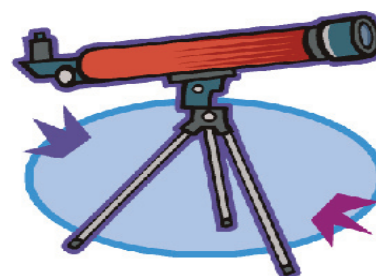
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## Silicon Valley Astronomy Lecture Series

**Dana Backman - May 23, 2007**  
**7 p.m. at Foothill College**

The next speaker in the Silicon Valley Astronomy Lecture Series at Foothill College is Dana Backman of the SETI Institute. His talk will be on May 23rd at 7 p.m. This talk is free and open to the public. Parking on campus is \$2 and the talk is held at the Smithwick Theater.

Dana Backman is head of the Education and Public Outreach program for the SOFIA flying observatory. One of his main interests is the creation of planetary systems. More information on this talk is available by calling the series hot-line at 650-949-7888.



## A Visit To Goldstone

Continued from page 5

orbiters to Mars in the mid-1970's. The DSN link was critical to the 1977-1989 Voyagers as they sent back unforgettable images of the Jupiter, Saturn, Uranus and Neptune systems. Now the DSN supports the Voyager Interstellar Mission. Thanks to DSN, we had 14 years of returned detailed photographs from Galileo, communications with Mars Pathfinder and the robot Sojourner, Spirit and Opportunity, and now Cassini data. The DSN is the vital communications pathway between Earth and our distant spacecraft.

After a museum visit and lunch in the Goldstone cafeteria, we were off to visit several of the antennae, named after their initial targets: 36-meter Echo, now used for GAVRT, Twin 34-meter Gemini antennae, now supporting SOHO, 34-meter Uranus, initially used for Voyager, and now a workhorse supporting many current missions. Then we were off to Venus, a 34-meter beam waveguide antenna first used for successful radar detection of the planet Venus, and finally to DSS-14 Mars, the 70-meter antenna first used in the 1960's to track Mariner missions to Mars. It was enlarged in the 1970's to support the Voyager 2 mission to Uranus and Neptune.

On the drive from Venus to Mars we passed the Apollo site. The 26-meter Apollo antenna supported the Apollo astronaut missions to the moon. This site also houses three 34-meter beam waveguide antennas, which can be used individually or arrayed with another 34-meter antenna to obtain higher performance.

Goldstone began operating in 1958 to track the Pioneer probes that returned data about radiation around the moon. Goldstone continues to play a vital role in communication with distant spacecraft nearly 50 years later, supporting missions in the 21st century. Worth a detour? Absolutely!

Links:

Jane and Mojo's Canberra DSN image collection <http://www.whiteoaks.com/Australia2000/pg32.html>

Jane's Goldstone DSN images <http://www.whiteoaks.com/jane/2007Goldstone/>

Goldstone Tours (public tours) <http://deepspace.jpl.nasa.gov/dsn/features/goldstonetours.html>

DSN website <http://deepspace.jpl.nasa.gov/dsn/>

GAVRT: <http://www.lewiscenter.org/gavrt/>



## The Last 33 Days In Astronomy

The news seen between Mar. 11 and Apr. 13, 2007.

MAR-13-2007 **New Outgassing Moon** One of the surprises from Cassini has been the geysers seen on Enceladus. Now it appears that a second Saturnian moon is outgassing in a similar fashion. The moon is Dione and the amount of material released is only 1/500th of the amount from Enceladus. [http://skytonight.com/news/Saturns\\_Other\\_Gassy\\_Moon.html](http://skytonight.com/news/Saturns_Other_Gassy_Moon.html)

MAR-22-2007 **New Director for the ASP** The Astronomical Society of the Pacific has a new executive director. James Manning replaces Michael Bennett who was the E.D. for 6 years. Manning is the current head of public outreach at the Space Telescope Science Institute (think Hubble) in Baltimore. Before that he was a planetarium director at the Museum of the Rockies in Bozeman, Montana. He begins his new duties in July. <http://www.astrosociety.org/news/manning.html>

APR-07-07 **Fifth Space Tourist Launched** Charles Simonyi, an early Microsoft employee famous to computer programmers as the creator of Hungarian notation, was sent into space along with two members of the ISS Expedition 15 crew. Simonyi has his own web blog at <http://www.charlesinspace.com/>. One launch article is at [http://www.space.com/missionlaunches/070407\\_exp15\\_postlaunch.html](http://www.space.com/missionlaunches/070407_exp15_postlaunch.html)

APR-10-2007 **STS-117 NET 6/8/2007** Technicians and engineers continue to repair the hail-damaged STS-117 external fuel tank, ET-124. Space Shuttle Program managers have targeted a launch date that is no earlier than June 8 using the repaired tank. If Atlantis launches near that date then Endeavour could launch as early August 8 with other flights in October and December. <http://www.spaceflightnow.com/shuttle/sts117/070410june/>

APR-12-2007 **Rare Blackhole Eclipse Sparks Interest** A blackhole at the center of NGC 1365 has recently been studied by the X-Ray telescope Chandra. A cloud of interstellar material was partially blocking the view which allowed for some unique measurements of this Active Galactic Nucleus. The accretion disk appears to have a diameter of just 7AU which is 10 times the expected size of the blackhole's event horizon. The material that is currently in the accretion disk will probably slip inside the event horizon within 100 years. [http://www.space.com/scienceastronomy/070412\\_blackhole\\_eclipse.html](http://www.space.com/scienceastronomy/070412_blackhole_eclipse.html)

APR-13-2007 **MGS Failure caused by Software** A preliminary report by an internal review board said the MGS spacecraft problem was linked to a computer error made 5 months before the Mars Global Surveyor had a battery failure. The error caused the spacecraft to expose one of two batteries to direct sunlight causing it to overheat and to eventually deplete the other battery. <http://mars.jpl.nasa.gov/mgs/newsroom/20070413a.html>

## Officers and Board of Directors

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**Dir** Mike Koop (408) 446-0310  
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### Ephemeris Staff

**Editors** Paul & Mary Kohlmiller  
 (408) 848-9701

**Circulation**  
 (Volunteers needed.)

**Printing** Accuprint (408) 287-7200

### School Star Party Chairman

Jim Van Nuland (408) 371-1307

### Telescope Loaner Program

Mike Koop (408) 446-0310

### Web Page

Paul Kohlmiller pkohlmil@best.com

### SJAA Email Addresses

Board of Directors board@sjaa.net  
 Membership ?'s membership@sjaa.net  
 Chat List chat@sjaa.net  
 Ephemeris ephemeris@sjaa.net  
 Circulation circulation@sjaa.net  
 Telescope Loaners loaner@sjaa.net  
 Members Email Lists:

<http://www.sjaa.net/mailman/listinfo>

### Publication Statement

SJAA *Ephemeris*, newsletter of the San Jose Astronomical Association, is published monthly.

San Jose Astronomical Association,  
 P.O. Box 28243  
 San Jose, CA 95159-8243

### Submit

Submit articles for publication in the SJAA *Ephemeris*. Send articles to the editors via e-mail to [ephemeris@sjaa.net](mailto:ephemeris@sjaa.net). **Deadline, 10th of previous month.**

## SJAA loaner scope status

All scopes are available to any SJAA member; contact Mike Koop by email ([koopm@best.com](mailto:koopm@best.com)) or by phone at work (408) 473-6315 or home (408) 446-0310 (Please leave message, phone screened).

### Available scopes

These are scopes that are available for immediate loan, stored at other SJAA members homes. If you are interested in borrowing one of these scopes, please contact Mike Koop for a scope pick up at any of the listed SJAA events.

# Scope	Description	Stored by
1	4.5" Tasco Newt/ EQ Mount	Annette Reyes
3	4" f/15 Quantum S/C	Hsin I. Huang
6	8" f/10 Celestron S/C	Karthik Ramamurthy
7	12.5" f/7 Dobson	Craig Scull
8	14" f/5 Truss Dobson	Charles Santori
11	f/8 Orion XT6 Dob	West Valley College
13	f/8 Orion XT6 Dob	Rajiv Vora
14	8" f/8.5 Dob	Bill Kerns
15	8" f/9 Dobson	Mike Koop
19	6" f/8 Meade Newt/P Mount	Daryn Baker
23	6" f/8 Edmund Newt/EQ Mount	Wei Cheng
24	60mm f/15 Meade Refractor	Al Kestler
26	11" f/4 Dobson	Vivek Kumar
27	13" f/4.5 Dobson	Steve Houlihan
28	13" f/4.5 Dobson	Craig Scull
32	5.5" f/7.6 Dobson	Sandy Mohan
33	10" Deep Space Explorer	Art Kalb
34	8" f/10 Dynamax S/C	Yuan-Tung Chin
38	4.5" f/8.5 Meade Digital Newt	Tej Kohli
39	17" f/4.5 Truss Dobson	Steve Nelson
40	Super C8+	Srinath Krishnan
41	18" Sky Designs Dob	Kevin Roberts
42	11x80 Binoculars	Ritesh Vishwakarma
44	4.5" f/8 Orion Skyview	Mantle Yu

### Scope loans

These are scopes that have been recently loaned out. If you are interested in borrowing one of these scopes, you will be placed on the waiting list until the scope becomes available after the due date.

# Scope	Description	Borrower	Due Date
12	8" f/6 Orion XT Dob	John Schulein	3/7/07
35	8" f/6 Meade Newt/EQ Mount	Lee Barford	4/25/07
36	Celestron 8" f/6 Skyhopper	Steve Quigley	4/12/07
43	4.5" f/8 Orion XT Dob	John Walker	4/6/07

### Extended scope loans

These are scopes that have had their loan period extended. If you are interested in borrowing one of these scopes, we will contact the current borrower and try to work out a reasonable transfer time for both parties.

# Scope	Description	Borrower	Due Date
2	6" f/9 Dob	John Paul De Silva	?
9	C-11 f/10 Compustar	Bill Maney	Indefinite
10	Star Spectroscope	Greg Bradburn	3/15/07
16	60mm H-Alpha Solar Scope	Mike Koop	Repair
21	10" Dobson	Michael Dajewski	Repair
29	8" Celestron S/C Astrophoto	Rodney Moorehead	2/18/07
37	4" Celestron Fluorite Refractor	David Smith	5/4/07

San Jose Astronomical Association  
P.O. Box 28243  
San Jose, CA 95159-8243

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## San Jose Astronomical Association Membership Form

P.O. Box 28243 San Jose, CA 95159-8243

**New**     **Renewal** (Name only if no corrections)

**I'll get the Ephemeris newsletter online**

<http://ephemeris.sjaa.net> Questions?

Send e-mail to [membership@sjaa.net](mailto:membership@sjaa.net)

### Membership Type:

- Regular — \$20
- Regular with Sky & Telescope — \$53
- Junior (under 18) — \$10
- Junior with Sky & Telescope — \$43

Bring this form to any SJAA Meeting  
or send to the club address (above).

Please make checks payable to "SJAA".

Subscribing to Sky & Telescope magazine through the SJAA  
saves you \$10 off the regular rate. (S&T will not accept multi-year  
subscriptions through the club program. Allow 2 months lead time.)

You can join or renew online:

<http://www.sjaa.net/SJAAmembership.html>

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