



# THE

# Jan 2006

# EPHEMERIS

THE OFFICIAL NEWSLETTER OF THE PRESCOTT ASTRONOMY CLUB

## A New View of the Andromeda Galaxy

By Dr. Tony Phillips and Patrick L. Barry

This is a good time of year to see the Andromeda galaxy. When the sun sets and the sky fades to black, Andromeda materializes high in the eastern sky. You can find it with your unaided eye. At first glance, it looks like a very dim, fuzzy comet, wider than the full moon. Upon closer inspection through a backyard telescope—wow! It's a beautiful spiral galaxy.

At a distance of "only" 2 million light-years, Andromeda is the nearest big galaxy to the Milky Way, and astronomers know it better than any other. The swirling shape of Andromeda is utterly familiar.

Not anymore. A space telescope named GALEX has captured a new and different view of Andromeda. According to GALEX, Andromeda is not a spiral but a ring.

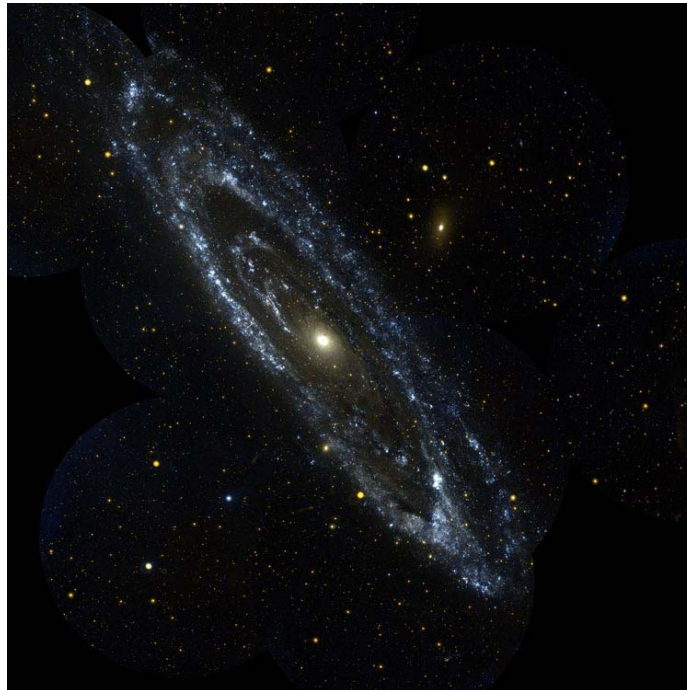
GALEX is the "Galaxy Evolution Explorer," an ultraviolet telescope launched by NASA in 2003. Its

mission is to learn how galaxies are born and how they change with age. GALEX's ability to see ultraviolet (UV) light is crucial; UV radiation comes from new-

born stars, so UV images of galaxies reveal star birth—the central process of galaxy evolution.

GALEX's sensitivity to UV is why Andromeda looks different. To the human eye (or to an ordinary visible-light telescope), Andromeda remains its usual self: a vast whirlpool of stars, all ages and all sizes. To GALEX, Andromeda is defined by its youngest, hottest stars. They are concentrated in the galaxy's core and scattered around a vast ring some 150,000 light years in diameter. It's utterly unfamiliar.

"Looking at familiar galaxies with a new wavelength, UV, allows us to get a better understanding of the processes affecting their evolution," says Samuel Boissier, a member of the



*The GALEX telescope took this UV image of the Andromeda galaxy (M31), revealing a surprising shape not apparent in visible light.*

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## 2006 Schedule

Jan 14	Meeting, St. Luke's Episcopal Church
Jan 18	META SIG Dinner
Jan 21	Starry Nights @ Watson Lake
Jan 28	Viewing @ Giermann's
Feb 4	Highland Nature Center
Feb 11	Meeting, St. Luke's Episcopal Church
Feb 21	Starry Nights @ Watson Lake
Feb 28	Viewing @ Giermann's

In 2006 the Club General Meetings will be on the 2nd Saturday of each month at St. Luke's Episcopal Church and the monthly Star Parties will be on the 4th Saturday. The META SIG will meet on the Wednesday after the General Meeting.

## Club Website

The Prescott Astronomy Club [www.pacorg.net](http://www.pacorg.net)

If you have pictures for the website, please send those to Gary Frey [gfreypo@cableone.net](mailto:gfreypo@cableone.net)

If you need pictures digitized, call **Gene Giermann 445-6772**

## Monthly Star Party

Our Monthly Star Parties will be held at Gene and Carol Giermann's on the 4th Saturday of each month. Come before it gets dark so we can set up our scopes and eliminate your headlights from ruining our night vision. Please bring red flashlights to use during the viewing.



### Directions:

**Go west on Center Street in Chino Valley (the first stoplight coming to Chino from Prescott). Go approximately 4 miles, past the second cattle guard and make the first right after the second cattle guard. There should be signs pointing you the way from there. If not, go right, up a little hill and make the first left. We are the second house on the left.**  
**From Williamson Valley: Go east on Nancy to T intersection with Brenda. Go right on Brenda to bottom of hill and follow the road left. You are now on West Brenda Trail. Go through the wash, over the hill, make the left, go a little distance and the road makes a right. Follow the road. Go down the hill, through 2 washes and up a little hill. We are the third house on the right after the 2nd wash.**

**From either direction, look for the little telescope and the PAC signs.**

**3475 West Brenda Trail  
445-6772**

GALEX team at the Observatories of the Carnegie Institution of Washington.

Beyond Andromeda lies a whole universe of galaxies—spirals, ellipticals and irregulars, giants and dwarfs, each with its own surprising patterns of star formation. To discover those patterns, GALEX has imaged hundreds of nearby galaxies. Only a few, such as Andromeda, have been analyzed in complete detail. “We still have a lot of work to do,” says Boissier, enthusiastically.

GALEX has photographed an even greater number of distant galaxies—“some as far away as 10 billion light-years,” Boissier adds—to measure how the rate of new star formation has changed over the universe’s long history. Contained in those terabytes of data is our universe’s “life story.” Unraveling it will keep scientists busy for years to come.



## If it's clear...

*by Fulton Wright, Jr., January 2006*

Shamelessly stolen information from Sky & Telescope magazine, Astronomy magazine, and anywhere else I can find info. When gauging distances, remember that the Moon is 1/2 a degree or 30 arc minutes in diameter. All times are Mountain Standard Time unless otherwise noted.

Mars is moving away, going from 12" to 9" in angular size this month. At least it is well placed for observation in the early evening.

On Sunday, January 1, about 6:00 PM, you can see the Moon and Venus, with about the same slim crescent phase, low in the southwest. If you have REALLY sharp eyes, you might be able to make out the shape of Venus with your unaided eyes, but binoculars or a small (3") telescope will make life easier. During the next 2 weeks Venus will sink lower and become a thinner crescent each night. Happy New Year.

On Monday, January 2, around 3:00 AM (ugh) you can watch 3 of Jupiter's satellites disappear. At 2:58 Io goes into Jupiter's shadow. At 3:17 Europa goes in front of Jupiter. At 3:32 Callisto goes in front of Jupiter. While all this is happening, Ganymede is sailing by, south of the planet.

On Tuesday, January 3, before morning twilight (about 6:15 AM) you might see some Quadrantid

meteors. The radiant lies about half way between Polaris and Arcturus. With luck you will see one a minute.

On Monday, January 9, from 4:00 AM (ugh) to 4:55 AM, you can observe a couple of shadows (from Europa and Callisto) on Jupiter. At 4:51 AM you can also see Io eclipsed by Jupiter's shadow.

On Monday, January 9, at 7:05 PM, you can see the Moon occult a 4th magnitude star. With binoculars or a small (3") telescope look for one of the Pleiades near the north limb of the Moon. The disappearance occurs on the dark limb, very near the terminator. The star's reappearance at 7:45 PM will be harder to observe because it happens on the bright limb.

On Saturday, January 14, at 6:02 PM (20 minutes after sunset), the full Moon rises, so forget the faint fuzzes for tonight.

On Sunday, January 29, the Moon is new so you have all night to search for faint fuzzes.

On Tuesday, January 31, Saturn is about 1/2 degree from the Beehive cluster. It has been sneaking up on the cluster all month. Look for them low in the east-northeast after sunset. Binoculars will help you see the cluster.

## New Officers

At our Christmas Party Meeting, we elected a slate of officers for the Prescott Astronomy Club. Leon Corcoran is President, Russell Schnitzer is Vice President, Gene Giermann is Secretary, John Paulsen is the Treasurer. Gary Frey and Paul Labranche are the Directors at Large whose terms expire in 2008. Dick Lewis and Bill MacDonald are Directors at Large whose terms expire in 2007.

We are looking to serve you and would appreciate any suggestions on improving the club that you may have. Please feel free to pass your ideas along.

## 2006 Club Schedule

We will be having our regular PAC meetings at St. Luke's Episcopal Church on the 2nd Saturday of each month. META SIG will have their meal meeting on the following Wednesday. Monthly Star Parties will be held at Carol and Gene Giermann's on the 4th Saturday of each month.

We will continue with the Starry Nights at Watson Lake Program on the 3rd Saturday and the Highland Nature center outing on the 1st Saturday, missing the one on Jan 7. Hope to see many of you at these outings.

# The Big Bangs for Astronomers in 2005

By Robert Roy Britt

Senior Space Writer posted: 20 December 2005

PHOENIX, Ariz. — *The past year in space science and astronomy was dominated by debate and some tantalizing near-findings.*

*A hangover of heady Mars discoveries festered while astronomers on the ground obtained evermore intimate glimpses of the outer solar system and the solar neighborhood but stopped short of declaring agreement on what they'd found. To punctuate that ambiguity with some stark clarity elsewhere, NASA smacked a comet and found it to be all fluff.*

Among the highlights:

## **The 10th Planet?**

You might think the discovery of an object larger than Pluto orbiting the Sun would automatically be hailed as the long-sought 10th planet. Caltech's Mike Brown and his colleagues figured as much. Not so fast, many astronomers said. This new world is one of perhaps thousands out there that await discovery. Will we call them all planets? Should Pluto even be considered a planet? In a weird twist to the debate, Brown suggests we all ignore the scientific debate and let culture decide. One has to wonder if that's the sort of ambiguity science ought to promote.

## **Signs of Life on Mars?**

This story extends back to last year and looks like the sort of mystery that'll keep scientists scratching their heads for years to come. The air of Mars seems to contain pockets of methane in doses that should not exist. Perhaps it's the belchings of subsurface microbes, European astronomers said early this year. They support that view with new evidence for blocks of underground ice in the same region as the methane, based on observations by ESA's Mars Express. The ice could be supplying the precious liquid water needed to support the biology, they figure. Other astronomers think the reasoning is very speculative, however.

## **Super-Earth Discovered**

Astronomers expect to eventually find many Earth-sized planets around other stars. But technology can't spot such small objects yet. Pushing the limits of existing methods, Paul Butler of the Carnegie Institution of Washington and colleagues detected a world just 7.5 times the mass of Earth orbiting another star and said it must be rocky. This year marked the 10th anniversary of the discovery of the first extrasolar

planet around a normal star, and astronomers have gathered enough data on about 150 planets since then to say, in the words of planet-hunting guru Geoff Marcy of the University of California, Berkeley, "I imagine most stars have terrestrial planets. It seems hard not to form them."

## **Birth of a Black Hole**

An explosion 2.2 billion years ago, whose light just arrived at Earth this year, was detected and then monitored by an unprecedented array of telescopes on the ground and in space. The event prompted a furious exchange of e-mails. Within moments, the scientists, led by Neil Gehrels of NASA's Goddard Space Flight Center, suspected they had seen the birth of a black hole as it happened (well, except for that previously mentioned time lag of 2.2 billion years). The event was triggered by the merger of two neutron stars, the thinking goes.

## **First Photo of an Extrasolar Planet?**

A series of announcements about the possible first picture of a planet around another star ended up in a debate that has yet to be resolved. In 2004 a team based at the European Southern Observatory (ESO) said they had made what they said was likely the first picture of an extrasolar planet. The object, 2M1207b, appeared bound to a young but failed star known as a brown dwarf sitting about 200 light-years from Earth. But it was also possible that 2M1207b was instead a distant background object.

This past April, Ralph Neuhaeuser of the Astrophysical Institute & University Observatory said his team had made the first confirmed picture of a planet around another star called GQ Lupi, some 400 light-years away. Both pictures are real, but astronomers can't agree on the masses of the objects in the images or, for that matter, how to state the difference between large planets and small stars. We'll have to wait for history to tell us if this was a big story or not.

## **Protecting Ourselves**

Some day, scientists have been telling us for some years now, we'll have to deal with an incoming asteroid or comet that would destroy civilization at worst or wipe out a city at least. Big impacts have occurred before, and there will be more. But we don't know enough about space rocks and their composition to plan properly for deflecting or destroying such a menace. Turnabout proved to be fair play when NASA's Deep Impact mission slammed a probe into Comet Tempel 1 on the 4th of July.

The upshot? This comet was fluffy, unlike others that have been studied up close. Meanwhile, a group of scientists and astronauts, led by Russell Schweickart, a former Apollo astronaut, prodded NASA to visit asteroid Apophis, which has a slight chance of hitting us a few decades hence. NASA's response: A purely scientific mission might be considered, but we have plenty of time to mount a diversion if further observations show this thing would really hit.

## Christmas Parade.

Okay everyone! Group hugs spanning last year's Float Crew to this year's Float Crew. What a cosmic blast! Here's the list. Forgive us if someone has been left out. This could only happen because the whole group stepped up to the plate and got it done... just before parade time! A second great experiment riding the Parade Route with NASTOW Towing: 778-HELP! Their truck is the neatest one to ride & their driver was perfect! Thanks, too, for letting a certain someone be "Miss Head Hollerer"-it was wonderful fun.

2004/2005 Excellent Curbside Cuisine: Dorothy Corcoran/Joseph Davidson/Hans Linders ("Father Elf")

2004/2005 Borrowed Elves: Celeste & Lucas Linders with wonderful handmade-by-Grandma Linders Elf Outfits.

2004/2005 Float Makers:

~Jack Locke-all the Cassini models, sign painting, Saturn painting + more! 2004 Float rider & '05 photographer. "Mr. Space Toys"-see them all on Book Nook's ceiling! @ 324 West Gurley Street, downtown Prescott.

~Leon Corcoran: All signage, changed out at Library through summer 2005 for every month's talk, painting duties, electrical expertise, photography, set-up, teardown, set-up, teardown...lights + more! All

around "Go-To Guy!"

~Irene McDonald-all the tree saturns, astronaut & alien elf hats/scarves + more! Meetings in McDonalds' Dining Room! "Ms. Let's Get This Done!" Rode 2005 float with gigantic Russian binoculars! Wonderful lemon sorbet.

~Carol Giermann-two lovely paintings for sign boards: Highlands Center & Watson Lake Dells + Alien & Astronaut painting, reconfigured as "Alien Elf & Astronaut", "Ms. Yes! We Can!" +

~Luanna Mangold- 2004/05 "Woman Power!+", construction & tear-down, rode the float both years with Telescope and provided the life-saving hand

warmers! Just back from round trip hike & campover in Grand Canyon!

~Bill

McDonald-"Mr. Hiss" (functioning well enough just after two tooth surgeries!!) Alien Light Man, rode the float with great aplomb! + Highlands Center Program Coordinator. "Elf Sitter"-but not ON the elves...

~Gene

Giermann-Garage Foreman + "Great Food Man" (Carol claims it's Gene's party...) + free use of Giermann's garage for all the '05 preparations & Float Parts Storage Center.

~Paul LaBranche-both years on setting up & tear down + Float Rider with Telescope. "Dark-Skies-Cake Man"

~Rich Leon-"Mr. Yes! I'll Be There!" Stays till everything is done, thank you so much! Float Rider with Scope, set-up & tear down for 2005. He's bringing Club Tees & Hats to Christmas Party on the Tenth if anyone needs presents!

~Marilyn Unruh- "Ms. Sign-Up Sheet!" Yes, it does work! And her Rule #1: Buddy System On the Way Out at Night. All Jack Locke's Space Toys and Planets grace her Book Nook ceiling.



# Galactic Collisions Fast and Frequent

By Bjorn Carey  
SPACE.com Staff Writer

There's room in the universe for thousands of galaxies but that doesn't stop them from running into each other. New observations support the idea that galaxies are in constant interaction with each other and that the biggest ones get bigger by engulfing smaller ones.

These observations confirm a long-standing theory about how the universe works in general and sheds light on how things got started in the first place.

"This is the way that everything in the universe was formed," said Pieter van Dokkum of Yale University. "It's a never-ending story of things colliding—small things colliding to make big things, big things colliding to make bigger things. These are the events that shape today's galaxies."

The theory goes like this: The universe was a fairly smooth place following the Big Bang, but there were little bits of substructure material that attracted matter and began to grow. As time passed, these clumps grew bigger and bigger. Through gravitational forces, the bigger ones began attracting some of the smaller clumps, collided, and merged with them, forming what we know as galaxies today.

Although this logic seemed reasonable to many scientists, they didn't have much evidence that these large bodies actually interacted with each other. Confusing the matter, the most massive galaxies also appear to be the oldest, which would have left very little time since the Big Bang for them to form via mergers.

Now, van Dokkum's multiple deep-field observations—taken with the National Science Foundation's 4-meter telescopes at Kitt Peak National Observatory and Cerro Tololo Inter-American Observatory—display the telltale signs of inter-galactic interactions.

Van Dokkum selected 126 nearby red galaxies, chosen because of their massive size, and began searching for signs of gravitational influence from outside sources, such as tails, broad fans of trailing stars, or other obvious asymmetries. Although these features are faint, they turned out to be quite common, showing up in 53 percent of the galaxies.

"It shows that these galaxies are not in equilibrium, that something is pulling stars out of these galaxies," van Dokkum told *SPACE.com*. "On this

~Richard Tuckness - "Mr. 2004 Binoculars" + Float set-up & teardown.

~Linda Sebok & Jim Hubert - 2004 Float Riders with Telescope + Great Antique Telescope. Thanks for your crucial work on "2005 Spotlight On the Stars" Education Coordination. The Club will greatly miss your expertise as you move back to Cleveland, Ohio. Good Luck in your life there.

~Karen Richmond - "Ms. Sparkles" with the best glittering outfit on the Float + Telescope. Good luck with your new "Cuppers" Coffee Shop on Cortez (by the Vendome) in its January 2006 Opening! Let's meet there often.

~John & Nyla Paulsen - "Mr. & Mrs. Best Words of Encouragement!" from the first time we met till now.

~Sue & Gary Frey - "Mr. & Mrs. Rocket Car!" + Fantastic Space Suits in 2004 Parade.

~Douggie T-G: "Saturn Man", construction/reconstruction/construction...both years set-up, tear down, walked both years as truck driver spotter + major truck transport of Float Gear. It's been quite the cosmic ride! Hello 2006!!!

Meghan Taylor-Gebler



scale the only thing we know of that can do this is another galaxy, and we can actually see that.”

These observations also show that these merges happen fast—which is probably why they were difficult to spot before now.

“Well, fast is a few hundred million years. That’s fast compared to the age of the universe,” van Dokkum said. While that doesn’t seem very fast, it’s quick enough to account for those old, massive galaxies.

This research, which is detailed in the Dec. issue of *Astrophysical Journal*, also helps solve the long-standing problem for judging a galaxy’s age. Previously, astronomers equated the age of stars with the age of the galaxy, even though sometimes the galaxies appeared much younger than the stars.

“We have found that, though their stars are generally old, the galaxies that result from these mergers are relatively young,” van Dokkum said.

Galaxies smashing into one another sounds like an explosive event. On the contrary, they probably slide together smoothly, generating little fanfare. Galaxies are mostly empty space, and the distance between stars is so huge that the probability of stars colliding is actually very small.

There is still a chance for a violent explosion though, especially if the central black holes of the merging galaxies collide and merge. “This event could be so powerful that it could cause ripples in space time,” said van Dokkum.

One would think that two galaxies mixing together would create a hot-bed for star formation. Cosmic gas is the fuel for star formation, and the idea is that the same tidal forces that pull these stars away from their galaxies will also compress the gas and lead to the formation of new stars

But collisions like these surprisingly spark very little, if any, new star formation. One possible reason is that the galaxy has already used up all its gas forming the stars already there.

“Or, at a previous point the central black hole created so much energy that it pushed the gas out of these galaxies,” van Dokkum said. “That is what’s next on the agenda to figure out.”

It doesn’t appear that the Milky Way has a collision rich history, van Dokkum said, mainly because it has a very large, intact disc that a merge or collision would have disrupted. But that could change soon—the Andromeda galaxy M31 lurks just 2.3 million light years away and is on a crash course for the Milky Way.

“The Milky Way will collide in the future, in about 4 billion years with the galaxy Andromeda and that collision will lead to formation of a much bigger galaxy,” van Dokkum said. “So we have that to look forward to.”

## 2006 "Starry Nights at Watson Lake"

### WINTER/SPRING SCHEDULE:

#### 21 JANUARY 2006:

7 PM: Cosmic ‘Hot Chocolate’ Chat!: Beautiful Winter Sky: Constellations, Planets & Deep Space.

~Speaker: Marilyn Unruh

Hot Chocolate compliments of Starbucks on Montezuma!

7:30-9 PM: What’s Up Tonight: Cruise the skies with Club telescopes & binoculars or bring your own!

#### 18 FEBRUARY 2006:

7 PM: Cosmic ‘Hot Chocolate’ Chat: Nebulae: See Really Cool Luminescent Gas Clouds!

~Speaker: Gene Giermann

Hot Chocolate compliments of Starbucks on Montezuma!

7:30-9 PM: What’s Up Tonight: Cruise the skies with Club telescopes & binoculars or bring your own!

#### 18 MARCH 2006:

7 PM: Cosmic ‘Hot Chocolate’ Chat: Saturn’s Neighborhood: Rings & Satellites, Closeup and Personal!

~Speakers: Ray Fobes & Leon Corcoran

Hot Chocolate compliments of Starbucks on Montezuma!

7:30-9 PM: What’s Up Tonight: Cruise the skies with Club telescopes & binoculars or bring your own!

#### 15 APRIL 2006:

7 PM: Cosmic ‘Hot Chocolate’ Chat: "Edge of Our Universe: Gorgeous Images & Discoveries from our Sun out through Galaxies & Star Clusters"

~Speaker: Gary Frey

Hot Chocolate compliments of Starbucks on Montezuma!

7:30-9 PM: What’s Up Tonight: Cruise the skies with Club telescopes & binoculars or bring your own!

#### 20 MAY 2006:

7-7:30 PM: "Cosmic 'Hot Chocolate' Chat": "Star Hopping the Night Sky" - Easy techniques for finding stars, planets & constellations. Paper Star Charts

explained & provided. Try your talents right away at the Star Party! Hot Chocolate compliments of Starbucks on Montezuma!

### **FALL 2006 SCHEDULE:**

#### **16 SEPTEMBER 2006:**

7 PM: Cosmic 'Hot Chocolate' Chat: Asteroids: A Process of Discovery!

~Speaker: Paul Comba

Hot Chocolate compliments of Starbucks on Montezuma!

7:30-9 PM: What's Up Tonight: Cruise the skies with Club telescopes & binoculars or bring your own!

#### **21 OCTOBER 2006:**

7 PM: Cosmic 'Hot Chocolate' Chat: Astronomical Distances: How DO we measure our universe?

~Speaker: Fulton Wright

Hot Chocolate compliments of Starbucks on Montezuma!

7:30-9 PM: What's Up Tonight: Cruise the skies with Club telescopes & binoculars or bring your own!

#### **18 NOVEMBER 2006:**

7 PM: Cosmic 'Hot Chocolate' Chat: Driving On Mars: Navigating a Cold & Roadless Planet!

~Speaker: Leon Corcoran

Hot Chocolate compliments of Starbucks on Montezuma!

7:30-9 PM: What's Up Tonight: Cruise the skies with Club telescopes & binoculars or bring your own!

## **Membership Dues are Due**

Membership fees for the Prescott Astronomy Club are all based on an annual basis running from January 1 to December 31 and are prorated on a quarterly basis for those joining during the year. Well, it's that time of year again and our annual dues are due. Once again, there has not been an increase in the membership so you won't find a better bargain than this, or more bang for your buck, or whatever you want to call it. Annual memberships for one are still only \$20.00 and the family rate is still only \$30.00.

Please fill out the form included with the Ephemeris and simply mail it with your check to: Gene Giermann, HC30 Box 933D, Prescott, AZ 86305. Or, if you prefer, pay at the meeting (cash or check) but please, include the completed form so we can update the membership roster.

## **All-Arizona Messier Marathon**

Greetings all,

It gives me great pleasure to announce that the 2006 All-Arizona Messier Marathon, hosted by the Saguaro Astronomy Club, is scheduled for March 25th-26th 2006. This years event will be held at the same location as in previous years; The Farnsworth Ranch, South of Arizona City, AZ. The site is about midway between Phoenix & Tucson and is about a 2 hour drive from both cities. The timing this year holds the promise of being able to observe all 110 objects in one night. The location offers excellent skies & prospects for good weather, which has made the All-Arizona, the premier Messier Marathon event for those looking to get high totals. In 2001 & 2003 we had 25 & 14 observers, respectively observe all 110 objects.

A formal press release with more detailed information will be out in a few weeks, but in the meantime, if you have any questions, please contact me off list at [saguaroastro\\_at\\_cox\\_dot\\_net](mailto:saguaroastro_at_cox_dot_net).

Also please share this with your members and anyone else who may be interested in attending.

Thanks

Rick Tejera

Editor & President Elect

Saguaro Astronomy Club

Phoenix, Arizona

[SaguaroAstro@c...](mailto:SaguaroAstro@c...)

[www.saguaroastro.org](http://www.saguaroastro.org)





# Meeting Information

PAC meetings are held each month. This year we will have both a meeting and a club observing session. Check the schedule in the newsletter for the meeting or activity location. Meetings are held at St. Luke's Episcopal Church at Hwy 89 & Ruger Road (North toward Chino Valley).

## \*\*\*Magazine\*\*\*

## \*\*\*Subscriptions\*\*\*

A reduced rate magazine subscription for members only, can be obtained through the club.

*Sky & Telescope for \$32.95 per year  
Astronomy for \$34 per year, \$60 for 2 years.*

For subscription renewals, send a check (made out to Prescott Astronomy Club) and the postage paid envelope to the Subscription Chair, Prescott Astronomy Club, Attn:Clyde Bauer, 324 W Gurley St, Prescott AZ 86301. If you have any questions about a current subscription, please bring the address label to Clyde

# PAC Store

## Items for Sale

We have t-shirts, hats and patches available, and now we have sweatshirts. The prices are:

Hats \$12.00

3" Patch \$7.00

10" Patch \$12.00

T-shirts

S, M, L, XL \$10.00

XXL \$12.00

Sweatshirts

S, M, L, XL \$14.00

XXL \$18.00

See Rich Leon at a meeting to purchase.

## Yavapai Skies Discussion Group

<http://groups.yahoo.com/group/yavapaiskies/>  
Join for information about astronomy events in Yavapai County.

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### MEMBERSHIP APPLICATION

RENEWALS PLEASE FILL OUT SO WE CAN UPDATE OUR FILES

NAME \_\_\_\_\_

MAILING ADDRESS \_\_\_\_\_

PHONE \_\_\_\_\_ EMAIL \_\_\_\_\_

MEMBERSHIP TYPE (Circle One)	SINGLE	FAMILY	JUNIOR
ANNUAL	\$20.00	\$30.00	\$10.00
2ND-4TH QUARTER	\$15.00	\$22.50	\$ 7.50
3RD-4TH QUARTER	\$10.00	\$15.00	\$ 5.00
4TH QUARTER	\$ 5.00	\$ 7.50	\$ 2.50

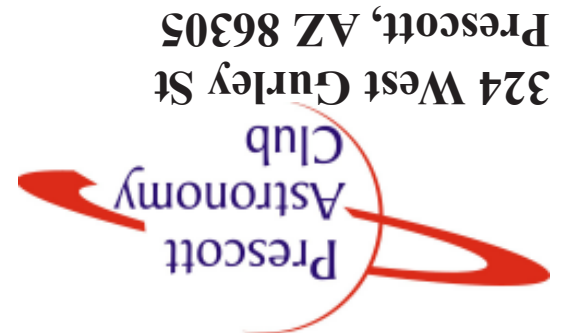
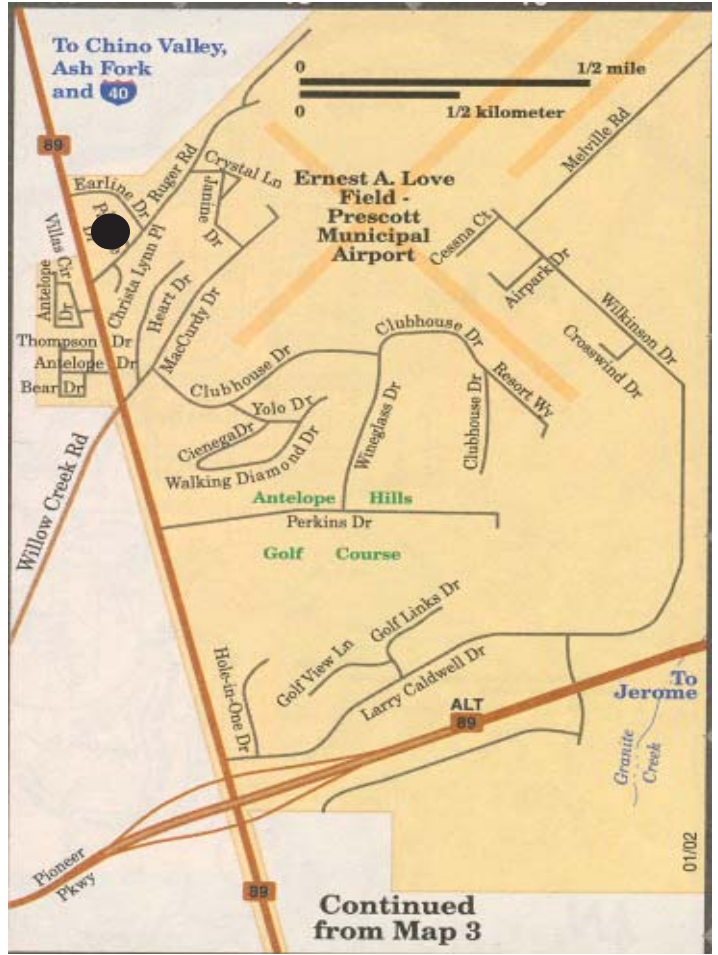
PHONE NUMBER IN NEWSLETTER \_\_\_\_\_ YES \_\_\_\_\_ NO

EMAIL IN NEWSLETTER \_\_\_\_\_ YES \_\_\_\_\_ NO

Please complete the information, make a check payable to PAC for the proper amount and return to Membership, Prescott Astronomy Club, 324 West Gurley St, Prescott, AZ 86301

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**Pac Meeting Site  
St. Luke's Episcopal  
Church,  
2000 Shepherd's Lane  
Corner of Ruger Road  
and HWY 89**



**324 West Gurley St  
Prescott, AZ 86305**