

# S.C.R.A.P.S.

Society's Chronological Astronomical PaperS



## Starfest 2001-A Space Odyssey September 22 & 23, 2001 Bays Mountain Park By Mike Fleenor

Starfest 2001- A Space Odyssey began at the Bays Mountain Park and Planetarium just a few hours before the Autumnal Equinox. While communities in the area were gearing up for football games and fall festivals, astronomy enthusiasts from the region were converging on a grassy knoll for a celebration of astronomic proportions. Mark Marquette from BMAC was the coordinator for this year's event. We opened with a moment of silence remembering those who were killed in the tragedies of September 11 while at the same time pausing to reflect on the tremendous liberties that we enjoy here in the United States. With everything that's going on in the World today its good to know that solace can still be had from simply Lookin Up!



**SMAS members and friends in attendance at Starfest 2001:** (Front row): Becky Feldhege, John Sparks, and Suzanne (from UT) Back Row: Paul Lewis, Charles Ferguson, Robb Feldhege, Roy Morrow, Mike Fleenor, Joe Campbell, and Jack Mc Connell



Mike Benson, the Southeastern Regional Astronomical League chairman presented John aka "Sparky" Sparks with an Arp observing award. If you are unaware of the qualifications for this award, check the AL's link on its website's front page. This program was designed for the CCD enthusiast in mind, but Sparky observed the Arp Galaxies with the naked eye! Way to go Sparky.

In its 22nd year, Starfest attracted participants from all over the Southeast. Mike Fleenor led a workshop, "Amateur Astronomy in The Twenty-First Century", which looked at the charged coupled device and the backyard observatory. He demonstrated the capabilities of CCD's in overcoming light pollution as well as doing science from your backyard. Mike also won best of show for his astrophotography entry, "Deepsky CCD Montage". Robb Feldhege, a "newcomer"

to the hobby, took best of show for his homebuilt laser collimator. Several veteran telescope makers were quite impressed with Robb's ingenious device and Robb sold all of the extras he brought with him! I think we all know where we can buy a collimator now... Hey Robb when's the next production run? Joe Campbell also took an award for his celestial artwork entry. The folks from Knoxville had more award recipients than any other group present!

Besides the workshop Mike led there were other great presentations such as the Amateur Astronomy Telescope that will be in operation aboard the ISS as well as an informative discussion regarding sizing objects through the telescope. Some of our fellow amateur astronomers from Nashville will have a major role to play in the amateur telescope aboard the space station! Gail Rigsbee an accomplished telescope maker was our guest speaker. He led us on a trip back into history tracing the development of the telescope and its influence on cosmology. I think everyone in attendance learned something.

The gastronomy celebration was in full force as we dined on catered food all weekend. The famous IO Pizza party was held in the "planetarium". Everyone got half a pizza all to themselves! While we could've had a blast watching movies and fellowshiping in the "planetarium", we were blessed with clear skies Saturday night and ventured outdoors to soak our retinas with light from distant suns. Several different telescopes were present from high-end refractors to "beast" reflectors serving portions of the night sky for all to enjoy.

Sunday morning we dined again on a catered meal while Paul Lewis presented a program regarding the teacher education programs at Cape Canaveral. Paul took us on a tour of some of the facilities at America's spaceport as well as displayed some interesting pictures while aboard Tenn. National Guard Aircraft. Paul also let everyone touch his "pet" Moon Rock! The weekend was a worthwhile experience and provided a great time of fellowship and learning.

**If you missed Starfest there is always next year!!**

## ASTRONOMY CORNER GRAVITATIONAL WAVES

By Michael Littleton

### *Ripples in SpaceTime-Do They Exist?*

The Theory of General Relativity predicts that gravity is not a central force as in Newtonian mechanics. Rather, it is a bending of spacetime by the presence of mass. A satellite is not held in orbit by a force from the center of the Earth. It is following the straight-line path through the fabric of spacetime warped by the mass of the Earth. A two-dimensional analogy is a marble rolling across the surface of a rubber sheet with a dimple caused by the presence of a heavy ball bearing sitting on the sheet. The marble's path curves as it encounters the dimple. A hypothetical two-dimensional observer confined to the plane of the rubber sheet would conclude the ball bearing had some attractive force on the marble. We, like the 2-D observer, can't see the curvature in 4-D spacetime.

The curvature of spacetime has been confirmed by various experiments. The first confirmation came in 1919 shortly after the publication of the Theory of General Relativity. During a total solar eclipse, a team lead by Authur Eddington, noted that the positions of stars near the Sun were displaced as the starlight was bent by the Sun's gravity. While the measurements supporting this conclusion were later found to be within the probable error of the observations, more sensitive measurements in similar observations supported Eddington's conclusion. Curvature of spacetime also accounted for the precession of Mercury's orbit. The curvature of spacetime near the Sun causes the axes of Mercury's orbit to rotate. Over many years, the path of Mercury's orbits look like the petals of a daisy.

If a stationary mass warps spacetime, the motion of matter produces ripples in spacetime. These gravitational waves travel at the speed of light and pass through matter. The wave strength decreases with distance from the source. A gravitational wave will alternately shrink and stretch distances perpendicular to its direction of travel, but on an incredibly small scale of about a factor of  $10^{-21}$ . For a one-meter stick, this corresponds to  $10^{-21}$  meter, which is very much smaller than the radius of an atomic nucleus. Therefore, gravitational waves are tremendously difficult to detect!

The magnitude of gravitational waves' effect is so small because the fabric of spacetime is so stiff. Pluck a guitar string and it vibrates. This takes only a small input of energy. To get a railroad track to similarly vibrate takes much more energy like the blow from a sledgehammer. If something as massive as a submarine were rotated at about 10 times per second, it would only produce a power in gravitational waves of about  $10^{-24}$  watts. It takes very massive sources that are undergoing violent processes to generate detectable gravitational waves. This description accurately fits merging black holes, merging neutron stars, or stars closely orbiting black holes or neutron stars.

A factor influencing the potential of detection of gravitational waves is the frequency of the events generating gravitational waves detectable from the Earth. If these events only occur once every thousand years, detection would be practically impossible. One recent paper suggested gamma ray bursts (GRB) from the collapse of supermassive stars are likely sources of detectable gravitational waves. GRB's occur more than once per day and detection of gravitational waves becomes more likely.

Gravitational waves have not yet been detected. Do they exist? In 1974 Joe Taylor and Russell Hulse at the Arecibo Radio Telescope in Puerto Rico found the perfect laboratory to study general relativity-a binary pulsar with an extremely stable pulse rate. Using the stable pulse rate and the effects from the Doppler shift, the astronomers found the mass of the components and the orbital shape and speeds. It has a very eccentric orbit with a close approach every 7.75 hours at a maximum speed of about 0.1 of the speed of light. The energy emitted by the system in gravitational waves is great especially during close approaches. Energy in the binary system is conserved in the generation of gravitational waves and therefore the neutron stars must be slowing and spiraling towards each other. After correcting for the other relativistic effects, Taylor and Hulse found the orbital period of the pulsars decreasing by 70 microsecond per year. This discovery demonstrated the existence of gravitational waves and won the team the Nobel Prize in 1993.

In next month's issue, how you might detect gravitational waves.

### **WANTED: AUTHORS FOR SCRAPS-NO EXPERIENCE NECESSARY!**

Have you made a modification to your telescope that you are proud of? Find a piece of sky that is overlooked in *Burnham's Celestial Handbook*? Have you just attended the Cleveland Star Stare? Share your experience with the rest of SMAS and potentially anyone with access to the Internet by writing an article for SCRAPS. It doesn't have to be Shakespeare and the SCRAPS editor will clean up the grammar if needed. Contact Mike Littleton at (865) 671-1022 or email [littlem@ix.netcom.com](mailto:littlem@ix.netcom.com).

## CALENDAR

- **10/02** Full Moon
- **10/10/01** Last Quarter Moon
- **10/12/01** SMAS Meeting at the Discovery Center at 8:00 PM
- **10/15/01** Venus rises at 5:54 AM. Jupiter rises at 11:49 PM. Saturn rises at 9:44 PM. Mars sets at 12:22 AM.
- **10/16/01** New Moon
- **10/18/01** to 10/22/01 Tennessee Star Party
- **10/23/01** First Quarter Moon
- **10/27/01** Mercury and Venus are less than 1° apart for today and 11 more days SMAS Star Party

### Directions to Gary Nolan's Place

- From Knoxville, go South on Chapman Highway into Seymour
- Go to the next light past the Kroger Shopping Plaza on the Right
- At the light, turn right onto US 411, Maryville Hwy. Go approximately 1.2 miles
- Just before Bethel Church on left, turn right on Hinkle Rd.

## Two Great Ideas by John "Sparky" Sparks

This month will be a bit special and promises to be even better than last month. The skies are clearest in October around Knoxville and there ought to be plenty of opportunities to observe. Pegasus and Andromeda will dominate the evening sky as well as Perseus and Cassiopeia. M31, the great Andromeda Galaxy, the brightest visible galaxy in the sky, crosses the zenith. On October 20<sup>th</sup> to 23<sup>rd</sup>, the Orionid meteor shower will fill the nights with quick moments of surprise for those who are alert. Mars, Jupiter, Saturn, Neptune and Uranus await the planetary explorer and this will be a last opportunity to observe Mars for a couple of years.

From the 18<sup>th</sup> to the 22<sup>nd</sup>, the Tennessee Star Party will be held at Fall Creek Falls State Park and I feel it is time SMAS supported it. This Star Party will have far better skies than Bays Mtn. and will feature larger telescopes, more telescopes and astronomers. The Tennessee Star Party is quickly becoming known as one of the great star parties in America and many people will be there. I would like to check this one out myself and I invite all of you to join me. I may not be there the whole time, but I will try to get there, as it is only a three-hour drive from Knoxville. Check out [www.bsasnashville.com](http://www.bsasnashville.com) for details of the Tennessee Star Party. Fall Creek Falls State Park lies directly between Knoxville, Nashville and Chattanooga and should draw many astronomers from all of east and middle Tennessee as well as other far away places.

There will still be a SMAS Starparty, but this one will be somewhat unique. Instead of a Star Party that avoids the moon, this one will be centered on it. This will be the 2001 SMAS Lunar Wars in which we learn from each other's optics how to get the best views of the moon. Now before you roll your eyes, let me ask you this: What ½ degree of sky is more interesting and has more things to see than the moon? I love viewing the mountain peaks past the terminator and counting how many peaks I can see in craters Copernicus or Tycho. Yes, they each have more than one peak to see if you have good optics and some patience. On October 27<sup>th</sup>, it will be 4 days after 3<sup>rd</sup> quarter and the moon will show plenty of shadows. As winner of Telescope Wars, I will forfeit Lunar Wars and we will award a ribbon to someone that we feel has the best views of the Moon on site. The public is invited and so are you. Lunar Wars will be held at our winter observing site, Gary Nolan's house, at 0-Dark: 30. Directions to Gary Nolan's house are next to the Calendar Section. This is one of the closest observing sites from Knoxville SMAS has ever used but the skies are surprisingly good.

Clear skies:  
"Sparky!"

## FROM THE CHAIR BY TOM RIMMELL

Thank you to all who attended last months picnic at Norris Dam. We had a wonderful evening! Many guest from the nearby campground enjoyed views through our telescopes. I would like to especially thank Lee & Janice Erickson, and Mike Littleton. Mike brought his grill and hamburgers. Lee and Janice brought many items that made the picnic possible.

**Presentation for October:** There are several star charts available for the amateur observer. Which one is right for you? Attend the October meeting and find out.

## ANNUAL PICNIC BY LEE ERICKSON

The SMAS Annual Picnic was held on September 8, 2001. The meeting was the annual gastronomy event at Norris Dam State Park. No formal meeting was held. There were about 18 persons in attendance. There were at least four guests of members, Matthew Clark, Myles Williams, Dr. Loong Yong and Park Ranger Mike Scott, plus several campers of the park. The Gastronomers were liberally doused with mosquito repellent, citronella candles were lit, food spread out, the grill lit, and conversation began by about 7:30.

The gastronomy consisted of protoplanetary disks (hamburgers) in dust clouds (buns) with condimentary material interspersed (ketchup, mustard, onion and lettuce). For those with an interest in the theoretical side of gastronomy, small two-dimensional representations in starch of negatively curved space (potato chips) were available for the taking from a DeSkitter Space bag. For Gastronomers favoring a steady-state universe, there were materials to fill the void within but not massive enough to cause a re-collapse (Low calorie vegetable dish with dip.) Gastronomers willing to risk the big crunch could observe first hand (from hand to mouth even) the Dark Matter Bars. There was disagreement on another item, some Gastronomers claiming to have observed M22 Bars and some claiming it could only be Oort Cloud bars. Extensive research on the part of this secretary has learned about the formation of both the Dark Matter and the M22 / Oort Cloud material with details to follow.



Photo by Tom Rimmell

**Supporting the M22 theory, Bob Arr:** Look, there! Just east of the teapot's dome! Something, a smudge! A hint of mystery—perhaps a key to secrets! Wheel around the machine, aim the sight, load the eyepiece, focus, peer...omygod, there it is. It isn't something small at all. It's immense! It has the sweet flavor of enormity, the biting persuasiveness of shadowy, lumpy essences from a tropical paradise, punctuated by bits of stellar brilliance. Its texture is gnarled like a coarse bark, yet its crumbs are incredibly delicious morsels of matter, accented in bands of white delicacy and dark lanes of palpable joy. The eyes are daz-

### BASE:

3/4 cup shortening  
3/4 cup sugar  
1/3 cup packed brown sugar  
1 egg  
1 1/2 teaspoons vanilla extract  
1 1/2 cups all purpose flour  
1 teaspoon salt

3/4 teaspoon baking soda  
1 1/2 cups miniature chocolate chips  
3/4 cup chopped pecans

### Filling:

2 packages cream cheese softened  
3/4 cup sugar  
2 eggs  
1 teaspoon vanilla extract

zled, the tongue ecstatic, the soul enraptured by the wonder of M22 (bars).

**Supporting the Oort Cloud theory, Lee Erickson:** It has white material like snow and dark spots like dust in the snow. A perfect example of the dirty snow ball description of comets. It approaches the Gastronomer slowly from a great distance. The Gastronomer waits with great anticipation, then when it is right in front of the Gastronomer, it seems to break up into handy size pieces and then it surely does not last long and is gone.