Sunset Astronomical Society

The Sunset *Gazette*

Serving the Tri-Cities since 1975

Volume 8, Issue 5 January, 2011

Meeting information

Meetings are generally in the theater in the Delta College Planetarium in Bay City. The meetings will usually be on the 2nd Friday of each month at 7:00 PM. Watch the newsletter for changes in dates and times. Membership is not required to participate in meetings and activities. See last Page for this month's meeting site.

Membership Information

Our club has switched to e-mailing our newsletters. For those wishing to receive a hard copy mailed an additional dues of $10.00 per year is required.

Student / Senior: (17 years & younger, 65+ years)

1 year - $15 (mailed Newsletter add $10)

2 year - $20 (mailed Newsletter add $10)

Regular: (18+ years)

1 year - $20 (mailed Newsletter add $10)

2 year - $30 (mailed Newsletter add $10)

Family:

1 year - $25 (mailed Newsletter add $10)

2 year - $40 (mailed Newsletter inclusive)

Membership includes voting privileges, the newsletter and free admission into Delta College Planetarium shows.

Treasurer's address for renewals and subscriptions:

Tom Smith, 3423 Hidden Road,

Bay City, MI 48706-1243

Subscription Information

Subscription prices for "Sky and Telescope" Magazine or "Astronomy" Magazine are available at club rate with the purchase of individual or family membership. For prices please refer to the treasurer or the club's website:

http://www.sunsetastronomicalsociety.com/SASMembership.htm

The SAS Newsletter

wishes all a

you

Delta Planetarium Bay City

Friday, 14th January

Setting up: 6:00 PM

Start: 6:30 PM

SAS New Year Meal

Enjoy an evening with friendship and fun. Please bring a dish (desert) to pass!

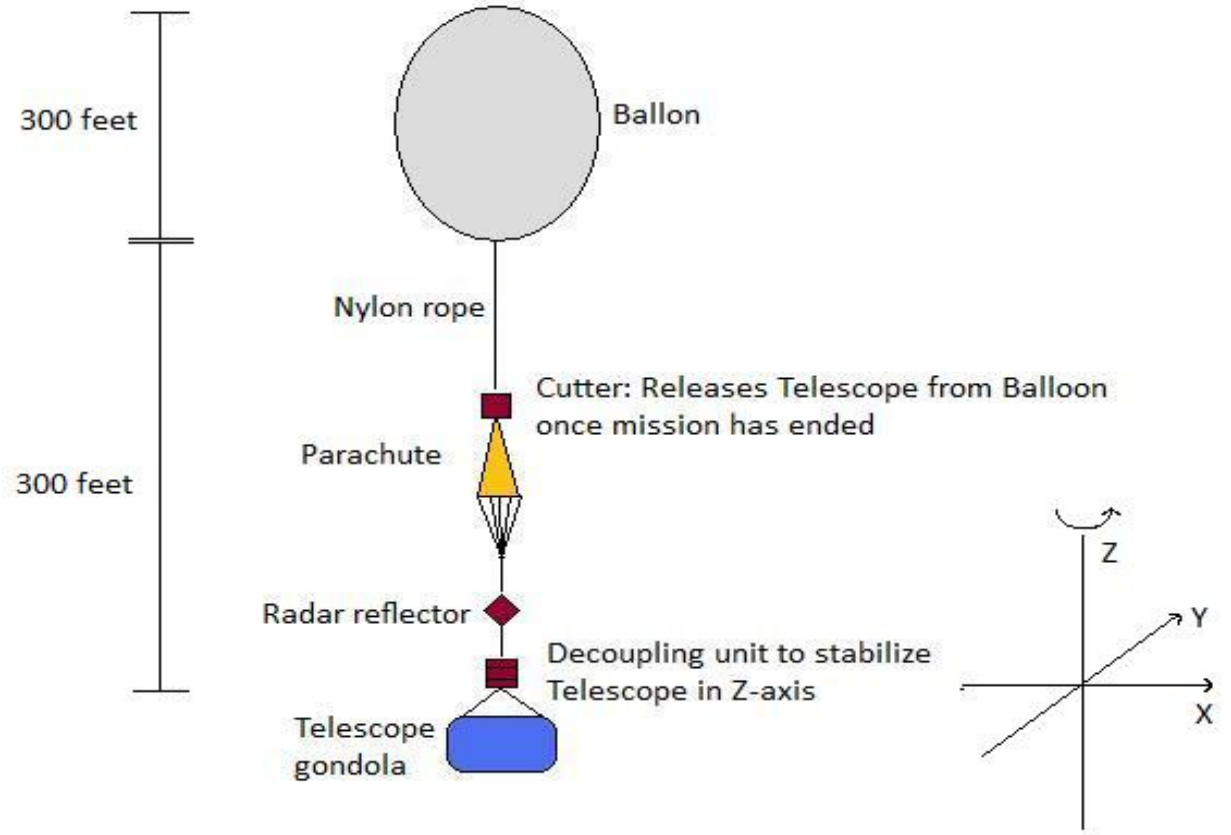
The club will provide turkeys, smoked salmons, drinks, plates and silverware.

A Short History of Balloon Astronomy III

By Martin Grasmann

In the last issue we talked about launching, tracking and recovery of a balloon telescope. But how do you actually make the gondola and the telescope stable enough so that it is capable of doing serious astronomical work? We all know hoe vital it is to have a stable mount and accurate tracking if we want to take pictures through our telescope. The scheme below shows a typical balloon telescope set up: First the balloon, then a long nylon rope which is attached to the cut-off mechanism which detaches the balloon from the rest of the unit when the observation mission is over. Next comes the parachute followed by the radar reflector and the decoupling unit. A balloon telescope can move along three axes. Along the x- or y-axis the balloon moves like a giant pendulum, along the z-axis the balloon performs rotational movements. The pendulum movements are actually pretty stable: the amplitude is around 9 arc minutes and the frequency is determined by the length of rope. Therefore it is pretty easy to calculate and adjust the disturbance in the x- and y-axis. The rotation along the z- or vertical axis can be controlled with a magnetometer which determines the azimuth direction like a compass. The decoupling unit contains a motor who counters these rotations. With that a precision of + - 30 arc minutes is possible. If this is not enough additional gyroscopes can help to further increase the accuracy to which the telescope can be pointed. There can be further enhancements like sun or star sensors which increases the pointing accuracy to about 1 arc second.

The accuracy strongly depends on the kind of observation. For example, IR telescopes for the observation of extend sources or X-

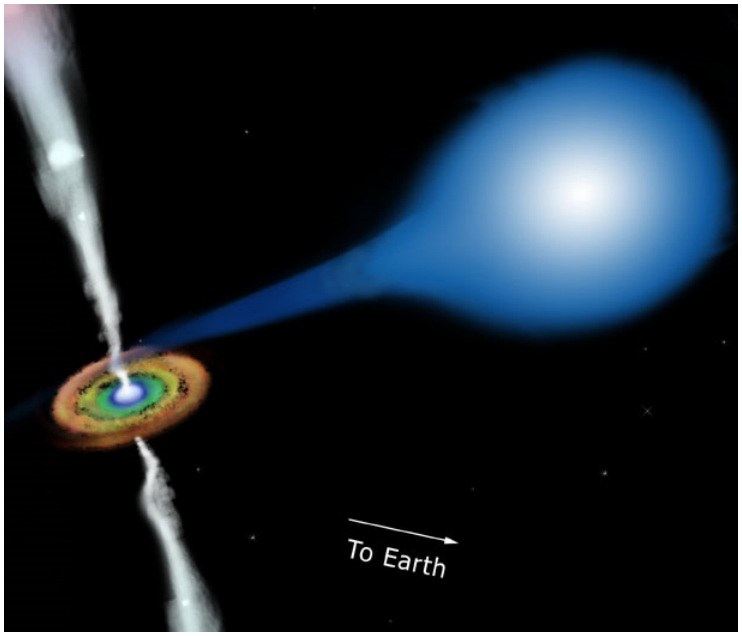


ray telescopes which have only very limited resolution do not need the kind of pinpoint accuracy like optical telescopes. Here an arc minutes accuracy is quite enough.

Especially in the 1970s and early 1980s balloon astronomy produced many new astronomical discoveries but even recently important contributions in the field of cosmology were made.

Amongst the early discoveries and contributions of balloon telescopes are balloon based X-ray telescopes which were used to investigate M1 (crab nebula) in the X-ray band. Back than X-ray telescopes did not have a very good resolution. To improve the resolution the astronomers applied a neat trick using eclipses of the moon which covered the nebula to obtain a much better map of the nebula in X-ray. The result were better models how the central neutron star was transferring its energy to the nebula which was then emitted in X-rays. Another interesting object studied by balloon X-ray telescopes was the X-ray source Hercules 1 which consists of a blue giant orbited by a neutron star. The orbit is so close that matter from the blue giant is transferred to the neutron star. But the matter does not fall directly onto the neutron star surface, instead it is 'stored' for some time in what

The Crab Pulsar. This image combines optical data from Hubble (in red) and X-ray images from Chandra X-ray Observatory (in blue).



Artistic view of accretion disc forming around a neutron star. These discs very often give rise to jets coming from the vicinity of the central object. Jets are an efficient way for the star-disc system to shed angular momentum with-

astronomers call an accretion disc with the neutron star at its center. In this disc the material from the blue giant orbits the neutron star. Gravitational forces compress the material causing the emission of electromagnetic radiation. As matter spirals onto the neutron star the intense gravitational gradient gives rise to intense frictional heating. Guided by the extreme strong magnetic fields of the neutron star the matter slams into the pole caps of the star and generates two superheated 200 million degree hot spots which emit intense X-ray radiation. Similar to the light beam of a light house every time Earth is in the pass of that X-ray beam we receive its radiation as a short pulse caused by the fast rotation of the neutron star. During the balloon experiments the astronomer discovered that the strength of the magnetic field of the neutron star was about 100 million Teslas. For comparison the Earth magnetic field is about 0.000045 Teslas.

Another topic was the investigation of the cosmic radiation. It consists of atom nuclei from nearly all elements of the periodic table and despite the fact that it is generated far away the make up of the radiation pretty much mirrors the distribution of elements in our own solar system. Some of the nuclei are radioactive isotopes, therefore they can act as a kind of cosmic clock. For example the relatively short lived radioactive beryllium-10 is nearly completely missing from the radiation which lead to the conclusion that the cosmic radiation is at least 10 million years old = it traveled for 10 million years. Another finding was the slight discrepancies in the distribution of the lighter elements lithium, beryllium and bor when compared to their frequency in the solar system. This could be explained by the break up of heavy elements when they fly through interstellar gas clouds, which in turn led to the conclusion that this interstellar gas must have a 'thickness' of 7 g per square centimeter.

IR balloon telescopes also provided an insight in the large scale distribution of cooler stars around the galactic center and the galactic disk, something which is not possible in the visible due to the absorption of visible light by large interstellar dust clouds. IR telescopes also showed the large scale distribution of cold dust in the milky way.

The concluding part of "A Short History of Balloon Astronomy IV" will be in the February newsletter.

SUNSET ASTRONOMICAL SOCIETY
THE SUNSET GAZETTE
SERVING THE TRI- CITIES SINCE 1975

Martin Grasmann
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New (Old) Elected Officers for the SAS:

President, Steve VanTol stevenv106@aol.com

1. Vice President, Dale Sisson dalesisson@hotmail.com

2. Vice President, Tim Ross tjrastronomy@hotmail.com

Treasurer, Thomas Smith tom55net@att.net

Secretary, Newsletter Editor, Martin Grasmann
martin.grasmann@sbcglobal.net

This issue can be accessed in color on the website of the SAS!!!
http://sunsetastronomicalsociety.com

SAS New Year Meal

Setting up: 6:00 PM

Start: 6:30 PM

January 14th, 2010

Delta Planetarium

1. **Welcome, new members**
2. **New Year Meal and Potluck**
3. **Club Stuff**

What's up in the Sky

Jan 1: *Dawn:* Waning Crescent Moon far below Venus on New Years morning.

Jan 1-11: *Dawn:* Good chance to see Mercury >10 deg above SE horizon half hour before sunrise.

Jan 2: *Dawn*: Very thin crescent Moon to be seen at lower right of Mercury.

Jan 2 - 5: *Evening*: 5.5 mag Uranus within 0.5 deg of Jupiter to the upper right. Binoculars needed!.

Jan 4: *Predawn*: The Quatrantid meteor shower peaks.

Jan 4: New Moon

Jan 9: *Evening*: Waxing crescent Moon is right/lower right of Jupiter.

Jan 10: *Evening*: Moon is upper right of Jupiter.

Jan 12: 1st quarter Moon

Jan 17: *Night*: Algol at minimum brightness for 2 h centered around 11:43 pm EST

Jan 19: Full Moon.

Jan 20: *Evening*: Algol at minimum brightness for 32 h centered around 8:32 pm EST

Jan 25: *Predawn:* Waning Moon right of Saturn and Spica.

Jan 26: Last quarter Moon

Jan 29, 30: *Dawn*: Waning Moon right of Venus on 29th and left of Venus on 30th.

UPCOMING EVENTS