Snake River Skies

Magic Valley Astronomical Society

Monthly Newsletter

May 2009

Astronomy Day — Saturday May 2, 2009

Astronomy Day is a grass roots movement designed to share the joy of astronomy with the general population - "Bringing Astronomy to the People." On Astronomy Day, thousands of people who have never looked through a telescope will have an opportunity to see first hand what has so many amateur and professional astronomers all excited. Astronomy clubs, science museums, observatories, universities, planetariums, laboratories, libraries, and nature centers host special events and activities to acquaint their population with local astronomical resources and facilities. Many of these events are located at non-astronomical sites; shopping malls, parks, urban centers-truly Bringing Astronomy to the People. It is an astronomical PR event that helps highlight ways the general public can get involved with astronomy - or at least get some of their questions about astronomy answered. Astronomy Week encompasses Astronomy Day starting on the previous Monday and ending on the following Sunday. The theme this year will be "Bringing Astronomy to the People." Please join the Society at the Herrett Center. Main source for Astronomy Day is quoted verbatim (except last sentence) from the Astronomical League website.

Astronomy Day at the Herrett Center Schedule

1:00-3:00	Space and astronomy videos/Frost-Eccles Library
1:00-5:00	Space & astronomy make-n-take activities, puzzles, and coloring pages/Rick Allen Room
	Water bottle rocket construction & launch/Rick Allen Room & East lawn
1:00-6:00	Solar & daytime target viewing/Centennial Observatory (weather permitting)
	Self-guided scale model of the solar system/North College Road fitness trail
2:00	"Blown Away – The Wild World of Weather"/Faulkner Planetarium
4:00	"Mystery of the Missing Seasons w/ Live Sky Tour"/Faulkner Planetarium
4:00-7:00	Space and astronomy videos/Frost-Eccles Library
7:00	"Bad Astronomy – Myths and Misconceptions"/Faulkner Planetarium
8:15	"Pink Floyd: Dark Side of the Moon"/Faulkner Planetarium
8:30-12:00	Star party/Centennial Observatory (weather permitting)

Food Vendor "Hoagie Street Deli" will be serving from 1:00-6:00 on the Kinney Court.

Inside this issue:

Events Calendar:

Astronomy Day will be May 2nd from 1:00-12:00 am for Observing join us at the Herrett Center / Centennial Observatory (fun, fun, fun)

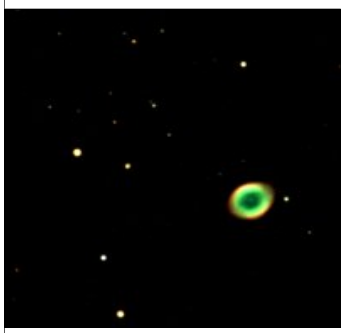
Our May meeting will be held on May 2nd at 7:00 pm in the Rick Allen Room of the Herrett Center. This meeting will allow the public from Astronomy Day to attend.

Mother's Day is May 10th

Solar Observing begins May 27th (Wednesday) from 1:30-3:30 at the Centennial Observatory

Globular Cluster, Omega Centauri (NGC 5139) Image Source Unknown.

Did you know: Twinkle Twinkle Little Star is a poem entitled "The Star" and was written by Jane Taylor and first published in 1806. Later it was combined with the French melody "Ah! vous dirai-je, Maman." It was never written by Mozart, which is a very common misconception



M-57 using the 24" Herrett Telescope and Shotwell Camera

The Lifecycle of a Star

Twinkle, twinkle, little star,
How I wonder what you are!
Up above the world so high,
Like a diamond in the sky!

A star is a ball of gas held together by its own gravity. The force of gravity is continually trying to cause the star to collapse. This is counteracted by the pressure of hot gas and/or radiation in the star's interior. This is called hydrostatic support. During most of the lifetime of a star, the interior heat and radiation is provided by nuclear reactions near the center; this is phase of the star's life is called the main sequence. These balls of gas also give off light

Protostar - Life Begins

Stars are formed in gigantic, cold, globular clouds containing tens of thousands or even millions of solar masses worth of dust that condense into individual stars. First, they form protostars, a clump of gas held together by gravity but always wanting to fly apart from the force of thermonuclear reactions. Protostars are surrounded by gas and dust, which prevent them from being seen. Eventually, the protostar settles down into a T-Tauri, which is the first stage we can see. Nuclear fusion reactions start and the star enters the Main Sequence.

Main Sequence

Stars spend most of their life, approximately 90%, in the Main Sequence. As stars start reaching the end of their lives, they turn into giants or supergiants and begin synthesizing heavy elements. When these heavier fusion reactions start to burn out, the stars either eject a planetary nebula or turn into supernovas, depending on their mass. Stars of about 5 stellar masses or less turn to nebulas, and stars of greater than 5 solar masses turn nova. The final resting stage of stars is also dependent on mass. Stars of less than 1.4 solar masses become white dwarfs, stars of 1.4-8 solar masses become neutron stars, and stars with more than 8 solar masses end their lives as black holes.

The main sequence is the stage where a star spends most of its existence. Relative to other stages in a star's "life" it is extremely long; our Sun took about 20 million years (2×10^7 years) to form but will spend about 10 billion years (1×10^{10} years) as a main sequence star before evolving into a red giant. Main sequence stars vary in mass. You may imagine that a more massive star has more fuel available so can spend more time on the main sequence fusing hydrogen to helium. You would be wrong - the opposite is true. More massive stars have a stronger gravitational force acting inwards so their core gets hotter. The higher temperatures mean that the nuclear reactions occur at a much greater rate in massive stars. They thus use up their fuel much quicker than lower mass stars. This is analogous to the situation with many chemical reactions, the higher the temperature the faster the reaction rate.

Lifespans for main sequence stars have a vast range. Whilst our Sun will spend 10 billion years on the main sequence, a high-mass, ten solar-mass ($10M_{Sun}$) star will only last 20 million years (2.0×10^7 years) on the main sequence. A star with a only half the mass of Sun can spend 80 billion years on the main sequence. This is much longer than the age of the Universe which means that all the low-mass stars that have formed are still on the main sequence - they have not had time to evolve off it.

Red Giants.

The Red Giant produces a large amount of light because its great size. All stars are expected to pass through the Red Giant phase at some point in their lifetime. The Red Giant is usually 10-1500 times the size of our sun Most Red Giants are red but some of them are orange or even yellow, because of the amount of different chemicals and or elements inside it. When the hydrogen atoms in a star fuse together, the amount of hydrogen begins to reduce as the amount of helium increases.

Since the helium atoms are heavier than the hydrogen atoms, they sink to the center of the core. This goes on for a long time, as hydrogen burns in a shell around the helium in the center. The quantity of energy produced by the giant decreases quickly over the time that it works. The outer edges will then expand and loose heat faster and the star appears as a red giant. When the star reaches the size nearly 1.4 times the size of our sun, it is declared a red super giant. As the outer edges continue to expand, the core shrinks and heats up. When the temperature in the core hits 108°K, helium atoms fuse together, forming carbon. Carbon does not compress as much as the helium so the core is now stabilized. Then, at the end of a red giant's life, it explodes into a supernova.

Continued next page

Supernovas

One of the most energetic explosive events known is a supernova. These occur at the end of a star's lifetime, when its nuclear fuel is exhausted and it is no longer supported by the release of nuclear energy. This will cause the star to release a huge amount of energy. This will create a blast wave that ejects the star's envelope into interstellar space. The result of the collapse may be, in some cases, a rapidly rotating neutron star that can be observed many years later as a radio pulsar. While many supernovas have been seen in nearby galaxies, they are relatively rare events in our own galaxy. The last to be seen was Kepler's star in 1604. This remnant has been studied by many X-ray astronomy satellites, including ROSAT by the release of nuclear energy. If the star is extremely massive, then the core will collapse. However there are many remnants of supernova explosions in our galaxy, that are seen as X-ray shell like structures caused by the shock wave propagating out into the interstellar space. One other famous supernova remnant is the Crab Nebula which exploded in 1054. Another dramatic supernova remnant is the Cygnus Loop,

Why Are the Remnants Important to Us?

Supernova remnants greatly impact the ecology of the Milky Way. If it were not for supernova remnants there would be no sun or earth. All the element heavier than boron were made in either a star or a supernova explosion. Through the action of supernova remnants, these elements were able to be on earth. The gas that fills the disk of the Milky Way is called the interstellar medium (ISM).

When the core is lighter than about 5 solar masses, it is believed that the neutrons are successful in halting the collapse of the star creating a neutron star. Neutron stars can sometimes be observed as pulsars or X-ray binaries.

White Dwarf Stars

A white dwarf is the final stage of the evolution of a star that is between .07 and 1.4 solar masses. White dwarfs are supported by electron degeneracy. They are found to the lower left of the main sequence of the Hertzsprung-Russell diagram. White dwarf stars received their name because the first ones to be discovered had a white color. They are characterized by low luminosity, a mass close to that of our sun, with a radius similar to our Earth. These stars are extremely dense because their large mass and small area. Their density is almost 1,000,000 time that of water. White dwarfs also have a low luminosity. This makes it so they have to be within a few hundred parsecs away from earth to be observed (1 parsec = 3 . 26 light years).

When a star stops burning the stars with less than 1.4 solar masses shrink greatly in size. While they shrink they start to become very faint. The value of 1.4 solar masses is referred to as the Chandrasekhar limit. Chandrasekhar reasoned that something must be holding up the White Dwarfs material against gravity. This was known as the electron degeneracy. When stars contract the electrons get close together there resistance keeps increasing and pushing closer together. This process is related to pressure. At great densities, pressure from the degenerate electrons is sufficiently high. It balances the force of gravity and the star stops contracting. So electron degeneracy stops the white dwarf form contracting and compresses the gas of the star. This means that the White Dwarf becomes incredibly dense. A mass the size of the sun is compressed into a volume only the size of the earth.

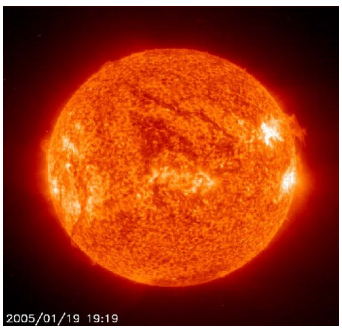
Neutron Stars

Neutron stars are stars that live to the extremes. Neutron stars have very high density, gravity, radiation, and magnetic fields. Matter that starts out normal, on a star, becomes almost all neutrons if a star goes through this stage. Neutron stars posses the most powerful magnetic fields of any object, that scientists' know of, in the universe. In the approximate 10 billion year life time of our galaxy, there have probably been about 100 million to a billion neutron stars that have formed in the Milky Way. Neutron stars are a very important part in a stars life cycle and set many records in extremities.
There are many different properties of a neutron star. One of these properties is heat. The protons in the center of a neutron star are believed by scientists to become superconducting at a whopping 100 million degrees Kelvin, making neutron stars the temperature record holders of the universe. Even deeper, the "neutron dip" layer can be found. In this layer, the energy becomes so great that the neutrons float out of the nuclei and are able to move. freely around, or drip out of the nuclei.

Inside the Eagle Nebula M-16

Credit: NASA Hubble STSci ESA

One other famous supernova remnant is the Crab Nebula which exploded in 1054. Another dramatic supernova remnant is the Cygnus Loop,



Our sun is a main sequence star.

Credit: NASA SOHO Image

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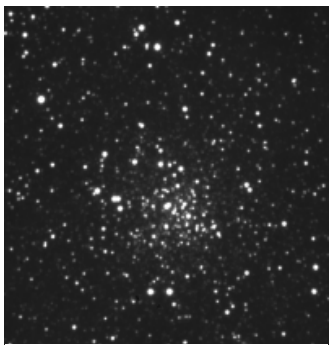
M-42 a Stellar Nursery
Image source unknown.
Possibly David Malin Anglo-Australian Observatory

At relatively low density levels, the nucleons get spread out and become fairly far apart from each other.



M-71 Using the Shotwell Camera
Optics unknown from the Club website under the heading for Astro Photos

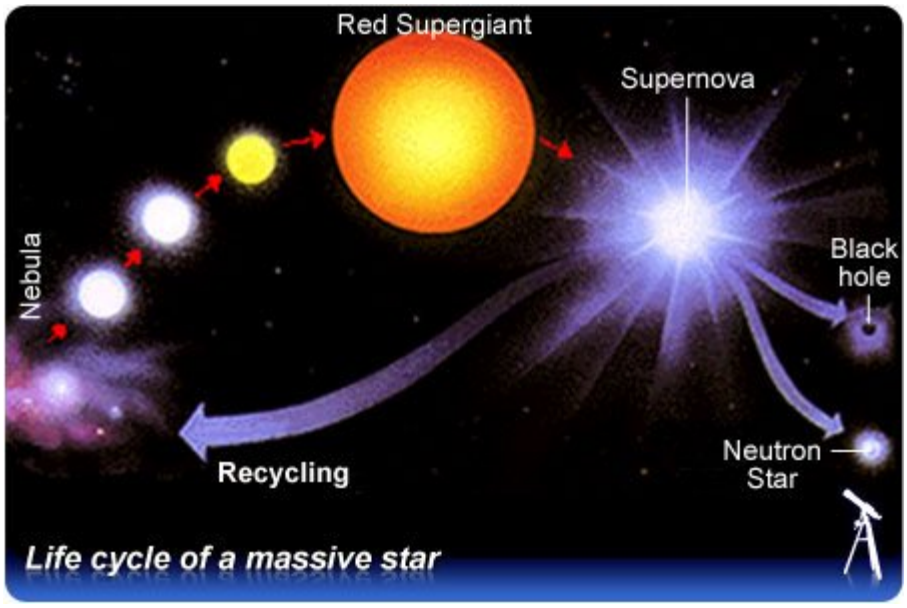
Inside a neutron star

After going deeper into the neutron star, everything starts to get even weirder and weirder. Even deeper yet, as the density and pressure increase, the "pasta-antipasta" sequence starts to take effect. At relatively low density levels, the nucleons get spread out and become fairly far apart from each other. At much higher densities, the nucleons merge together and form spaghetti like strands and at even higher densities, they form sheets. After increasing the density even further than that, the sequence gets reversed and holes form in place of where the nucleons once were.

That is what happens inside the layers of a neutron star.

X-Ray bursts

Neutron stars release a lot of energy including X-Rays. X-Ray bursts occur when the neutron star has a lower mass companion star. These occurrences usually only last a few seconds or minutes but their peak luminosity is about a hundred thousand times that of the Sun's. Hydrogen and helium are transferred from the companion star to the neutron star which builds up in a dense layer. After a while, the hydrogen and helium get packed into a layer so dense and hot that fusion starts which converts most of these gasses into iron, releasing a gigantic amount of energy. This releases so much energy that it has the equivalent of detonating the whole world's nuclear arsenal on every square centimeter of the stars surface in one minute. X-Ray outbursts are just one of the amazing things about neutron stars and the enormous amount of energy that they release.
pushes over the Chandrasekhar mass limit, causing the star to collapse. This is how a neutron star forms.



Pulsar

Pulsars were first discovered in 1967 by a graduate student Jocelyn Bell Burnell as Radio sources that blink on and off at a constant frequency. Now we observe the brightest ones at almost every wavelength of light from a Pulsar. Pulsars are spinning neutron stars that have lots of different of particles moving almost at the speed of light! These particles stream out above their magnetic pole. These jets produce very powerful beams of amazing light. For a similar reason that "true north" and "magnetic north" are different on Earth, the magnetic and rotational axes of a pulsar are also misaligned. This means, the beams of light from the jets sweep around as the pulsar rotates, just as the spotlight in a lighthouse does. Pulsars are like a Black Hole, it is an endpoint to stellar evolution.

Pulsars are basically in the category of birth of a star. It is formed by the remnants of a Supernova.

Concluded next month with brown dwarfs and black holes.

Lifecycle image from NASA

The station module formerly known as Node 3 will be called "Tranquility."

WASHINGTON -- The International Space Station module formerly known as Node 3 has a new name. After more than a million online responses, the node will be called "Tranquility."

The name Tranquility was chosen from thousands of suggestions submitted by participants on NASA's Web site, www.nasa.gov The "Help Name Node 3" poll asked people to vote for the module's name either by choosing one of four options listed by NASA or offering their own suggestion. Tranquility was one of the top 10 suggestions submitted by respondents to the poll, which ended March 20.

"The public did a fantastic job and surprised us with the quality and volume of the suggestions," said Bill Gerstenmaier, associate administrator for Space Operations. "Apollo 11 landed on the moon at the Sea of Tranquility 40 years ago this July. We selected 'Tranquility' because it ties it to exploration and the moon and symbolizes the spirit of international cooperation embodied by the space station."

NASA announced the name Tuesday with the help of Expedition 14 and 15 astronaut Suni Williams on Comedy Central's "The Colbert Report." The show's producers offered to host the name selection announcement after comedian Stephen Colbert took an interest in the poll and urged his viewers to suggest the name "Colbert," which received the most entries.

"We don't typically name U.S. space station hardware after living people and this is no exception," Gerstenmaier joked. "However, NASA is naming its new space station treadmill the 'Combined Operational Load Bearing External Resistance Treadmill,' or COLBERT. We have invited Stephen to Florida for the launch of COLBERT and to Houston to try out a version of the treadmill that astronauts train on."

The treadmill is targeted to launch to the station in August. It will be installed in Tranquility after the node arrives at the station next year. A newly-created patch will depict the acronym and an illustration of the treadmill.

Tranquility is scheduled to arrive at NASA's Kennedy Space Center in Florida in May. There, it will be prepared for space shuttle Endeavour's flight, designated STS-130, which is targeted for launch in February 2010. Tranquility will join four other named U.S. modules on the station: the Destiny laboratory, the Quest airlock, the Unity node and the Harmony node.

Tranquility is a pressurized module that will provide room for many of the space station's life support systems. Attached to the node is a cupola, which is a unique work station with six windows on the sides and one on top.

Suni Williams made the announcement on "The Colbert Report" two years after running the Boston Marathon in space on a station treadmill similar to COLBERT. Video of Williams' run and the name announcement on "The Colbert Report" will air on NASA Television's Video File. For NASA TV downlink, streaming video and scheduling information, visit:

http://www.nasa.gov/ntv

"We had the sky up there, all speckled with stars, and we used to lay on our backs and look up at them and discuss about whether they were made or only just happened." - Mark Twain

The International Space Station
Image credit NASA

The public did a fantastic job and surprised us with the quality and volume of the suggestions

Tranquility is a pressurized module that will provide room for many of the space station's life support systems. Image credit: NASA

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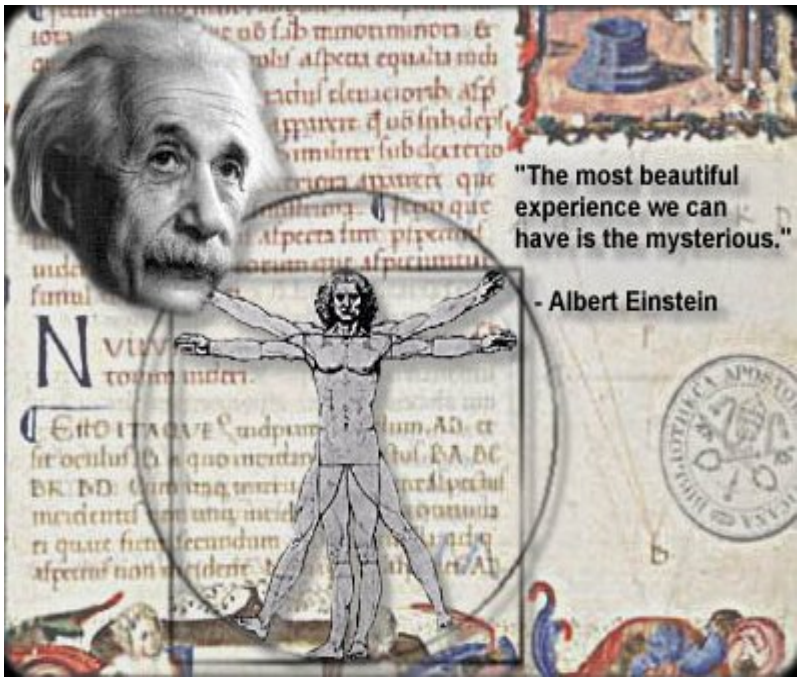
SNAKE RIVER SKIES
A publication of the
Magic Valley Astronomical Society
P.O. BOX 445 KIMBERLY, ID 83341

http:/ /www.mvastro.org



TRIVIA

Astronomy Day was born in California in 1973. Doug Berger, then president of the Astronomical Association of Northern California, decided that rather than try to entice people to travel long distances to visit observatory open houses, they would set up telescopes closer to where the people were - busy locations - urban locations like street corners, shopping malls, parks, etc. Our club's Astronomy Day activities are associated with the Herrett Center for the Arts and Science.

HOAGIE STREET DELI

Editors note—Though not officially Astronomy related this story describes the food vendor for astronomy Day.

We are the Hoagie Street Deli. A Mom and Pop operation that is a "Community Asset Building Business" by building a healthy community by putting positive attention into community needs and to positively influence and educate our community youth through our business. We started in Murtaugh, Idaho in 1995 then moved in Kimberly, Idaho, We look forward to your business.

Our menu is priced for a day of enjoyment and meets the families and the students budget. Credit or Debit Card machine will not be available.

Have a Fun Day

Astronomy Day Menu

Hoagies

Turkey $3.00

Ham $3.00

Combo $3.00 (turkey/ham)

1/4 # Chuck Steak "Burger" $3.00

1/4 # Kielbasa Sausage $3.00

1/4 # Beef Hot Dog
$2.00

Sandwiches will be available with

Meat, Cheese, Pickles, Tomatoes, Mustard, Mayo, Ketchup, and Sauerkraut.

Also available:

Chips, Candy Bars, Snacks, Apples Banana's, Soda, Water, Juice

Please visit our Deli located in the town of Kimberly at 623 Main St. 208-423-4322

A good Hoagie Street Deli Sandwich awaits you