the Webfooted Astronomer

The Seattle Astronomical Society

July 2005

Special points of interest:

- Telescope Library
- A Code for the Heavens
- Comet Puts on Show While Waiting for its Close-up

July Meeting:

Wednesday, July 20

Speaker: "To Be Announced"

The meetings begin at 7:30 P.M., but come as early as you like since many members will be there ahead of time to share their latest activities in astronomy. We generally have a presentation on some topic of interest to amateur astronomers by club members or guest speakers, or occasionally special programs devoted to astronomical computing, members' telescope equipment, and the like. In addition, we have a number of active astrophotographers, and generally reserve time to show slides of their latest efforts.

Meeting Information

Wednesday, July 20
7:30 p.m.

Physics-Astronomy Building
Room A102
University of Washington
Seattle

Come early at 7 p.m. for coffee and snacks and to visit with your fellow members!

In this issue:

Seattle Astronomical Society

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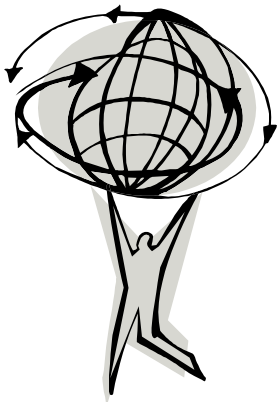


From the President's Desk…

Telescope Library

By Thomas Vaughan

The media is already gearing up for the next Mars opposition! In late October, Mars will swing within 43 million miles of Earth, with an apparent diameter of over 20 arcseconds. That's not as big as it was in 2003, but it will be close!

These sorts of astronomical events are great for the SAS. They are a focal point of star parties, and bring more of the public into contact with our club. They are also a time when use of the telescope library heats up, and waiting lists are common.

However, even with waiting lists for some scopes, the telescope library is underused. Many telescopes have fallen into disrepair. Others work, but are too large for people to easily fit in their car. We have a large number of german equitorial mounts, which are extremely heavy and awkward for beginners to use.

Most users of the library are folks who are travelling somewhere and would like a portable scope, or beginners who are just getting started and want to do some basic planetary or lunar observing. Our library is not serving those members well.

The Board has discussed this several times in the past, and believes the library should focus on smaller, more portable scopes that are robust and easy to use. So how could we get there? We are considering this plan of action:

- Clean up and fix the existing scopes where possible.
- Sell the least used telescopes.
- Purchase a few (2-4) telescopes that are portable, robust, and easy-to-use.

Some example scopes would be small (6") dobsonians, or Maksutovs on good quality tripods. We would make some money through selling off older, larger scopes, but practically speaking we expect that this would be a net cost to the club. We have money in the treasury to purchase a few small telescopes, and think this could be a real benefit for members.

What do you think? Come to the July SAS meeting, or feel free to email me at president@seattleastro.org.

New Newsletter Editor

Please join me in welcoming Vanessa Long as our new Newsletter Editor! And thank you again to Rose and Saurabh, who have done a great job as editors for the past year.

SAS Photographs Wanted

Do you have photographs of SAS activities? We would like to put together a photo archive for the Society. They would be helpful for promoting the SAS, and are also a part of our history! If you have photographs you are willing to donate/share, please contact Burley Packwood (education@seattleastro.org).

VP Publicity Needed

Our current VP of Publicity, Rod Ash, needs to step down in mid-July. Are you interested in helping out the Society? The VP of Publicity sends out brief press releases to promote Society activities, and fields questions and inquiries to the club. If interested, please contact me at president@seattleastro.org.

Dark Sky Site

We are still fundraising for the Dark Sky Site! Have you joined as a dark sky member? If not, please visit the website at http://www.seattleastro.org/dark-sky.html, and fill out a membership form.

Happy Observing-

-Thomas

SAS June 2005 Club Meeting Minutes

Announcements:

Dark Sky Site is about "20% there" as far as making the goal due to a number of dark sky memberships and some generous donations.

Reminder that the SAS Youth Group meets once a month at the UW observatory classroom. Contact Margaret Stoermer or Karl Schroeder for info. The group meets at 1:00PM the first Sunday of the month.

A new newsletter editor has stepped forward. Thanks go out to Saurabh Saxena for the time and effort he put in as editor and to Vanessa Long for taking on the job.

The Mountaineers are looking for a speaker to talk to an advanced Girl Scout troop in late July on Snoqualmie Pass. If anyone is interested, please contact Thomas Vaughan.

An announcement was made for the Mt. Bachelor Star Party July 6-10. Info can be found at www.mbsp.org.

Meeting Topic: Maxine Nagel talks about her recent experience at the Mt. Lemmon Astronomy Camp

Maxine put together a presentation with her many excellent photos taken at and around the Mt. Lemmon Science Center near Tucson which she attended last month. She started with photos of the mirror lab at the facility and a description of the processes used to manufacture large telescope mirrors. Maxine did a superb and energetic job of describing the facility and the activities available. Her photos made it quite apparent that the camp makes available a number of superb instruments. From her description, the adult astronomy camp sounds like a very worthwhile experience for anyone interested in astronomy. Her photos also did a good job of portraying the beautiful high mountain setting of the camp. Information on the camp can be found at www.astronomycamp.org. Thanks, Maxine!

Meeting was adjourned at around 8:45PM

Comet Puts on Show while Waiting for Its Close-Up

Image: www.pparc.ac.uk

[By Sarah Graham]

NASA scientists have planned a spectacular celestial show for July 4th. That's the date on which a probe from the Deep Impact spacecraft is scheduled to slam into Comet Tempel 1 in an attempt to learn more about the comet's billion-year-old interior. New images snapped by the Hubble Space Telescope are giving researchers a sneak peak at what type of conditions they might find. The pictures show a new jet of dust streaming out of the icy object.

Hubble's Advanced Camera for Surveys snapped the latest photos from a distance of 120 million kilometers on June 14, 2005. The jet extends some 2,200 kilometers from the comet's nucleus in the direction of the sun. Similar jets have been observed coming from other comets, but astronomers are still unsure as to exactly why they occur. Proximity to the sun could have caused a crack in Tempel 1's outer crust, allowing trapped dust and gas to escape, or the ejected material could be comprised of crumbled bits of crust thrown off by mounting pressure from underlying heated gas.

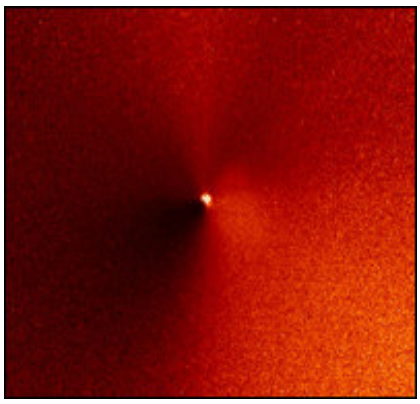


Image: NASA/ ESA/ P. Feldman (JOHNS HOPKINS UNIVERSITY)/ H. WEAVER (APPLIED PHYSICS LAB)

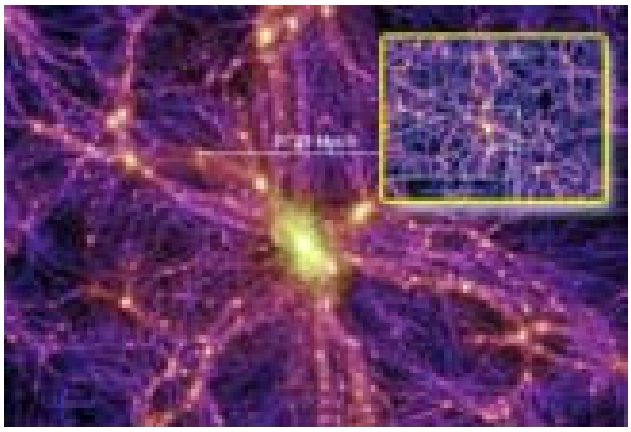
The NASA team hopes the close encounter next week will provide new insight into Tempel 1's core, as well as "lead to a better understanding of both the solar system's formation and the implications of comets colliding with Earth." The crash landing on Tempel 1 will not change the comet's orbital path, but it should leave a crater that is between two and 14 stories deep and at least as wide as a house. Deep Impact will closely monitor the resulting ejecta curtain for about 14 minutes, and other space- and ground-based observatories will be trained on the event as well. The collision is scheduled for 1:52 a.m. EST on July 4.

Source: http://www.sciam.com/article.cfm?chanID=sa007&articleID=000B77F4-6CF6-12BC-ACF683414B7F0000

The ESA TV Service will provide extensive live coverage on Deep Impact. The scheduling and satellite details are online today under http://television.esa.int

A Code for the Heavens

[By Michael Schirber]



A highly detailed computer model has captured the birth of galaxies and giant black holes. It lets astronomers follow the subsequent growth of these massive structures in the largest cosmological simulation to date.

The so-called "Millennium Run" took 28 days of intense computation to generate its 25 terabytes (25 trillion bytes) of data. The simulation – named after the 2000-time-frame in which the idea was conceived – tracks the evolution of matter inside a cube 2 billion light-years on a side.

A light-year is the distance light travels in a year, about 6 trillion miles (10 trillion kilometers).

"One of the main advances here is size, which does matter in this business," said August Evrard of the University of Michigan. "We are able to connect the first structures in the universe with the galaxies we see nearby."

The simulation starts when the universe was 10 million years old and evolves it all the way to the present – 13 billion odd years later. The cube contains roughly 10 billion "particles" – each with the mass of a billion Suns. These colossal blobs of matter interact gravitationally with each other in cyberspace.

Gravity will cause some of the particles to merge. In the center of these matter clumps, galaxies can form, but exactly what type of galaxy will depend on the size of the clump and the history of mergers. It would take a clump of a few thousand particles to house a Milky-Way-sized galaxy.

A paper describing the Millennium Run appeared in the June 2 issue of *Nature*.

Invisible skeleton

The Millennium Run does not actually go into all the messy details of forming stars and accreting gas. Instead, it essentially provides the framework, or skeleton, for all that galaxy business by concentrating on the elusive dark matter, which is the dominant form of matter in our universe.

(Continued on page 11…)

July 2005

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	**2** Tiger Mountain/Poo Poo Point Star Party (Members Only!)
3	**4** NASA's Deep Impact spacecraft arrives at Comet Tempel 1	**5**	● **6** UW Campus Observatory public viewing night	**7**	**8**	**9** Green Lake / Paramount Park Star Party
10	**11**	**12**	**13**	◐ **14**	**15**	**16**
17 Astro-photography Imaging SIG Meeting	**18**	**19**	**20** SAS Meeting UW Campus Observatory public viewing night	○ **21**	**22**	**23** Amateur Telescope Makers SIG Meeting
24	**25** SAS Board Meeting	**26**	**27**	◑ **28**	**29**	**30**
31						

August 2005

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3 UW Campus Observatory public viewing night	4 Table Mountain Star Party	5 Table Mountain Star Party Stellafane	6 Table Mountain Star Party Stellafane Tiger Mountain/Poo Poo Point Star Party
7	8	9	10	11	12	13 New Member Orientation Meeting Green Lake Star Party Paramount Park Star Party
14	15	16	17 SAS Meeting UW Campus Observatory public viewing night	18	19	20 Amateur Telescope Makers SIG Meeting
21	22 SAS Board Meeting	23	24	25	26	27
28	29	30	31			

Moving a Mountain of a Dish

[by Patrick L. Barry]

Giant Deep Space Network antenna in Madrid is moved using four 12-axle, 24-wheel crawlers.

Your first reaction: "That's impossible!"

How on earth could someone simply *pick up* one of NASA's giant Deep Space Network (DSN) antennas—a colossal steel dish 12 stories high and 112 feet across that weighs more than 800,000 pounds—move it about 80 yards, and delicately set it down again?

Yet that's exactly what NASA engineers recently did.

One of the DSN dishes near Madrid, Spain, needed to be moved to a new pad. And it had to be done gingerly; the dish is a sensitive scientific instrument full of delicate electronics. Banging it around would not do.

"It was a heck of a challenge," says Benjamin Saldua, the structural engineer at JPL who was in charge of the move. "But thanks to some very careful planning, we pulled it off without a problem!"

The Deep Space Network enables NASA to communicate with probes exploring the solar system. Because Earth is constantly rotating, a single antenna on the ground can communicate with a probe for only part of the day, when the probe is overhead. By placing large dishes at three locations around the planet—Madrid, California, and Australia—NASA can maintain contact with spacecraft around the clock.

To move the Madrid dish, NASA called in a company from the Netherlands named Mammoet, which specializes in moving massive objects. (Mammoet is the Dutch word for "mammoth.")

On a clear day (bad weather might blow the dish over!), they began to slowly lift the dish. Hydraulic jacks at all four corners gradually raised the entire dish to a height of about 4.5 feet. Then Mammoet engineers positioned specialized crawlers under each corner. Each crawler looks like a mix between a flatbed trailer and a centipede: a flat, load-bearing surface supported by 24 wheels on 12 independently rotating axes, giving each crawler a maximum load of 194 tons!

One engineer took the master joystick and steered the whole package in its slow crawl to the new pad, never exceeding the glacial speed of 3 feet per minute. The four crawl ers automatically stayed aligned with each other, and their independently suspended wheels compensated for unevenness in the ground.

Placement on the new pad had to be perfect, and the alignment was tested with a laser. To position the dish, believe it or not, Mammoet engineers simply followed a length of string tied to the pad's center pivot where the dish was gently lowered.

It worked. So much for "impossible."

Find out more about the DSN at http://deepspace.jpl.nasa.gov/dsn/ . Kids can learn about the amazing DSN antennas and make their own "Super Sound Cone" at The Space Place, http://spaceplace.nasa.gov/en/kids/tmodact.shtml.

(*Continued from page 7: A Code for the Heavens...*)
The light-emitting stuff – that we are all familiar with – only makes up about a tenth of the matter. The other 90 percent does not react with light. This dark matter has yet to be detected directly, but astrophysicists find it indispensable for explaining the cosmos.

"At present, cosmologists can simulate dark matter, which we can't see, better than galaxies and gas, which we can," said Nickolay Gnedin from the University of Colorado in a separate commentary.

Dark matter is easier to work with because it does not interact with anything, except through gravity. Although computing the gravitational interactions of 10 billion dark matter clumps is no small feat, it becomes significantly harder when you throw in the radiation and gas dynamics needed to make stars.

In some sense, then, the Millennium Run is just the first step in creating a digital universe. Once the dark matter "template" was finished, the international team of investigators – that calls itself the Virgo Consortium – was able to tack on a galaxy formation model, which basically told the computer where to stick bright, shiny things amongst the dark clumps.

Is it possible to separate the dark matter evolution from galaxy formation? Evrard admitted that there are complications, but simulations like the Millennium

SAS DARK SKY SITE

Enjoying the sunny skies and clear nights of summer? Just imagine what it would be like to drive to a dark sky site and camp out for a night of superb viewing!

Fundraising is continuing and we need your help. Fill out a membership form and join today!

http://www.seattleastro.org/dark-sky.html

Run have compared favorably with full hydrodynamical simulations, which incorporate everything at once but are so computationally expensive that the represented volumes are considerably smaller.

Quasar lineage

Of particular interest in the "bright and shiny" category are quasars – the most luminous objects in the universe. They are believed to be giant black holes – some of them billions of times more massive than our Sun – which are gobbling up very hot, glowing material.

Recent observations by the Sloan Digital Sky Survey (SDSS) have found big booming quasars so far away that we are seeing them when the universe was just a tenth of its age. Making black holes this big, this early, had seemed implausible in the currently favored cosmology.

"Yet when we tried out our galaxy and quasar formation modeling, we found that a few massive black holes do form early enough to account for these very rare SDSS quasars," said lead author Volker Springel of the Max Planck Institute for Astrophysics.

These black hole quasar candidates can be traced from when the universe was only a few 100 million years old, all the way to the present. If the simulation is correct, the first quasar galaxies later turned into the massive galaxies that now sit in the center of the biggest galaxy clusters.

This finding was not surprising, but the Millennium Run allows scientists the opportunity to watch the entire life cycle of these behemoth structures – as well as other, more modest galaxy types.

Try out your own pet theory

One advantage of calculating the cosmic web of dark matter separately is it allows you the freedom to explore different ways of building up galaxies.

"The really cool thing is that in the future, when the data is made public, you can go in and insert your own rules for galaxy formation," Evrard said.

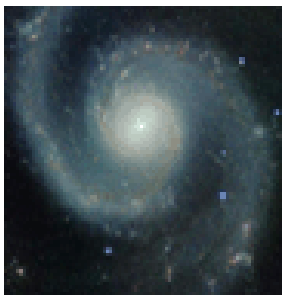
This is seen as a much more efficient use of computer time, as different researchers – and the ambitious amateur cosmologist – can use the dark matter skeleton from the Millennium Run to hang their own galaxy models.

"For this reason, the simulation will have staying power," said Evrard. "Maybe not for a millennium," he joked, "but for a decade, at least, and perhaps longer."

This article is part of SPACE.com's weekly Mystery Monday series.

Source: http://www.space.com/scienceastronomy/050627_virgo_sim.html

Space Bits



1001 Hawaiian Nights Dedicated to the Cool and the Far Away!

British astronomers today saw the first images from an ambitious new programme of discovery, the UKIRT Infrared Deep Sky Survey (UKIDSS). The survey will scour the sky with the world's most powerful infrared survey camera (WFCAM) to find some of the dimmest and most distant objects in the Universe.

Link: http://www.pparc.ac.uk/Nw/UKIDSS.asp

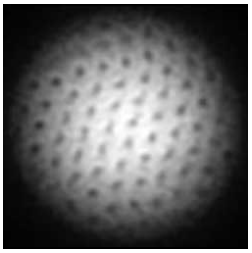
Planets under Construction

Artist illustration of a planetary zone filled with pebbles. Image credit: CfA.

Astronomers from the Harvard-Smithsonian Center for Astrophysics have discovered a massive planetary zone forming around the star system TW Hydrae. By probing this vast disk of material with the National Science Foundation's Very Large Array in the radio spectrum, they have detected that rocks and pebbles extend outward for at least 1.6 billion km (1 billion miles). These chunks of rock will slowly clump together, eventually forming larger and larger planets over millions of years. This is the first time astronomers have seen this intermediate stage, after pure dust, but before planets.

Link: http://www.universetoday.com/am/publish/planets_under_construction.html?2462005

New Form of Matter Created



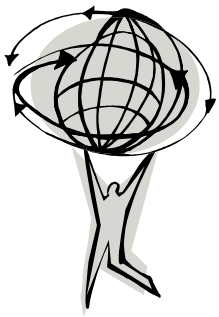
A rotating superfluid gas of fermions pierced with vortices. Image credit: MIT.

Physicists at MIT have successfully created a new form of matter in their laboratory; a gas that shows superfluidity at higher temperatures. Superfluid gasses, which can flow without resistance, have been created before, but only at very cold temperatures just above Absolute Zero. Matter like this could exist in the Universe's most extreme places, like at the heart of black holes, neutron stars, or in the early stages of the Big Bang.

Link: http://www.universetoday.com/am/publish/new_matter_created.html?2262005

We promise you the sun, moon and stars and we deliver...

The Seattle Astronomical Society is an organization created and sustained by people who share a common interest in the observational, educational, and social aspects of amateur astronomy. Established in 1948, the SAS is a diverse collection of over 200 individuals. A variety of programs and activities is presented by the SAS throughout the year. Monthly meetings feature speakers on a wide range of topics, from the Hubble Space Telescope to electronic imaging to personal observing experiences. The club holds public observing "star parties" at Green Lake every month, dark sky observing parties outside Seattle, plus such activities as meteor watches, public telescope and astronomy displays, National Astronomy Day, and an annual Awards Banquet.



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