# the Webfooted Astronomer

**The Seattle Astronomical Society**

**February 2006**


**Special points of interest:**

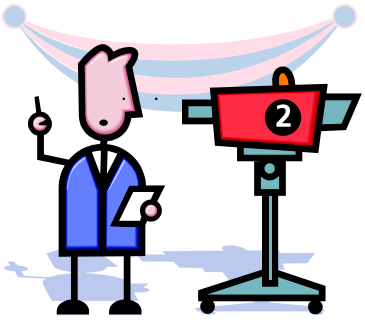
- Banquet and Dark Sky Site News
- The Smell of Moondust
- The Next Giant Leap

# February Meeting:

Wednesday, February 15

**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, February 15
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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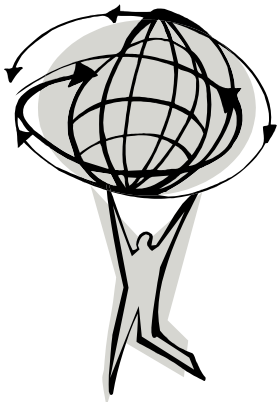


# From the President's Desk…
## Banquet and Dark Sky Site News

**By Thomas Vaughan**

### Banquet

Thanks to all who attended this year's SAS Banquet! I had a great time myself, due in no small part to the enthusiasm of everyone there, and our excellent speaker, Dr. Peter Ward.

And congratulations to those SAS Members who won awards this year: Ed Barnes, Janice Edwards, Maxine Nagel, and Stephen Van Rompaey. Your hard work and energy for the Society is appreciated!

Thanks again to the sponsors who contributed door prizes to the event (they are listed in this Newsletter). If you didn't win a door prize, do take consolation in the fact that it will be at least a year before you have to hear any more of my bad jokes.

### Dark Sky Site

One of the biggest and best surprises at Banquet was the announcement that an anonymous donor has offered to match donations, up to $15,000 total! The fundraising has slowly been building momentum, and this latest development should be a real shot in the arm for the cause. At the Banquet itself 2 more people joined as Dark Sky Members, and with the matching funds, we are already over 45% of the way towards our goal.

Have you thought about joining? Visit our website, and send in a membership form. http://www.seattleastro.org/dark-sky.html.

Whether you are a new or long-time dark sky site member: please donate! Your donations will be matched, and you may also be able to get matching donations from your employer.

### Dark Sky Site Member Meeting

Are you a dark sky site member, or considering joining soon? There is a meeting for dark sky site members on **Thursday, February 9th, 7pm at the Theodor Jacobsen**

**Observatory**. The goal is to catch up on current developments, and plan for the next steps. We'll exchange ideas for fundraising, governance, and site selection and improvements. Need directions? Contact president@seattleastro.org.

## Volunteering

Interested in helping out with the Society? We have a number of ways you can participate. For instance, the SAS volunteers at the UW's Theodor Jacobson Observatory. Volunteers receive training, and help out once every other month at the bi-monthly public viewing nights.

We are looking for a VP of Membership. And there is always room for more help at meetings and public star parties. Let myself or any member of the board know if you are interested in helping, or would like to know more!

Happy Observing-

-Thomas

# SAS January 2006 Club Meeting Minutes

Seattle Astronomical Society

Annual Banquet Notes 1/21/06

The Annual Banquet, held at the Rock Salt on Latitude 47 was a great success and enjoyed by over seventy attendees. After an excellent dinner, society president Thomas Vaughan provided opening remarks. These were followed by an introduction of guest speaker Dr. Peter Ward. Dr. Ward provided a lively and fascinating discussion on the concept of alien life, the possibilities and requirements for such life and some of the forms it might take.

After Dr. Ward's informative and thought provoking presentation, Thomas took the podium once again to provide a review of the club's past year, information on upcoming events and an update on the Dark Sky Site project, which is on track to becoming an important asset to an active club. This promises to be an exciting year for SAS!

Awards were next on the agenda with Janice Edwards receiving a Service Award for her 2 years as VP Membership, many contributions to club literature (graphic design) and SAS displays at Seattle Public Library, Pacific Science Center and others. Maxine Nagel received the High Energy Particle Award for, among other things, her 2 presentations at SAS meetings this year, many astrophotos presented at meetings, help with the banquet and photography of the telescope cleaning party. Ed Barnes got a Distinguished Service Award for his amazing 30 years of providing coffee and cookies before meetings, being the social anchor for each meeting, the center of pre-meeting gatherings. The board is scrambling to fill the gap left when Ed "retired" from this duty. Stephen Van Rompaey received a Service Award for his contribution as president for 2 years, the numerous other positions he has filled in for including VP Activities for 9 months. Stephen was also instrumental in setting up the observatory partnership with the UW, he straightened out club's finances and has remained Tiger Mountain key master. Burley Packwood received the Astronomical League Herschel Club Certificate. Maxine Nagel received the Astronomical League Messier Club Certificate.

The banquet was concluded with a drawing for the many fine door prizes provided by generous donors and the SAS. Many thanks to all who helped make this year's banquet a wonderful event!

Special thanks to each of these generous donors who provided excellent door prize items:

- Astronomical Society of the Pacific
- Captain's Nautical
- Lumicon
- Orion Telescopes & Binoculars
- Pacific Science Center
- Sky & Telescope

# Snowstorm on Pluto

**[By Dr. Tony Phillips]**

*This artist's rendering shows how Pluto and two of its possible three moons might look from the surface of the third moon. Credit: NASA/ESA and G. Bacon (STSci)*

There's a nip in the air. Outside it's beginning to snow, the first fall of winter. A few delicate flakes tumble from the sky, innocently enough, but this is no mere flurry.

Soon the air is choked with snow, falling so fast and hard it seems to pull the sky down with it. Indeed, that's what happens. Weeks later when the storm finally ends the entire atmosphere is gone. Every molecule of air on your planet has frozen and fallen to the ground.

*That* was a snowstorm—on Pluto.

Once every year on Pluto (1 Pluto-year = 248 Earth-years), around the beginning of winter, it gets so cold that the atmosphere freezes. Air on Pluto is made mainly of nitrogen with a smattering of methane and other compounds. When the temperature dips to about 32 K (-240 C), these molecules crystallize and the atmosphere comes down.

"The collapse can happen quite suddenly," says Alan Stern of the Southwest Research

Institute. “Snow begins to fall, the surface reflects more sunlight, forcing quicker cooling, accelerating the snowfall. It can all be over in a few weeks or months.”

Researchers believe this will happen sometime during the next 10 to 20 years. Pluto is receding from the warmth of the Sun, carried outward by its 25% elliptical orbit. Winter is coming.

So is New Horizons. Stern is lead scientist for the robotic probe, which left Earth in January bound for Pluto. In 2015 New Horizons will become the first spacecraft to visit that distant planet. The question is, will it arrive before the snowstorm?

“We hope so,” says Stern. The spacecraft is bristling with instruments designed to study Pluto’s atmosphere and surface. “But we can’t study the atmosphere if it’s not there.” Furthermore, a layer of snow on the ground (“probably a few centimeters deep,” estimates Stern) could hide the underlying surface from New Horizon’s remote sensors.

Stern isn’t too concerned: “Pluto’s atmosphere was discovered in 1988 when astronomers watched the planet pass in front of a distant star—a stellar occultation.” The star, instead of vanishing abruptly at Pluto’s solid edge, faded slowly. Pluto was “fuzzy;” it had air. “Similar occultations observed since then (most recently in 2002) reveal no sign of [impending] collapse,” says Stern. On the contrary, the atmosphere appears to be expanding, puffed up by lingering heat from Pluto’s waning summer.

Nevertheless, it’s a good thing New Horizons is fast, hurtling toward Pluto at 30,000 mph. Winter. New Horizons. Only one can be first. The race is on….

Find out more about the New Horizons mission at http://pluto.jhuapl.edu . Kids can learn amazing facts about Pluto at spaceplace.nasa.gov/en/kids/pluto.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

# February 2006

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| | | | 1 | 2<br>UW Astronomy Colloquium | 3 | 4<br>New Member Orientation Meeting<br>Green Lake Star Party |
| 5 | 6 | 7 | 8 | 9<br>UW Astronomy Colloquium | 10 | 11<br>Amateur Telescope Makers SIG Meeting |
| 12<br>Paramount Park Star Party | 13 | 14 | 15<br>SAS Meeting | 16<br>UW Astronomy Colloquium | 17 | 18 |
| 19 | 20<br>SAS Board Meeting | 21 | 22 | 23<br>UW Astronomy Colloquium | 24 | 25<br>Tiger Mountain/ Poo Poo Point Star Party |
| 26 | 27 | 28 | | | | |

# March 2006

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| | | | **1**<br>UW Campus Observatory public viewing night | **2**<br>UW Astronomy Colloquium | **3** | **4**<br>Green Lake Star Party |
| **5** | **6** | **7** | **8** | **9**<br>UW Astronomy Colloquium | **10** | **11**<br>Amateur Telescope Makers SIG Meeting |
| **12**<br>Astrophot-ography/ Imaging SIG Meeting<br>Paramount Park Star Party | **13** | **14** | **15**<br>SAS Meeting<br>UW Campus Observatory public viewing night | **16**<br>UW Astronomy Colloquium | **17** | **18** |
| **19** | **20**<br>SAS Board Meeting | **21** | **22** | **23**<br>UW Astronomy Colloquium | **24** | **25**<br>Tiger Moun-tain/Poo Poo Point Star Party |
| **26** | **27** | **28** | **29** | **30** | **31** | |

# The Next Giant Leap

[by Patrick L. Barry]

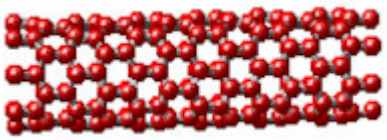
**The next big thing is small: Nanotechnology could lead to radical improvements for space exploration.**

When it comes to taking the next "giant leap" in space exploration, NASA is thinking small -- really small.

In laboratories around the country, NASA is supporting the burgeoning science of nanotechnology. The basic idea is to learn to deal with matter at the atomic scale -- to be able to control individual atoms and molecules well enough to design molecule-size machines, advanced electronics and "smart" materials.

If visionaries are right, nanotechnology could lead to robots you can hold on your fingertip, self-healing spacesuits, space elevators and other fantastic devices. Some of these things may take 20+ years to fully develop; others are taking shape in the laboratory today.

**Thinking Small**



*A carbon nanotube. Copyright Prof. Vincent H. Crespi Department of Physics Pennsylvania State University.*

Simply making things smaller has its advantages. Imagine, for example, if the Mars rovers Spirit and Opportunity could have been made as small as a beetle, and could scurry over rocks and gravel as a beetle can, sampling minerals and searching for clues to the history of water on Mars. Hundreds or thousands of these diminutive robots could have been sent in the same capsules that carried the two desk-size rovers, enabling scientists to explore much more of the planet's surface -- and increasing the odds of stumbling across a fossilized Martian bacterium!

But nanotech is about more than just shrinking things. When scientists can deliberately order and structure matter at the molecular level, amazing new properties sometimes emerge.

An excellent example is that darling of the nanotech world, the carbon nanotube. Carbon occurs naturally as graphite -- the soft, black material often used in pencil leads -- and as diamond. The only difference between the two is the arrangement of the carbon atoms. When scientists arrange the same carbon atoms into a "chicken wire" pattern and roll them up into miniscule tubes only 10 atoms across, the resulting "nanotubes" acquire some rather extraordinary traits. Nanotubes:

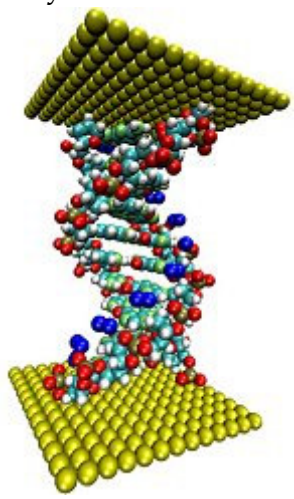
- have 100 times the tensile strength of steel, but only 1/6 the weight;
- are 40 times stronger than graphite fibers;
- conduct electricity better than copper;
- can be either conductors or semiconductors (like computer chips), depending on the arrangement of atoms;
- and are excellent conductors of heat.

Much of current nanotechnology research worldwide focuses on these nanotubes. Scientists have proposed using them for a wide range of applications: in the high-strength, low-weight cable needed for a space elevator; as molecular wires for nano-scale electronics; embedded in microprocessors to help siphon off heat; and as tiny rods and gears in nano-scale machines, just to name a few.

Nanotubes figure prominently in research being done at the NASA Ames Center for Nanotechnology (CNT). The center was established in 1997 and now employs about 50 full-time researchers.

"[We] try to focus on technologies that could yield useable products within a few years to a decade," says CNT director Meyya Meyyappan. "For example, we're looking at how nano-materials could be used for advanced life support, DNA sequencers, ultra-powerful computers, and tiny sensors for chemicals or even sensors for cancer."

A chemical sensor they developed using nanotubes is scheduled to fly a demonstration mission into space aboard a Navy rocket next year. This tiny sensor can detect as little as a few parts per billion of specific chemicals--like toxic gases--making it useful for both space exploration and homeland defense. CNT has also developed a way to use nanotubes to cool the microprocessors in personal computers, a major challenge as CPUs get more and more powerful. This cooling technology has been licensed to a Santa Clara, California, start-up called Nanoconduction, and Intel has even expressed interest, Meyyappan says.



An engineered DNA strand between metal atom contacts could function as a molecular electronics device. Credit: NASA Ames Center for Nanotechnology.

**Designing the future**

If these near-term uses of nanotechnology seem impressive, the long-term possibilities are truly mind-boggling.

The NASA Institute for Advanced Concepts (NIAC), an independent, NASA-funded organization located in Atlanta, Georgia, was created to promote forward-looking research on radical space technologies that will take 10 to 40

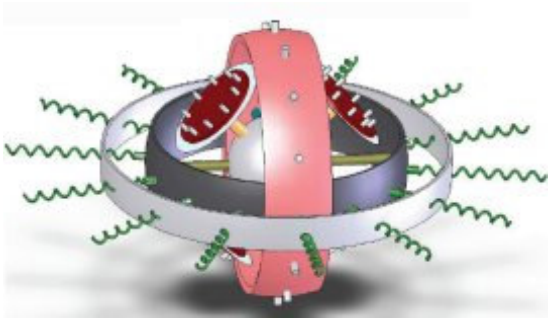
years to come to fruition.

For example, one recent NIAC grant funded a feasibility study of nanoscale manufacturing--in other words, using vast numbers of microscopic molecular machines to produce any desired object by assembling it atom by atom!

That NIAC grant was awarded to Chris Phoenix of the Center for Responsible Nanotechnology.

In his 112 page report, Phoenix explains that such a "nanofactory" could produce, say, spacecraft parts with atomic precision, meaning that every atom within the object is placed exactly where it belongs. The resulting part would be extremely strong, and its shape could be within a single atom's width of the ideal design. Ultra-smooth surfaces would need no polishing or lubrication, and would suffer virtually no "wear and tear" over time. Such high precision and reliability of spacecraft parts are paramount when the lives of astronauts are at stake.

Although Phoenix sketched out some design ideas for a desktop nanofactory in his report, he acknowledges that -- short of a big-budget "Nanhatten Project," as he calls it -- a working nanofactory is at least a decade away, and possibly much longer.



*This bio-nanorobot envisioned by Constantinos Mavroidis and colleagues resembles a living cell.*

Taking a cue from biology, Constantinos Mavroidis, director of the Computational Bionanorobotics Laboratory at Northeastern University in Boston, is exploring an alternative approach to nanotech:

Rather than starting from scratch, the concepts in Mavroidis's NIAC-funded study employ pre-existing, functional molecular "machines" that can be found in all living cells: DNA molecules, proteins, enzymes, etc.

Shaped by evolution over millions of years, these biological molecules are already very adept at manipulating matter at the molecular scale -- which is why a plant can combine air, water, and dirt and produce a juicy red strawberry, and a person's body can convert last night's potato dinner into today's new red blood cells. The rearranging of atoms that makes these feats possible is performed by hundreds of specialized enzymes and proteins, and DNA stores the code for making them.

Making use of these "pre-made" molecular machines -- or using them as starting points for new designs -- is a popular approach to nanotechnology called "bio-nanotech."

(*Read more at*: http://www.nasa.gov/vision/earth/technologies/27jul_nanotech.html)

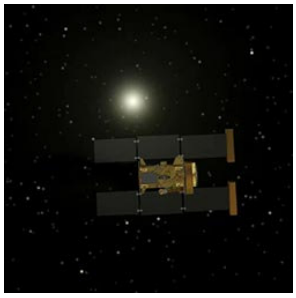
# Space Bits

*Apollo 17 astronaut Jack Schmitt, with his spacesuit grayed by moondust. Image credit: NA*

## The Smell of Moondust

When the Apollo astronauts returned to their lunar landers, they all noticed that the moondust - which had clung to their boots and suits - had some interesting properties. For starters, it smelled like spent gunpowder; as if someone had just fired a gun in the lander. Apollo 17's Jack Schmitt came down with a brief case of extraterrestrial hay fever. It could be that the relatively damp interior of the lander causes particles from the solar wind to evaporate into the air.

Link: http://www.universetoday.com/am/publish/gun_moondust.html?3112006

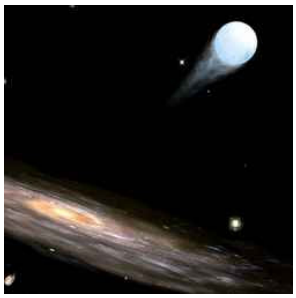


*Artist concept of Stardust*

## Stardust Mission Status Report

NASA's Stardust spacecraft was placed into hibernation mode yesterday. Stardust successfully returned to Earth samples of a comet via its sample return capsule on Jan. 15. The spacecraft has logged almost seven years of flight.

Link: http://www.jpl.nasa.gov/news/news.cfm?release=2006-016



*Artist illustration of a galactic exile. Image credit: CfA*

## Podcast: Galactic Exiles

Young hot blue star - the supermassive black hole has spoken, it's time for you leave the galaxy. When binary stars stray too close to the centre of the Milky Way, they're violently split apart. One star is put into an elliptical orbit around the supermassive black hole, and the other is kicked right out of the galaxy. Dr. Warren Brown from the Harvard-Smithsonian Center for Astrophysics was one of the astronomers who recently turned up two exiled stars.

Link: http://www.universetoday.com/am/publish/podcast_galactic_exiles.html?2712006

## 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.



**The Seattle Astronomical Society**

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| **Total amount enclosed:** | $_____ |

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