



the Webfooted Astronomer

News from the Seattle Astronomical Society

June 2009

Double Hubble Trouble

by Ron Hobbs

For most of the past three decades the United States has explored the opportunities of low Earth orbit using the Space Transportation System, commonly known as the Space Shuttle. Much lauded and much maligned, the high point of the shuttle program has to be the delivery to space of one of the finest astronomical instruments yet devised, the Hubble Space Telescope. Though triumph turned to tragedy after its launch 19 years ago, in the intervening two decades five teams of astronauts have repaired and refurbished the satellite and extended its legacy, now possibly for another 10 years.

I have longed dreamed of witnessing a shuttle launch in person, but the vagaries and expenses of cross-country travel have precluded being in the right place at the right time. However, several weeks ago, the dream came true for me and my 20-year-old son, Alex, in a fashion I could never have dreamt of. In early April, NASA announced that they would extend press credentials to museum and science center staff to cover the launch of Atlantis on STS-125, the final Servicing Mission to the Hubble. Though it seemed like a long shot, on the morning of May 11, 2009, my son and I found ourselves at the Kennedy Space Center Press Site, just three miles from Pad 39-A where Atlantis was fueled and ready for its long-delayed journey. We spent the day there, next to the Vertical Assembly Building, learning about the tools the astronauts would use to repair the ailing telescope, watching the astronauts being driven to the pad, buying memorabilia and taking pictures of the manatees and alligators. KSC is a prominent wildlife reserve; one of the last things that happens just before launches is a check for birds soaring in the area.

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NEXT MEETING

June 17 — 7:30 p.m.

University of Washington
Physics/Astronomy Building,
Room A-102

Galileo's Footsteps

Postponed from May! SAS member Jon Bearscope presents a slide show about his trip to Italy last spring, during which he followed in Galileo's footsteps.

As Florence, Italy presents a spectacular exhibit of ancient objects to celebrate 400 years since Galileo turned his scope on the skies, so, too SAS proposes a "visual celebration" of the limitations Galileo faced. Bring your three-inch and smaller refractors -- junk scopes welcome! -- to get a feel for what the great scientist had to work with.

If weather permits, we'll take the scopes outside and do some observing and sketching. It will be a fun evening following Galileo and imagining his working conditions. He had lousy optics... but dark skies!

SAS Calendar

June 17 — 7:30 p.m.

Seattle Astronomical Society Meeting
Guest speaker: Jon Bearscove, "Galileo's Footsteps." Details on page 1.

June 17 — 9 p.m.

UW Observatory — Public viewing night

June 19 — dawn

Mars & Venus two deg. apart, near Moon

June 20 — 10:46 p.m.

Summer solstice

June 20 — 9 p.m.

Tiger Mountain Star Party (members only)

June 22 — New Moon

June 27 — 7 p.m.

Seattle Astronomical Society Star Parties

- ◆ Green Lake, Seattle
- ◆ Paramount Park, Shoreline

June 27 — 1 p.m.

New member orientation meeting.
Contact: orientation@seattleastro.org

June 29 — First quarter Moon

July 1 — 9 p.m.

UW Observatory — Public viewing night

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The great fear of making the pilgrimage to view a launch is that it will be delayed past when you have to leave. I had considered driving down to the Cape to see this launch last fall while visiting family; just after I decided it was not worth the risk the data handler went down and the mission was delayed again for six months. This time, however, the risk paid off. Things got quiet just before the launch as each issue was worked and resolved. And then at 2:01 p.m., local time, they were off.

The launch of a rocket like the Shuttle is almost an astronomical event in its own right. No matter how many times you have seen it on a screen, nothing prepares you for the reality of it. The Solid Rocket Motor plumes are incredibly bright, almost painful to look at, even with sunglasses. And the sound—what can you say? It literally shakes your body. In just a couple of minutes they were gone, the tiny light of the massive engines disappearing behind a high cloud.

After the launch my son and I had the rest of the week to explore the "Space Coast." Forty years ago, I had been at Cape Kennedy, as it was known from 1963 to 1973, to see Apollo 11 on Pad 39-A. Two and a half years later I went back to the Cape to watch the launch of Apollo 14. To my delight, the Apollo 14 Command Module is on display at the U.S. Astronaut Hall of Fame. The last time I had seen it, it was on its way to the Moon with Alan Shepard and his crew.

While we went behind the scenes, the well-trained team of astronauts aboard Atlantis struggled with frozen bolts and other problems to perform high-altitude

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Double Hubble Trouble

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maintenance on the 20-year-old Hubble. Their efforts were stunningly successful, and left behind an instrument that is “better than ever.” We now have the promise of another five to 10 years of the imagery and data that have made Hubble the greatest public works project of all time.

The second week of May 2009 may go down in history as a watershed for astronomy. On Thursday, May 14, as the first spacewalk was taking place in the Shuttle cargo bay, the European Space Agency launched two observatories toward L2 where they will have an unobstructed view of the sky. The FIRST (Far Infrared and Sub-millimetre Telescope), now known as Herschel, will take over from Spitzer, now that the latter spacecraft’s coolant has been expended and it has begun its “warm” mission. And Planck will survey the cosmic microwave background with unprecedented resolution, extending the findings of COBE and WMAP. And if that wasn’t enough, that same week, the commissioning of Kepler was completed and it began the 3½ year staring contest that is its prime mission.

The completion of Hubble Servicing Mission 4 (the third mission was split into two: 3A and 3B) is “bittersweet.” It will probably be seen as the denouement of the Shuttle program. The fifth spacewalk was almost certainly the last to be conducted from the Shuttle airlock. There are now just eight shuttle missions remaining, unless something dramatic comes out of the independent review panel President Obama has commissioned. This mission was certainly one of the Shuttle’s finest hours, and demonstrated admirably the benefit of being able to put humans into space. ★

Ron Hobbs is the Public Programs Assistant for The Museum of Flight and a Solar System Ambassador for NASA’s Jet Propulsion Laboratory.



At left, double Hubble trouble as the author, Ron Hobbs (right), and son Alex wait at the Kennedy Space Center press site for the launch of Atlantis on May 11. Above: Moments after liftoff. Photos by Ron Hobbs.

Scoring more energy from less sunlight

For spacecraft, power is everything. Without electrical power, satellites and robotic probes might as well be chunks of cold rock tumbling through space. Hundreds to millions of miles from the nearest power outlet, these spacecraft must somehow eke enough power from ambient sunlight to stay alive.

That's no problem for large satellites that can carry immense solar panels and heavy batteries. But in recent years, NASA has been developing technologies for much smaller microsattellites, which are lighter and far less expensive to launch. Often less than 10 feet across, these small spacecraft have little room to spare for solar panels or batteries, yet must still somehow power their onboard computers, scientific instruments, and navigation and communication systems.

Space Technology 5 was a mission that proved, among other technologies, new concepts of power generation and storage for spacecraft.

"We tested high efficiency solar cells on ST-5 that produce almost 60 percent more power than typical solar cells. We also tested batteries that hold three times the energy of standard spacecraft batteries of the same size," says Christopher Stevens, manager of NASA's New Millennium Program. This program flight tests cutting-edge spacecraft technologies so that they can be used safely on mission-critical satellites and probes.

"This more efficient power supply allows you to build a science-grade spacecraft on a miniature scale," Stevens says.



Solar cells typically used on satellites can convert only about 18 percent of the available energy in sunlight into electrical current. ST-5 tested experimental cells that capture up to 29 percent of this solar energy. These new solar cells, developed in collaboration with the Air Force Research Laboratory in Ohio, performed flawlessly on ST-5, and they've already been swooped up and used on NASA's svelte MESSENGER probe, which will make a flyby of Mercury later this year.

Like modern laptop batteries, the high-capacity batteries on ST-5 use lithium-ion technology. As a string of exploding laptop batteries in recent years shows, fire safety can be an issue with this battery type.

"The challenge was to take these batteries and put in a power management circuit that protects against internal overcharge," Stevens explains. So NASA contracted with ABSL Power Solutions to develop spacecraft batteries with design control circuits to prevent power spikes that can lead to fires. "It worked like a charm."

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Helen Johnson, a spacecraft technician at NASA's Goddard Space Flight Center, works on one of the three tiny Space Technology 5 spacecraft in preparation for its technology validation mission.

More energy from less sunlight

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Now that ST-5 has demonstrated the safety of this battery design, it is flying on NASA's THEMIS mission (for Time History of Events and Macroscale Interactions during Substorms) and is slated to fly aboard the Lunar Reconnaissance Orbiter and the Solar Dynamics Observatory, both of which are scheduled to launch later this year.

Thanks to ST-5, a little sunlight can go a really long way.

Find out about other advanced technologies validated in space and now being used on new missions of exploration at nmp.nasa.gov/TECHNOLOGY/scorecard. Kids can calculate out how old they would be before having to replace lithium-ion batteries in a handheld game at spaceplace.nasa.gov/en/kids/st5_bats.shtml. ★

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



Manatash Ridge observing weekend set for June 20-21

A joint outing between the Seattle Astronomical Society and the University of Washington Department of Astronomy to the UW's Manastash Ridge Observatory facility near Ellensburg has been set for the weekend of June 20-21. The trip will involve an overnight stay at the observatory. There will be some UW students there using some of the living space. Depending on the level of interest some may be able to sleep indoors, while others camp.

This is the weekend immediately prior to the New Moon. The weather is usually cooperative in June although unpleasantness isn't unheard of.

The observatory building has three bedrooms, two bathrooms, a kitchen, and a living room. There is running water and electricity for charging batteries. The site has WiFi networking and internet access.

It may be necessary for us to caravan there with some of our own vehicles for transporting camping and observing gear. It's recommended that those vehicles not go all the way up the rugged road to the observatory proper, but rather be parked at a lower lot, from which we can ferry people and gear to the observing site aboard the UW vehicles with UW-approved drivers.

IF YOU WANT TO ATTEND: Please send email expressing your desire to attend to Jerry Kuch at jerrykuch@gmail.com or call Jerry at 425.830.5192.

If interest turns out to be greater than the facility can support, we'll have to give out slots on a first-come, first-served basis. If this trip is successful, it may be possible for us to organize another one in September.



The Webfooted Astronomer
 Seattle Astronomical Society
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RETURN SERVICE REQUESTED

NEXT MEETING
June 17, 2009

Jon Bearscope
 Galileo's Footsteps

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Join or renew on-line at <http://www.seattleastro.org/membernew.shtml> or mail this form and your check to the address below. For family memberships, please include the names of persons you want to appear in the membership directory. For renewals, please include magazine subscription customer number.

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