

AstroNotes

Newsletter of the Ottawa Centre,
Royal Astronomical Society of Canada

Galileo's Final Plunge



Illustration courtesy NASA/JPL

October 2003

The Galileo Era

by Tim Cole, Editor

- Some eight years ago, the *Galileo* spacecraft released a probe that plunged into the Jovian upper atmosphere. The probe's data stream overturned the theories of the day. That was just the first of a string of encounters that sent back the data we used to revise a library's worth of textbooks.

- Piece by piece, we began to see a fascinating and wildly varied array of small worlds. We found a world tortured and melted by monstrous tidal stresses. We found another world wrapped in fractured ice, offering tantalizing hints of a preserved ocean. We found the stuff of science that made the fanciful speculations of science fiction writers look drab.
 - *Galileo* was half-crippled even as it entered the Jovian system, and we tend to focus on its flawed antenna. Actually, *Galileo's* engineers and techs built well. The spacecraft survived incredible abuse, including an accumulated dose of hard radiation many times worse than the designers' worst case estimates. *Galileo* wouldn't have survived much longer, but lack of fuel ended the mission first.
 - Late in the afternoon of 21 September, the battered and irradiated *Galileo* spacecraft rounded the limb of Jupiter for the last time. The cover illustration lets us imagine the tough little spacecraft following its probe into the Jovian clouds. It was a magnificent end to a 14-year voyage that made the *Odyssey* look like the tale of a stormy day on a cruise ship. We humans are a cantankerous lot, but we still manage to do great things.
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In Memoriam: Dr. Lionel Bradley Pett, 1909_2003

- Many of you know of Hugh Pett, one of the primary benefactors of the SMARTScope project. Fewer of you know of Hugh's father Bradley, who was a quiet but vitally important patron of the project. Project leader Chris Teron writes:
- "Hugh Pett's father, Bradley Pett, passed away on 23 September 2003.
- "Hugh's father's love of science and desire to share it with others will live on in a small part through the SMARTScope project. His very kind donation, together with Hugh and Irene's own huge donations and efforts, have been the major stimulus to make the project happen. It is an honor to have named the observatory after the Pett family and I am pleased that he was able to briefly visit the Pett Observatory after it was

built.

- "I hope you will join me in extending condolences to the Pett family."
- Farewell to a friend of science, education, and the betterment of his fellow humans. Rest in peace.

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The Rockland Summer Star Party

by Joe Silverman

- I had planned to go the Rockland Star Party in Savoy, Massachusetts and then head to Stellafane in Springfield, Vermont. But, I left a day late and returned two days early, skipping Stellafane because of the bad weather. The first two of the three nights at the Rockland Star Party were all-night viewing sessions. The last night was an gab session around a campfire. Americans are great. They laughed at all my jokes — well, at least most of them.
- I left Ottawa at 5:15am on Tuesday and arrived at the campground at about 1:00 where I was warmly welcomed by Don Urban, the organizer of the event. I enjoyed the ride down. The scenery on the I-89 was beautiful and the approach to the campground was a winding country road that produced picture books scenes around every bend. Since my wife stayed at home, I could torque up the stereo until my eardrums were vibrating and sing along.
- I set up my tent and telescope, renewed old friendships, and spent about 10 minutes looking through a Coronado 90mm Hydrogen Alpha filter on a Televue 102 refractor with binoviewers and a pair of Nagler 16mm eyepieces. The views were spectacular. I could trace the threads in the filaments on the sun's surface. The details in the prominences were impressive.
- The individual threads in the prominences, as they rose up to form an arc gave me a sense of their complicated structure and tremendous power — even at a distance of 93 million miles. With the binoviewer, the threads that made up a

prominence appeared three-dimensional. The sun appeared as a sphere, not as a disc, since I could sense the curvature from the centre of the sun's image. The views were absolutely glorious. The following morning, I again had the opportunity of looking through the Coronado system and the views were even more spectacular —almost a religious experience. It was worth the trip just to be able to spend some uninterrupted time looking at the sun through this setup.

- There were an overwhelming number high quality scopes on the field, some of them handmade. I managed to look through a 25" Obsession, a 18" Obsession, a 15" Obsession, a 8" Orion Dob, several 11 to 14 inch Schmidt-Cassegrains, and of course my own Celestron C-8. There were also a lot of serious astro-imaging enthusiasts at the star party who set up an outstanding variety of equipment. There was a 14-inch Celestron Schmidt-Cassegrain telescope equipped with a 5" f/6 refractor, on a robotic mount with state-of-the-art astro-imaging equipment installed. This setup was in its own portable observatory with an adjacent carpeted warm-up room. The observatory made it feel like you were on a starship
- There were also several Astro Physics and Tak refractors of various sizes — all

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- with their own impressive arrays of astro-imaging equipment. I also saw a collection of cameras on a heavy-duty mount. My interest is in visual observing, so if you're curious about the astro-imaging equipment, I'd suggest you visit these two web sites: www.jburnell.com and www.kiroastro.com.
- I arrived with only my 8" Schmidt-Cassegrain telescope. But it didn't make a difference. The Americans were impressed that I drove from Ottawa to get to their star party and they were very welcoming. I was invited to visit the portable observatory where I was given a tour by one of its owners — Jim Burnell, the co-author

of a book on astronomical imaging¹. He suggested that I use the warm-up room when I needed a break, an offer open to everyone at the star party. Since I was only interested in visual observing and since we Canadians do not get cold at night, (we barbeque in winter and drive with the window down in autumn!), I didn't take him up on his offer. But I did attend his very good lecture on astro-imaging. We all managed to stay awake despite having spent most of the night observing.

- The Rockland Astronomy Club fosters an enviable culture — your interest in astronomy is all that is required to participate. The club has a very simple organization, based on an advisory committee whose members have no formal titles. Yet this club annually organizes two first class, well-run events — the Rockland Star Party and the North-Eastern Astronomy Forum (NEAF). Twice, I have attended NEAF in Suffern, New York. I have enjoyed the lectures and benefited from the great prices created by the competition among many astronomical vendors being side-by-side.
- On the first night the conditions were average, but I perused the night sky, especially around Sagittarius, Scorpius, Ophiuchus, Cassiopeia, and the Big Dipper. I often experimented with different eyepieces, and of course, I frequently viewed Mars. I was impressed with an eyepiece I had just purchased through Astromart, a University Optics Konig 16mm.
- Sometimes, I approached the DSOs using right ascension and declination. Other times, I treated my Schmidt-Cassegrain as a Dob and used only my Telrad and finderscope. I also did some binocular viewing. Only around 2:00 a.m. did I decide to check out some of the other scopes. Everywhere I went, people were welcoming and friendly. I can't discuss all the 'scopes that I visited, but the high points of my tour were magnificent views of Mars and M-13 on a 25" Obsession with binoviewers and a pair of 16mm Naglers, and the Veil on an 15" and 18" Obsessions, both with a Nagler 31mm. These were the best views of these DSOs that I had ever experienced.

¹ *The Handbook of Astronomical Image Processing, by Richard Berry and James Burnell, Willmann-Bell Inc., Richmond VA, 2000 — Editor*

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- There's no question: aperture and quality optics count. But being outside and observing the night sky is more important. Even after I experienced many spectacular images with several large, high-quality scopes, I can still go back to my Celestron C-8 and be thrilled by its views.
- During the night, "Barlow" Bob, the owner of the solar scope, came by with a star spectroscope, installed it on my telescope, and pointed it at several stars. It was very intriguing to view the spectra of various stars at the different stages of their life cycles. It would be nice to set up a 'scope with a star spectroscope during public or sidewalk astronomy sessions and explain the information that can be gleaned from the emission and absorption lines².
- On Wednesday night, the seeing was excellent, but the transparency was poor. It had been hot during the day, but and cold that night and everything dewed up. Even with my Orion dew zapper on the corrector plate, I had to use a hair dryer every 20 minutes on the finderscope, Telrad, and eyepieces. The views of various DSOs were disappointing — hardly worth the effort of removing the dew.
- But something glorious was happening. Mars was rising high in the sky and the atmosphere was very stable. Although the poor transparency had ruined the DSO viewing, it had little affect on Mars. The views of Mars were eye-popping and just kept on improving throughout the night. Most scopes stayed aimed at Mars, and "Oohs" and "Ahhs" were heard all night.
- The best views that I saw of Mars came from the 15 and 25" Obsessions — views worth going bankrupt for. An 8" Orion Dob with a variable polarizer filter also created impressive views. On my C-8, a red filter produced great views. One of the Obsessions used a yellow filter to successfully enhance the detail. It was hard to compare scopes and filters since the views

improved as Mars moved higher in the sky. The scope you last used had the advantage over the others. Also, sometimes, you got moments of exceptional seeing. Unfortunately, the binoviewers had to be perfectly adjusted, and I found it difficult to fine-tune the focus to squeeze out all the detail. I just didn't have enough experience using them while on a ladder.

- The details of the features of Mars were incredible. Syrtis Major was purple. Texture could be seen on Mare Serpentis, Iapygia, and Mare Tyrrhenum. The South Polar Cap with its jagged boundary was easy to see. I also saw a touch of the North Polar Cap and possibly a narrow patch at the south pole. (Was it a moment of exceptional seeing or my imagination?) It was as if I was looking at

2 I have a Rainbow Optics star spectroscope which I often use at public events. The response is usually very rewarding. — Editor

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- a picture of Mars in Sky and Telescope. But with a big difference. Photons from our sun were reflecting off Mars and directly striking the rods and cones of my retina.
- Was it worth 15 hours of driving for two nights of observing? You bet! It was a great experience. Experimenting with my 'scope, the three-dimensional views of M-13 and the Veil, the eye-popping views of Mars, the spectacular views of the sun, and the friendly reception that I received, are all etched in my memory. I drove home with a smile on my face while the music played loud.
- Life doesn't get much better — well, maybe a *bit* better. If my wife would come along to share my views of the universe, I'd even lower the volume on the car radio and stay on one station. A few more nights of clear skies would have just hit the spot. I should have chosen a campsite that provided shade to the east, so my tent wouldn't have heated up so quickly, and I'd have been able to sleep in past 8:00.
- Ah, but there is always next year.

2003 Annual Dinner Meeting

- This year's Annual Dinner Meeting will be another "don't miss" event. Our guest speaker is Canadian astronomer **Dr. J.J. Kavelaars**, a prolific discoverer of members of the outer solar system.
- Dr. Kavelaars received his PhD from Queen's University in 1998 and is now a Research Officer at the National Research Council Herzberg Institute for Astrophysics. While training as an extra-galactic astronomer who was mostly concerned with the size and scale of the universe, Dr. Kavelaars became interested in the structure of the outer solar system.
- Since 1997, JJ has discovered over twenty small satellites of the planets Jupiter, Saturn, Uranus and Neptune and hundreds of Kuiper Belt Objects in the far reaches of the outer solar system.
- In his talk, JJ will describe the current models of the end stages of the formation of the outer solar system and detail Canadian plans to solve some of the remaining riddles. The talk will be presented at an introductory level with lots of pictures to guide the way.
- Preparations for the Annual Dinner Meeting are underway, but unavoidable delays meant they weren't finalized by the time this issue had to be sent to the printers. The venue and ticket price will be posted on the Ottawa Centre web site as soon as those details are available.

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(un)Fasten Your Seatbelts

by Patrick Barry and Tony Phillips, NASA/JPL

- The "fasten seatbelts" light turns off, and you get up to ask the stewardess for a pillow; it's going to be a long flight. Only a kilometer ahead in the cloudless sky, a downward draft of sheering winds looms. When the plane hits these winds, the "turbulence" will shake the cabin violently and you could be seriously hurt.
- You don't know about those winds, of course, and neither does the pilot. Today's weather satellites can't see winds in clear skies: they rely on the motion of clouds to infer which way the winds are blowing.
- "Believe it or not, their best indication of wind shear right now is warnings from aircraft that have gone through it ahead of them," says Bill Smith of NASA's Langley Research Center.
- But a new satellite technology being pioneered by NASA and NOAA could improve this shaky situation. It's called GIFTS, short for Geosynchronous Imaging Fourier Transform Spectrometer. GIFTS is an infra-red sensor that can detect winds in cloudless skies by watching the motions of atmospheric water vapor. Water vapor is mostly invisible to the human eye, but it reveals itself to GIFTS by the infra-red radiation it absorbs.
- Smith is the lead scientist for EO-3, a satellite designed to test out this new technology. Slated for launch in 2005 or 2006, EO-3 will carry GIFTS to Earth orbit where it can produce 3-dimensional movies of winds in the atmosphere below.
- These wind data will not only improve safety, but also help the airlines save money. Knowing the winds along a flight route allows airlines to adjust the plane's fuel load accordingly, thus reducing the weight that the engines must lift. Saved fuel means saved money and less pollution.
- GIFTS can help planes avoid another potentially lethal problem, too: ice forming on their wings. If a cloud contains "supercooled" water droplets whose temperature is below freezing, those droplets will form ice on the wings of planes that pass through it. By looking at about 1700 different frequencies of the light coming from clouds, GIFTS can measure the temperature of the cloud top and determine whether it contains

water droplets that could cause aircraft icing. With information from GIFTS in hand, pilots can simply avoid clouds that appear dangerous.

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- Once EO-3 demonstrates the accuracy of GIFTS, airlines will be able to capitalize on this potential to make flying a cheaper and safer experience.
- Learn more about the GIFTS instrument and other advanced technologies being tested on the EO-3 mission at nmp.jpl.nasa.gov/eo3. Kids can go to The Space Place to play a data compression game related to EO-3 at spaceplace.nasa.gov/eo3_compression.htm.



Illustration Courtesy NASA/JPL

EO-3, carrying the GIFTS instrument, will be in a geosynchronous orbit for extended monitoring of large regions of our planet and enabling observation of weather patterns at higher resolution than possible with existing geostationary satellites.

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

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Astronomy Programs at the Canada Science and Technology Museum

- The CSTM's Fall astronomy courses start this month. Advance registration is required for all programs, and spaces are limited. Please call (613) 991-3053. The reservation line is open seven days a week, 9 a.m. to 5 p.m.
- For course details, visit the CSTM's astronomy program page at www.sciencetech.technomuses.ca/english/whatson/astronomy_programs03.cfm

Backyard Astronomy Course — Level 1

- Adults: \$55 Students: \$40
- Fall 2003 — Thursdays: October 23, 30; November 6, 13, 20
- 7:00 to 9:00 p.m.
- Winter 2004 — Tuesdays: January 20, 27; February 3, 10, 17
- 7:00 to 9:00 p.m.

Stargazing for Families

- Families: \$90 Adults: \$40 Students: \$30 Children(7_14) \$20
- Fall 2003 — Tuesdays: October 21, 28; November 4, 18
- 7:00 to 9:00 p.m.

Photographing the Night Sky

- Adults: \$55 Students: \$40
- Fall 2003 — Mondays: October 20, 27; November 3, 17
- 7:00 to 9:00 p.m.

Backyard Astronomy Course — Level 2

- Adults: \$55 Students: \$40
- Winter 2004 — Thursdays: February 26; March 4, 11, 25; April 1
- 7:00 to 9:00 p.m.

Mea Culpa!

Errors in the August/September Issue

- Last month's issue has at least two goofs to undo.
- In the article *Two Successful Star Parties*, the photo is courtesy of Jenn Tigner.
- The *General Assembly and National Council Report* was actually written by Rick Wagner, one of our National Council Reps.
- Apologies for the errors, folks.

