BPAA Newsletter

Battle Point Astronomical Association, Bainbridge Island, WA

ISSUE 53: NOVEMBER - DECEMBER 2002

NOVEMBER – DECEMBER - JANUARY CALENDAR

(Unless otherwise noted, all events are at the Edwin Ritchie Observatory, Battle Point Park)

November

November 3: Taurids Meteor Shower Peak
November 4: New Moon 6:38 a.m.
November 6: BPAA Board Meeting 7 p.m.
November 8-9: Imaging the Sky 2002, Salem, Oregon
November 9: Star Party Battle Point Park. Beginner session 6 p.m. Paul Below & Bruce Muggli
November 10: Observatory tours 2 to 4 p.m. Gena Ritchie
November 11: 430th Anniversary, Tycho Brahe's Discovery of Supernova 1572; First-quarter Moon 1:55 p.m.
November 13: Member Meeting 7 p.m. Harry Colvin; featured speaker Sonny Tremoulet
November 19: Leonids Meteor Shower Peak
November 20: BIB Videos 7 p.m. Gabriel Herzberg; Full Moon 4:57 p.m.; Lunar Eclipse
November 26: Last-quarter Moon 10:48 p.m.

December

December 4: BPAA Board Meeting 7 p.m.
December 5: New Moon 8:17 a.m.; Moon Occults Mercury
December 7: 30th Anniversary Apollo 17 Launch, Last Manned Mission to the Moon
December 11: Member Meeting 7 p.m. Harry Colvin
December 12: First-quarter Moon 1:03 p.m.
December 14: Geminid Meteor Shower Peak
December 15: Observatory tours 2 to 4 p.m. Gena Ritchie
December 18: BIB Videos 7 p.m. Gabriel Herzberg
December 20: Full Moon 4:13 p.m.
December 22: Winter Solstice 5:14 p.m.
December 25: Isaac Newton's 360th Birthday (1642)
December 27: Star Party Battle Point Park. Beginner session 6 p.m. Paul Below & Bruce Muggli

January

January 3: New Moon 9:08 a.m.
January 4: Earth at Perihelion (0.983 A.U. from Sun)
January 5-9: 201st Meeting of the American Astronomical Society in Seattle
January 7: Lecture, Robert L. Millis, Director of Lowell Observatory, 7 p.m. (Cont. on p. 2)

January 8: BPAA **Annual Meeting** 7 p.m. **ALL MEMBERS INVITED!**
January 10: First-quarter Moon 11:57 a.m.
January 12: Observatory tours 2 to 4 p.m. Gena Ritchie
January 15: Member Meeting 7 p.m. Harry Colvin
January 18: Full Moon 5:06 p.m.
January 25: Last-quarter Moon 12:57 a.m.; Star Party Battle Point Park. Beginner session 6 p.m. Paul Below & Bruce Muggli

Calendar Notes:

Time to get out the long underwear. The stars of winter are definitely worth pursuing, despite the discomfort of cold. In winter, the number of bright stars visible is greater than all other seasons. Many of these are located in the constellation Orion, the brightest of all the star groups.

For those of you sans long underwear, there are a number of interesting indoor activities coming up as well.

First, the 8th Annual Imaging the Sky Conference is scheduled for November 8 and 9 in Salem, Oregon. This is the place to be if you have any interest at all in CCD cameras. This year the theme is Urban Imaging. The speakers include Richard Berry, Ron Wodaski, Tom Carrico, and Craig Zerbe. There are two tracks of lectures, one geared at beginners and the other for those more experienced. Check out their website at http://home.teleport.com/~argo/its2002/its2002.html.

The member meeting on November 13 will feature Sonny Tremoulet, master telescope builder and mirror maker. At the meeting, he will showcase his 16-inch, f 4.5 Dobsonian telescope, which he constructed, along with the mirror which was made on a home-built grinding, polishing and figuring machine. The telescope is outfitted with digital encoders that connect to a Sky Commander setting circles unit, and then to a laptop computer. The scope took top honors at the Table Mountain Star Party this year, and was also featured in Mel Bartel's Telescope Walkabout at the Oregon Star Party. There is a picture of the scope at http://www.tmspa.com/2002History.html.

On two Wednesdays in November and December, November 20 and December 18, Gabriel Herzberg will be showing the Bainbridge Island Broadcasting videos documenting Astronomy Day, UW Professor John Delaney's lecture on oceans to stars, and UW Astrobiologist Monika Kress's lecture on the origin and early habitat of earth. This is an excellent opportunity for those of you who missed any of the above, either live or on BIB.

In January, from the 5th to the 9th, the American Astronomical Society will be meeting in Seattle at the Washington State Convention and Trade Center. Get the details from the website at http://www.aas.org/meetings/aas201/prelim/prelim.html. Robert L. Millis, Director of Lowell Observatory, will be in Seattle for the AAS meeting. Thanks to the efforts of Don Trantow, Dr. Millis has agreed to speak to the BPAA on January 7. Dr. Millis is involved in the exploration of the Kuiper Belt. His talk will include Kuiper Belt objects, a brief history of Lowell Observatory, and information on the construction of a new observatory southeast of Flagstaff, Arizona.

Finally, note that our star parties in December and January will coincide with the third quarter Moons. Other star parties may be scheduled at any time via our email yahoogroup. Any member who plans to observe can invite others to join in by sending an email to bpaa@yahoogroups.com. To join our email group, send an email with your name to bpaa-owner@yahoogroups.com and we can enroll you. If you want to also have web access to the messages and files, you can join the yahoogroups by clicking the register link for new users on http://groups.yahoo.com/, and then you can request to join our group on this page: http://groups.yahoo.com/group/bpaa/. The system will send us a message, and we'll approve your request after we verify your membership.

Diane Colvin (dcolvin@bainbridgeisland.net)

NEWS BRIEFS

MABEL STERNS NEWSLETTER AWARD to BPAA

The Astronomical League's yearly awards for top club newsletters were announced in the August *Reflector* with the *BPAA Newsletter* receiving fifth place. The award reads, the editors "are very successful in encouraging other members to write articles for the newsletter…. Even though the area has several astronomy clubs, membership in the club has been consistent over the eight years of its existence, due in no small part to the hard work of the newsletter editors."

First place went to Fiske Miles of the *Cosmic Messenger* for the Astronomical Society of Kansas City; second place to Kathleen Higgins for the *Boise Astronomical Society Sky Watcher;* third place to Steve Gray of *Prime Focus* for the Ft. Worth Astronomical Society; and fourth place to Ron Burk of *Skylights* for the Astronomical Society of Northern New England. (Cont. on p. 3)

The editors extend thanks to all of you who have contributed your articles. And please don't rest on your laurels—we always need your input for articles.

EXOTIC STARS REVEALED AS SUPER-MAGNETS

Scientists have found a rare and enigmatic class of neutron stars. The stars (of which only five are known) are actually magnetars--exotic stars with magnetic fields trillions of times stronger than the Sun's or Earth's, so powerful that they could strip a credit card clean 100,000 miles (about 160,000 kilometers) away. For the whole story, go to http://www.gsfc.nasa.gov/topstory/20020911magnetar.html

(From the Washington NASA Space Grant Consortium's electronic newsletter for teachers which provides curriculum ideas, Internet links and other resources to help them better meet the Washington EALRs and the National Science Education Standards.)

KUIPER BELT OBJECT

A Kuiper belt object roughly the size of Pluto's moon Charon has been recently discovered. Here are a couple of links to the story:
http://skyandtelescope.com/news/current/article_753_1.asp
http://www.cnn.com/2002/TECH/space/10/07/ice.object/index.html

It's at 44.5 AU, and takes 285 years to orbit the Sun in a roughly circular orbit. P. B.

U of W ASTROBIOLOGY SEMINARS

Nov. 5 – Prof. Anna-Louise Reysenbach, "Metabolic plasticity in high temperature microbes: Responding to the evolving atmo sphere on early Earth?"

Nov. 12 – Dr. John Chambers, "Volatile delivery to habitable planets."

Nov. 19 – Dr. Kurt Konhauser, "Iron Biomineralization: Modern Analogues for Precambrian iron formations."

Nov. 26 – Dr. Ralph Lorenz, "Titan."

Dec. 10 – Prof. Tom McCord, "Salt Minerals on Europa and other Surfaces: Food for life."

All are welcome. Tuesdays, 2:30-3:30, Rm. A-114 , Physics & Astronomy Building, U of W Campus.

TRIP TO JACK RIGGS' RADIO TELESCOPE

Jack Riggs called October 1st to say that the radio telescope was all set and that that day was an especially good day to visit because the Moon would be visible in the afternoon. He was anxious to demonstrate how he can get signal return from the Moon in an active transmit mode. I said most of our people would only be available on the weekend, but he said the Moon would not be visible on the weekend.

I checked the list of people interested and we ended up with four people going, Jim Vaughan drove with me, Jim Young and David Warman as passengers. We had no trouble finding Jack's place in East Bremerton. Jack is very personable and hospitable, and would be glad to demonstrate the R-T on the weekend for another group. The telescope is in his open back yard, but his equipment room, where the action takes place, is very crowded with computers, transmitters, receivers, and all sorts of junk. The floor would be very attractive with a few meat balls and some tomato sauce.... With four visitors the place was a little crowded. Six would be the absolute maximum.

The 30 foot antenna is impressive, and so is Jack's equipment. It is still not running smoothly, however, and Jack was unable to bounce a signal off the Moon, although he had done it frequently in the past week.

Lyon McCandless

REPORTS AND ARTICLES

President's Message

This issue I would like to follow up on two items from last time.

In the last newsletter, I mentioned that BPAA members can obtain discounts on subscriptions to *Sky & Telescope* magazine. I neglected to provide details, and several people have asked how this is done.

The process is to write a check to BPAA for $29.95 (for a one year subscription) and send it to our Club's PO Box (see the last page of this newsletter) or give the check to our treasurer, Eric Cederwall. Include a note to Eric that it is for a subscription to *Sky & Telescope*. It would be a good idea to include your current mailing address. Eric then deposits your check into our Club's bank account, and writes a check from BPAA to *Sky & Telescope* and sends it to them. That's all there is to it. When it is renewal time, *Sky & Telescope* will (Cont. on p. 4)

send you a reminder, which will have a note on it to send the check to your club's treasurer.

The program is designed by *Sky & Telescope* to ensure that the people taking advantage of it really are members of a club. Also there is a minimum number of people that have to subscribe in order for us to get this discount (I think it is 8 or 10; we currently are over the minimum limit).

This will save you about $10 on a year's subscription. Which makes your BPAA membership an even greater bargain, it is like getting 40% off of your annual family membership!

The second item is our telescope checkout program. The club has telescopes that are available for checkout by members. The checkout period will be for one month, and the time to obtain or return the scopes will be at our monthly beginner session (see our calendar for dates). If this date is not possible for you, we could also receive returns at the monthly member meeting. If there is no waiting list for the telescopes, then the scope can be renewed for an additional month.

At checkout, one of our members will review the operation of the telescope with you, and go over some important issues. Beginners should start with one of the smaller Dobs, and then work up to larger scopes if they want.

Current status (as of 10/21/02):

- 4.5 inch Dob: available, no wait list
- 6 inch Dob, available, no wait list
- 8 inch SCT, checked out, no wait list
- 16 inch Dob, available, no wait list

For now, you can email me at aurorae@sprynet.com with your request to reserve a telescope. Longer term, I would like a member to volunteer to run this program.

Paul Below

INTERNATIONAL SPACE STATION (ISS) AMATEUR TELESCOPE- STATUS

By Mac Gardiner

Why should we even consider placing an amateur telescope on the ISS? What makes it so uniquely valuable with all of the effort involved, toward a program whose success is still problematical? What makes the whole effort worth while? Finally, could we amateurs be counted on to do our part in running the system, should the system be placed in space and made available to amateurs?

Studies of the Cosmos, spearheaded by the Hubble Program, are now centered on its early life, where events were dynamic, beautiful, and creative. Such can only be seen clearly from observations in space, and those involving UV can only be viewed from space. The ISS-AT will expedite this. The ISS-AT covers all locations on earth, and some part of the cosmos is always available for viewing, even during daytime. No clouds can obscure transient celestial phenomena. It is always available. Any ground station operation is labor intensive. An amateur operation will not only save money, but it will cause the enthusiastic workers (most of whom are voters) to be salesmen for the effort as well. The ISS can use support and programs that have low continuing costs. ISS is international, and so is amateur astronomy. In particular, Canada, Japan, Germany, Russia, UK, and Italy have active and eager members who could influence their respective governments toward increased participation. Education, from early awareness, through participatory group projects, to advanced independent research would be improved. The geographical location of the student is immaterial, and the chance to explore and share is high.

So far, the Astronomical League (AL) made up of 24,000 amateurs in the USA, feels emphatically that the answer is YES!! to all the above work and options.

1. The Astronomical League is committing a significant percentage of its resources and energy into this project, selecting Orville Brettman (past President of AL) as Project Manager of the program and allocating $14,000 for miscellaneous annual costs associated with a pro bono program. This is the largest project ever undertaken by the AL, and it is steadily and quietly working toward its goals, and Orv has built up an impressive staff of around 15 very active volunteers to chair various responsibilities. NASA considers that its financing and resource allocation situation is well in hand, but they have expressed interest and concern about the League's capability to man and run the ground system used to process observation requests, deliver

(Cont. on p. 5)

programming schedules to the ground control system, process the raw data received, generate, collate, distribute and file the astrophotographs.

2. The League's response to this concern and interest has been to build a ground-based analog of the space system, run it and prove, both to themselves and NASA, that the League is competent and willing to carry out such a project. It is called Project ALPHA and consists of a 16' Autonomous Telescope with two CCD cameras, housed in a remote multi-telescope Winer Observatory facility in Sonoita, AZ, and a satellite link to the Dyer Observatory at Vanderbilt University at Brettwood, TN where operations are based.

3. Communications, administration and data handling are handled by the League web site server system. The equipment was loaned or donated by interested contractors and individuals, and the major continuing expense is that of the Winer Observatory.

4. The system is up and running at Sonoita, AZ. Beta tests have been made, students are using the system, and one student research project has been carried out. Typical turn around time from request to available file is about a week.

In no way, other than conceptual, is this a clone of the space-borne telescope. However, its administration and operation is a precursor to that required for the ISS-AT system. In less than a year, the system was brought to operation; and lessons learned are being incorporated as the structure for the full system which would ultimately include both ground and space elements. In this way, requests that can be handled by the ground unit will relieve the load on the space component.

The Hubble Telescope is expected to be phased out in the 2010-2015 time period, and its successor, the Next Generation Telescope, will not be available until around 2020. It could well be that the ISS-AT would end up being the only visual spectrum astrophotographic system operating in space during that time! Amateurs would have the equipment and the experience to lead in this research!

ASTROBIOLOGY - First Signs of Life

By Bill O'Neill

This term I'm auditing a course in geobiology, as part of the astrobiology program at UW. Geobiology concerns the effects that life has had upon the Earth and the effects exerted by the Earth's conditions on the origin and evolution of life. The professors, Roger Buick and Peter Ward, are world renowned, so it's quite a privilege to hear their lectures and arguments. Little of this subject is uncontroversial, since scientists are trying to discern what happened from rare bits of evidence remaining from events billions of years ago. Arguments are plentiful, and new (sometimes contradictory) evidence and methods have appeared with increasing frequency in recent years. I'll try to give you a feel for current interpretations with respect to the earliest history of the Earth.

It's generally accepted that the solar system assumed something like its present form about 4.55 billion years ago (4.55 Gya) – roughly one-third the age of the universe. Somewhat less certain is the age of the oldest rock sample yet found: a tiny (0.2 mm) crystal of zircon has been dated as 4.4 billion years old (on the basis of its content of oxygen isotopes), and it's noteworthy that the type of granitic rock in which the zircon was found normally forms under water.

Cratering observed on other planets and the Moon suggests that the Earth was heavily bombarded by bolides (meteorites and comets) so big that their impacts would have vaporized primordial oceans and exterminated any life throughout the Hadean period, until about 4 Gya. The Moon is thought to have arisen from a collision between Earth and something the size of Mars more than 4.3 Gya, and it was most heavily bombarded 4.2-3.8 Gya. Subduction and other tectonic activity have probably erased any rocks from Earth's earlier period, except for some "recently arrived" meteorites, which date to 4.55±0.03 Gya (on the basis of their uranium and lead isotope proportions). The oldest rocks brought back from the Moon by the Apollo explorers date to 4.43 Gya by the same methods – corresponding to what is expected to be the age of Earth's oldest crusts.

The oldest sedimentary rocks (from Isua, Greenland), apparently resulting from erosion induced by water, date to 3.8 Gya. The period prior to that time is named Hadean for the hellish conditions that must have been produced by the bolide hammering that Earth experienced then. The period from 3.8 to 2.5 billion years ago is known as the Archaean, and it's from that time when the first signs of life have been recognized. Of course, it's possible that life emerged earlier and its evolution was stymied by those Hadean impacts. It's hard to imagine how we'd know, although future explorers on the Moon might find a few rocks there which had been splattered into space from the Earth by bolide impacts – a proposal to that was initiated recently by a couple of UW graduate students.

For now, the oldest certain signs of life (found in South Africa) date back at least 2.6 billion years: filamentous mats and paired spheroidal microfossils that are composed

of organic carbon (kerogen) and show orientation relative to the mineral substrate which resembles the orientation living micro-organisms exhibit.

Claims have been made with respect to rocks dated to 3.45 Gya, but the alleged microfossils and cyanobacteria stromatolites have been criticized as being either non-biogenic or not ancient by authorities in the field – including my professors. However, rocks dated at 3.52 billion years, from the Coonterunah formation in Australia (home turf of Professor Buick) do contain the proportions of stable carbon isotopes presently considered peculiar to biologic processes, and there are controversial specimens of Greenland rocks with similar stable carbon isotope ratios apparently dating back to 3.85 Gya.

Thus, it's generally accepted that microbial life emerged more than 3 billion years ago, perhaps within a few hundred million years after the Hadean bombardment subsided. It's remarkable that it appears to have required a couple of billion years more for multicellular life to emerge and produce fossil evidence – the famous Precambrian explosion of diversity occurred a "mere" 600 million years ago.

Aren't we fortunate that the Earth remained hospitable for so long? Looking around the solar system, we can see how lucky we earthlings have been.

Robert Forward Obituary by Mac Gardiner

Each of us meets a "mentor" sometime, somewhere, who greatly influences the remainder of his/her professional or personal life. My "never to be forgotten" is Robert Forward

Robert L. Forward, a science fiction writer, physicist and inventor whose 11 novels were inspired by his research into gravitational physics and advanced space propulsion, died at his home in Seattle, from cancer in late October; he was 70.

Robert Lull Forward was born in Geneva, N.Y., on Aug. 15, 1932. He served in the Air Force, reaching the rank of captain. He received his bachelor's degree in physics from the University of Maryland and a master's in applied physics from the University of California at Los Angeles. For his doctorate from Maryland, he built and operated the world's first bar antenna for the detection of gravitational radiation; the antenna is now at the Smithsonian Institution.

At Hughes and later at companies he founded, Forward Unlimited (in 1987) and Tethers Unlimited (in 1994), Dr. Forward devoted his research efforts to propulsion systems for space travel. He often explained that he had advised so many science fiction writers on the technical details of space flight and other scientific issues that he decided to take up writing himself.

He studied the potential for antimatter propulsion and space weapons, and it was in that regard that I got to know him quite well. The essential concept was to use a particle beam, made up of anti-hydrogen molecules, to interact with specific components of oncoming nuclear warheads. As the reaction is a direct function of the target density, the uranium and plutonium elements are most responsive and the beam "seeks out" the true warhead from all less dense material, including decoys. Its prime use would be for countering mass attacks, involving tens of thousands of missiles, as its total mass of weapon "expendables" was in micrograms.

Its energy release per pound was about 2000 times that of fusion reaction, and there is no critical mass requirement allowing the equivalent of 1lb. of TNT to be placed inside the warhead itself.

Its problems included storage and the means of antimatter production. It is hard to find a container that won't blow up. A production facility that would have produced enough -H2 per year to stock a 20,000 missile response in ten years would have required the full electrical power output of Grand Coulee dam.

Finally, a prominent physicist, Dr. Gabrielse, told me that making anti-matter isn't easy. I learned, just a few weeks ago, that he had succeeded in producing just one molecule of it, 25 years later.

Over 18 months, I had many meetings with Robert, had him up to Seattle to address Boeing Management, and joined him in sessions at Rand and Los Alamos. My appreciation of his creative intelligence and pragmatic approach to huge problems increased with each meeting, and he remains tops in my list of notable useful acquaintances. I am truly sorry to hear that he is gone.

WATCH for John H. Rudolph's article on "Long Lake, Petroglyphs" in the next *BPAA Newsletter*, #54.

Financial Statement for October 2002

BALANCE SHEET:	$
Current Assets	18,241
Fixed Assets	242,538
Total Assets	**260,779**
Liabilities	-0-
Equity	260,779
Total Liability/Equity	**260,779**

PROFIT & LOSS:	$ Oct.	$ YTD
Income:		
Contributions	35	7,391
Membership Dues	105	2,280
Other	60	1,782
Total Income	**200**	**11,453**
Expense:		
Administration	0	1,546
Program	60	2,321
Utilities	46	692
Total Expenses	**106**	**4,559**
Net Income (Loss)	**94**	**6,894**

Eric Cederwall, Treasurer

Planetariums

By Jim Vaughan

John Rudolph designed the meeting room at the observatory to accommodate a planetarium. I think that a planetarium is a wonderful idea. The problem is how do we build one that is within our budget.

The traditional planetarium is a building with a dome and a very special projector. The projector has a couple of spheres with a light in the middle. Holes are drilled at the star positions. The size of the holes determines the brightness. Very bright stars have lenses. Planets each have their own projector. The planetarium projectors are large and very expensive.

There is a company that markets a portable planetarium. The dome is a tent and the projector is a can with holes in it. You crawl in the tent and sit on the floor. The company sells the tent and a selection of cans.

John built a crude projector by drilling holes in a sphere with a light in the middle. He tried it out and it works. It only shows fixed stars and not the planets. It works pretty well but has a lot of limitations.

There are several programs that simulate planetariums. The one we use for star parties is "Starry Night". There are also "The Sky" and "Home Planet". "Home Planet" is free. These programs use a huge database of stars. They also show the planets, galaxies, satellites and comets. The only problem is that they are displayed on a monitor or a flat screen. The program shows the shapes of the constellations but does not show where they are in the sky the same way a planetarium does.

John Rudolph has suggested that we use a specially designed fish eye lens on the projector. The projector would project the full sky on the inside of the dome. There is a lens designer who is willing to design the lens and Bob Matthews is willing to make the lens. This is a very difficult lens to make.

I'd like to make another suggestion. I call it my "Poor Man's Planetarium."

After going to the Star Party a couple weeks ago, I realized that Starry Night is very good at showing the shapes of constellations, but does not really show the positions in the sky. I think that there is a lot of value in showing where the stars actually are in the sky. It also reminded me of an idea that I have had for a long time for a Poor Man's planetarium.

In a normal planetarium, all the stars are projected on the inside of the dome at the same time. Since, contrary to your mother, we don't have eyes in the back of our head, the only stars that need projecting are the ones that we can see. The stars behind us are not needed. The trick is to get everybody to look at the stars that are being projected. The idea is to mount the standard Box Light projector on an Alt/AZ mount and synchronize the projected image with the direction that the projector is pointed. The stars remain in a fixed position on the inside of the dome. Only a portion of the field is shown at one time. It is up to the narrator to direct the audience's attention the region of the sky that is being projected, north, east, south, or west.

There are several things that we can do to see if this scheme will work before we invest any money.

1. The projector must have a zoom lens or else Starry Night must have a continuous zoom capability so that we

can project the stars at the correct angular separation. It also also must be capable of operating in different orientations without damage.
2. Try pointing the projector in different directions and manually change the azimuth settings of Starry Night to see if the effect works.
3. To calibrate the angles, mount the projector on a turntable. A setting circle and a laser pointer can be used to make accurate azimuth measurements. Project the image and zoom until the azimuth separation on the setting circle matches the azimuth of the stars. Postit notes can mark the position of the stars on the wall. After we get the zoom calibrated, we can permanently mark the position of two or more stars on the wall so that we can set up the projector easily. Set Starry Night to the time and date of the original calibration and zoom until the stars match the marks on the wall.
4. Tilt the projector until the bottom of the image is at the horizon and adjust the altitude in Starry Night to correspond to the projector angle. If the projected field is 90 degrees wide and the projector is at 45 degrees, the image would cover the area between the horizon and zenith. This might be enough for an effective presentation. With our rectangular room there would be lots of keystoning, distortion and focusing problems. A dome would correct most of these problems.
5. Most planetarium programs can be interfaced to control a goto telescope. Our problem is different. We need to slave Starry Night to the position of the projector. The object is to point the projector to a point in the sky and have Starry Night follow the projector. I think that this can be done easily if Starry Night can accept an Alt/AZ or RA/DEC position from the keyboard. It is relatively easy to emulate the keyboard from another computer. It is easy to build a connector that plugs between the keyboard and the computer so that the regular keyboard operates normally and also allows the second computer to send keyboard commands. The second computer reads the position of the projector and sends keyboard commands to Starry Night. Since the second computer can type a lot faster than I can, Starry Night should be updated fast enough to keep up with the projector.
6. The Alt/AZ mount of the projector can be controlled manually or with stepping motors. A manual mount would use shaft angle encoders on both axes and a computer (a microcontroller such as a PIC or a second PC) to measure the position of the projector. The second computer sends keyboard commands to the main computer. I think that a manual control would work very well. The operator points the projector at the sky and the stars appear where he is pointing. If we were to use stepping motors, a standard paddle would be used to move the projector. Mel Bartels' Scope program could be used to point the projector. We would only have to write a keyboard interface program.

I think that it is worth taking the first couple steps to see if the effect works.

CHARACTERIZING AN ASTEROID

The first question to ask is "Why do we bother?" and the obvious answer is "Because it is there!" and that has been sufficient for astronomers, particularly amateur astronomers from day one. As to what characteristics we wish to derive from "bothering," the answer is, "those that our data and our imagination will let us."

Assume that the asteroid is known to be passing close to the Earth. That means that it will be within the earth¹s atmosphere, slowing down, and probably tumbling as it does so. We have an organization known as the IOTA (The International Occultation Timing Association) Occultations occur when a foreground object, such as an asteroid, passes in front of a more distant object, like a star.

Forecasting the occultations of stars by asteroids is a complicated matter. An occultation occurs when the long, thin shadow of an asteroid, cast by a distant star, traces its narrow course across Earth's surface. Hundreds of occultations are observable every year, but owing to errors in the cataloged positions of asteroids and stars it is easy to make mistakes in predicting the exact path the asteroid shadow will pursue.

Data obtained by timing occultations can provide information on the asteroids' sizes, shapes, and compositions. Asteroids "take on a carnival of forms, resembling lizard heads, kidney beans, molars, peanuts and skulls," notes the planetary scientist Erik Asphaug. It is theorized that many asteroids are not solid objects but rubble piles. Such asteroids cannot be rotating very rapidly, otherwise centrifugal force would have torn them apart, and initial indications are that there is indeed a sharply defined upper limit to asteroid rotation rates, suggesting that at least some asteroids are slag heaps, not boulders. But only a handful have yet been imaged with sufficient accuracy to make this determination, so amateurs can improve the database by using occultations to map the shapes of additional asteroids.

BPAA was asked to assist the IOTA in the asteroid occultation of Zeta Arietes, which was predicted to pass its narrow shadow on Seattle around 9:35 p.m. Oct. 15.

Dave Warman (with Mal Stamper) and Harry Colvin each determined their locations, exactly (with GPS), then timed the occultation using timing (Cont. on p. 9)

Information from the WWV national source. Dave took video tapes of the vidicon images with the timing pulses superimposed, while Harry used a stopwatch, synchronized to GPS time. Harry's occultation lasted 2.1 seconds, while Dave recorded at 1.8 seconds.

What does this all mean? (Figure 1.)

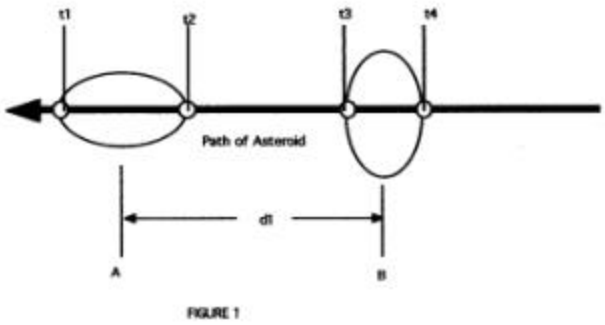

FIGURE 1

Let's consider two observing stations, Harry and Dave (Aand B), part of a long string of similar stations. Harry records his position A accurately and times the start and stop of the occultation as t1 and t2. Dave does the same at Position B. (tl + t2)/2 is that time at which something approximating the center of pass passes the observation station , and the same holds true for position B. We know the down range distance d1 from GPS, so the average velocity v1 of the asteroid is computed over the interval t1-t4. Knowing the velocity, the down-range dimension of the asteroid at A (t1-t2)/v1 and that at B is (t3-t4)/v1. From this minimal data input, some measure of the asteroid size and shape can be derived. The more data points used, the more refined in the determination. A series of measurements of velocity permit the determination of deceleration, permitting the derivation of Mass of the asteroid. From that and size, density is determined. Density gives one a guess on composition, and spin rate determines the possibility of a "rubble" asteroid.

In other words, you can learn quite a bite by having a team time occultations in a coordinated manner. (The details of the measurements made are supplied by Harry and Dave.)

Mac Gardiner

SEEING STARS

By Anna Edmonds

The Leonids are coming, the Leonids!!! This is the November meteor shower caused by debris left by Comet Tempel-Tuttle as it circled the Sun in 1767 and 1866. The peak time for the shower in the Seattle area should be around 2:40 A.M. on November 19. Predictions for the zenith hourly rate (ZHR) of meteors at that time range around 2,500—potentially a real shower.

However, there are several complications, a major one being the presence of a full Moon which can blot out all but the very brightest lights. The Moon will be between the constellations of Ares and Taurus that night, but—and this might help a wee little—by 2:30 it will be off in the west, whereas the constellation Leo will be coming up in the east.

The shower takes its name from Leo because the Leonids appear to come from the lion's mane. Leo begins to appear about 11:00 P.M.; by 2:30 it's up 30º. (If you extend your arm with your little finger and pointer stretched out as far as they'll go, the distance you measure in the sky is 15º, so two of these should show you how far Leo will be above the horizon.)

ASTRONOMY 0.001

The position of Leo is a second complication: the ZHR is calculated for a very dark sky when the radiant of the shower is directly overhead. Obviously that won't be the case here: our skies aren't dark, and Leo never gets very high in our sky.

So, why bother with a meteor shower that may at best produce only a half dozen faint streaks across the sky after a whole night's watching, that may occur when Seattle's usually rainy fall has come back, and when—if there is any viewing—one's nose will be frost-bitten from having been out in six hours of cold wind? Because it's there. Because it might be spectacular, producing not only meteors but fireballs as bright as Venus at its height and bolides that explode while you're watching. You wouldn't want to miss that, now would you?

I can't guarantee that any of this will happen. I can guarantee that you won't see it if you don't go outside.

And if you miss the Leonids, the Geminid meteors are coming December 14. How about that?

INSIDE THIS ISSUE

Battle Point Astronomical Association
P. O. Box 10914
Bainbridge Island, WA 98110

BATTLE POINT ASTRONOMICAL ASSOCIATION
P.O. Box 10914, Bainbridge Island, WA 98110
Website: http://bicomnet.com/ritchieobs/
Ritchie Observatory, Battle Point Park
Bainbridge Island, Tel. (206)842-9152
Public Tours:
To be announced during the summer, or by by special appointment.

Officers & Directors
Paul Below, President
(360)779-2961,aurorae@sprynet.com
George McCullough, Vice-Chairman
(360)697-3525, geomac@sprintmail.com
Richard V. (Rik) Shafer, Secretary
(253)639-0927, rikshafer@aol.com
Eric Cederwall, Treasurer
(206)842-8587, ecederwall@bainbridge.net
John H. Rudolph, Facility Director
(206)842-4001, rudoarch@juno.com
Mike Walker, Education Director
(360)638-1576, miwalker@krl.org (home), michaelw@cksd.wednet.edu (work)
Anna Edmonds, Publicity Director
(206)780-2708, waed@bainbridge.net
Diane Colvin, Events Director
(206)842-6617, dcolvin@bainbridge.net
Harry Colvin, Special Interest Group Coordinator
(206)842-6617, hcolvin@bainbridge.net

Edward M. (Mac) Gardiner, President Emeritus/Founder
(206)842-3717 macg@bainbridge.net
Ed Ritchie, Chief Astronomer/Founder
1993-1997