BPAA Newsletter

Battle Point Astronomical Association, Bainbridge Island, WA

ISSUE 49: MARCH-APRIL 2002

MARCH-APRIL-MAY-CALENDAR

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

March

March 5: Last-quarter Moon 5:24 p.m.
March 6: BPAA Board Meeting 7 p.m.
March 9: Observatory tours 2 to 4 p.m. Gena Ritchie & Don Trantow
Tour & Star Party for Olympic Astronomy Club 4 p.m.
March 13: New Moon 6:02 p.m. Member Meeting 7 p.m. Patrick Rooney
Project ASTRO/Seattle presentation Linda Khandro & Professor Woody Sullivan
March 14: Lecture Series 2002 7 p.m. Paul Middents; The 17th Century: Brahe, Kepler & Horrocks
March 15 or 16: Messier Marathon - Battle Point Park
March 20: Vernal Equinox. Moon occults Saturn.
March 21: Lecture Series 2002 7 p.m. Paul Middents; The 18th Century Transits
March 21: First-quarter moon 6:28 p.m.
March 23: Observatory tours 2 to 4 p.m. Gena Ritchie & Don Trantow
Astronomy Day Planning Meeting 4 p.m. Jared Barnhill
Star Party - Battle Point Park. Beginner session 6 p.m. Paul Below & Bruce Muggli
March 28: Full Moon 10:25 a.m.
March 31: Comet Kohoutek Closest Approach to Earth (2.492 AU)

April

April 3: BPAA Board Meeting 7 p.m.
April 4: Last-quarter Moon 7:30 a.m.
April 7: Daylight Saving Time begins
April 10: Member Meeting 7 p.m. Harry Colvin
April 11: Lecture Series 2002: 7 p.m. Paul Middents; The 19th Century Transits
April 12: New Moon 11:22 a.m.
April 13: Observatory tours 2 to 4 p.m. Gena Ritchie & Don Trantow
April 16: Moon occults Saturn
April 18: Lecture Series 2002: 7 p.m. Paul Middents; 19th Century Precision
April 20: **Astronomy Day** Tours, Activities, Lectures, PotLuck and Star Party
First-quarter Moon 4:49 a.m.
April 25: Lecture Series 2002: 7 p.m. Paul Middents; Our Picture of the Milky Way Evolves
April 26: Full Moon 7:01 a.m.

April 27: Observatory tours 2 to 4 p.m. Gena Ritchie & Don Trantow

May

May 1: BPAA Board Meeting 7 p.m.
May 2: Lecture Series 2002: 7 p.m. Paul Middents; Nebulae Become Less Nebulous
May 7: Venus passes 2.4 degrees from Saturn
May 8: Member Meeting 7 p.m. Patrick Rooney
May 11: Observatory tours 2 to 4 p.m. Gena Ritchie & Don Trantow
May 14: Moon occults Venus & Mars
May 16: Lecture Series 2002: 7 p.m. Paul Middents; The Red Shift; A Distance Scale Evolves
May 18: Star Party Battle Point Park. Beginner session 7 p.m. Paul Below & Bruce Muggle
May 23: Lecture Series 2002: 7 p.m. Paul Middents; Cosmology Extends the Distance Scale
May 25: Observatory tours 2 to 4 p.m. Gena Ritchie & Don Trantow
May 30: Lecture Series 2002: 7 p.m. Paul Middents; The Large Scale Structure of the Universe

Calendar Notes:

March and April are busy months for the BPAA. The newly-established monthly Member Meetings will continue, with the March meeting featuring a presentation on Project ASTRO/Seattle. UW Astronomy Professor Woody Sullivan and Linda Khandro will be on a mission to interest BPAA members in joining with them as Project ASTRO astronomer partners for the 2002-2003 school year.

February's Member Meeting featured a talk by Paul Middents by way of introduction to his lecture series for 2002 on Measuring the Universe. The Intro was enticing, easily convincing those present that the lecture series will be well worth attending. The series of 10 lectures started February 28, and will continue through May 30.

On March 15 or 16 (whichever holds the best bet for clear skies), BPAA will host its first Messier Marathon. Theoretically, observers will have an opportunity to observe all 110 objects that make up the Messier catalog in just one night. Anything short of that goal will be a plus. Just finding and identifying as many Messier objects as possible in one night will prove to be a challenging and rewarding experience for those who participate.

April 20 is **Astronomy Day**. BPAA will join with hundreds of astronomy clubs and other entities worldwide to acquaint members of the public with the joys of astronomy. Jared Barnhill has once again volunteered to head the event, and we all need to make an effort to help him out to make Astronomy Day the success it has always been. Jared will be holding planning meetings February 23 and March 23 at 4 p.m. Be sure and show up and let him know what your contribution will be on this stellar day.

After a winter nearly devoid of viewing opportunities, we can now look forward to glimpses of the Spring Sky. The Big Dipper is nearly overhead during the spring, and once again we can "arc to Arcturus." Arcturus is the brightest star in the spring skies and the most prominent star in the constellation Bootes, the herdsman. Arcturus, only 37 light years away, is one of the nearest bright stars. It is a giant star about 23 times the diameter of the sun and radiating about 130 times as much energy.

Remember that when the weather clears we can schedule last-minute star parties 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

Future Issues of the *BPAA Newsletter*

The Battle Point Astronomical Association (BPAA) is planning to publish future issues of the *BPAA Newsletter* electronically on our website:

http://bicomnet.com/ritchieobs/

Adobe Acrobat will be used to prepare the text file of each *Newsletter* for publication on line. If you do not have an Adobe Acrobat reader you can download the program free. Instructions will be posted on our website telling how to do this.

Electronic publication of the *BPAA Newsletter* will have several advantages. It will save money and effort while allowing for more timely distribution of news. It will also permit us to include colored pictures with the text.

This Notice is being sent to all current members of BPAA for whom we have an email address listed in our database. As a test, we have temporarily posted a partial copy of the Jan-Feb 2002 *Newsletter* on our website which you may wish to examine to assure that your system is capable of receiving the newsletter on line. When each new edition is posted we will send you an email to alert you to download it. We will continue to mail xerox copies to members who do not have the capability to download and read or print out the *Newsletter* files. Please send me an email if you wish to continue to receive paper copies by mail.

Rik Shafer RikShafer@aol.com
BPAA Secretary

LOANER SCOPES

Paul Below and I have been fixing up two loaner scopes for club member use. One is a 4.5" and the other a 6" Dob. I just came in from testing out the 6" scope - easy to do, it's such a great grab-and-go size.

With a 7.5mm eyepiece I could see very good detail - much more than just the Northern and Southern equatorial bands on Jupiter. Unfortunately the Great Red Spot was on the opposite side, but the seeing was good enough tonight that I'm sure it would have been visible had it been anywhere close to the meridian. Banding could also be seen on Saturn, as well as the Cassini Division, which did not come and go but was quite steady. It is a very nice scope and a nice size for young people to use. We'll be showing them at this coming members meeting, and, weather permitting, maybe we could set them up for viewing.

Doug Tanaka

BINOCULAR OBSERVING CLUB

Did you know that the Astronomical League has a Messier Binocular observing club? This page has the details:

http://www.astroleague.org/al/obsclubs/binomess/binomess.html

The requirement? Find any 50 of the 110 Messier objects with binoculars. Do that, and you get a certificate and your name on our web site and in the *Reflector*!

The Astronomical League has gone through the hard part. They have lists of the Messiers graded by whether they are easy or hard with binoculars. They also have a log sheet that you can use (or you can write down your observations in a notebook). You can print the files from their web site.

For our Messier Marathon, maybe you would

want to take the binocular challenge: see if you can earn the Astro League's binocular Messier certificate in a single night!

For a simple finder or planner, *Sky and Telescope* sells a laminated Messier Card for $5. It is on their web site; in the product index click on M for Messier and you'll find it listed under Messier Card.

http://skyandtelescope.com/shopatsky/product-index.asp

I have one of these, and it is very handy for planning. Cathy has used it at Table Mountain to determine which Messiers were visible and liked it.

(The March copy of *Astronomy* has an article on the Messier Marathon. It contains a finder map and a list of the objects in a suggested order.)

Paul Below

Lecture Series 2002

Measuring the Universe: How our ideas of the earth, the solar system, the galaxy and the universe have evolved.

A ten lecture series is offered at the Ritchie Observatory, Battle Point Park, Bainbridge Island, WA by Paul Middents, "adjunct emeritus" from Olympic College and veteran of four previous BPAA courses and lecture series. (The last was given in 2001.).

Each lecture will start at 7 P.M. on Thursday evenings and last for approximately two hours with breaks for the faint of heart.

Lectures are scheduled for the following dates:

Feb. 13, Thirty-minute introduction and overview as part of the regular monthly meeting of the BPAA

Feb. 28, Lecture 1: The Ancient Greeks

Mar. 14, Lecture 2: The 17th Century; Brahe, Kepler and Horrocks

Mar. 21, Lecture 3: Newton, Halley, Cook and the 18th Century Transits

Apr. 11, Lecture 4: The Herschels; Planets, Galaxies and the 19th Century Transits

Apr. 18, Lecture 5: 19th Century Precision and the Distance to the Stars

Apr. 25, Lecture 6: Our Picture of the Milky Way Evolves

May 2, Lecture 7: Nebulae Become Less Nebulous

May 16, Lecture 8: The Red Shift; A Distance Scale Evolves

May 23, Lecture 9: Cosmology Extends the Distance Scale

May 30, Lecture 10: The Large Scale Structure of the Universe

The only prerequisite for this course is a mature interest in astronomy. Familiarity with mathematics through high school algebra, geometry and trigonometry will be useful but you will be able to follow most of the material without applying any mathematics.

The perspective will be strongly historical. Emphasis will be placed on the role of transits of Venus in developing a knowledge of the size of the solar system. This is inspired by the occurrence of the next transit on June 8, 2004. This will be the first one since 1882. If you don't know what a transit is, come to the lectures and find out! Actually the following link will help pave the way:
http://www.dsellers.demon.co.uk/venus/ven_ch1.htm

This link is based on a book of the same name and one of the sources I will be drawing on for this series. I will provide other links via this web page. Standard introductory astronomy texts such as the one used in previous BPAA courses will also be useful: *Discovering the Universe*, 5th Edition, Comins and Kaufmann

Other sources for this course

Venus in Transit, Eli Maor

. *Parallax,* Alan W. Hirshfeld

Web access will be very useful to all participants.

Paul Middents

REPORTS AND ARTICLES

EDUCATION ITEMS

1. Excerpt from *The Soul of the Night*, by Chet Raymo, Publisher: Prentice-Hall, 1985.

"Once, when I was very young, my father woke me in the dead of night to see a comet. He had heard on the radio that a comet would be visible in the eastern sky in the hours before the dawn. Slippered and jacketed, dragging sleep behind me like a comet's tail, I followed my father into the yard. Together we stood among the black pines and searched our little patch of starry sky.

"It is clear now, in the light of memory, that my father did not know exactly what it was we were looking for or where in the sky we might find it. He imagined, I suppose, that the comet would announce itself, trumpeting like an angel, trailing a train of light. He imagined swoosh and glitter. He expected a sky on fire, and he wanted me to see it.

"We did not see the comet. It was probably one of those dozen-a-year comets of the astronomers, visible only with binoculars or telescope or photographic plate. Or perhaps it was a faint naked-eye comet hidden from us by the pines. We did not see it. We stood in the frosty air and searched the sky until dawn lighted the east. I carry from that night my first memory of the stars, nameless, uncountable, flung like a cold net across the pines, beautiful and frightening."

Here is an astronomer /essayist in the mold of Lewis Thomas or Loren Eiseley. We don't need to be experts to look up to marvel and wonder. Raymo remembers his roots, sharing the real reasons we stargazers do what we do. His words bring depth and inspiration to the view out there.

2. BPAA Education Director's Report:

At the March 13 General Membership Meeting, Linda Khandro from the University of Washington will present a 20-minute introduction to Project ASTRO. This is a quality program sponsored through the Astronomical Society of the Pacific and the National Science Foundation. Here's a chance for astronomy enthusiasts to get involved with our local schools.

From the website:

Project ASTRO

Creating partnerships between grade 3-12 teachers and amateur and professional astronomers and earth scientists

Project ASTRO pairs grade 3-12 teachers with volunteer amateur and professional astronomers and earth scientists with the goal of building long-lasting partnerships to improve science education in schools. Over the course of the school year, each scientist visits his/her class at least five times (usually many more) and develops an ongoing relationship with the students in addition to assisting the teacher and/or leading astronomy/earth science activities. These activities may include hands-on science, question-and-answer sessions, evening star parties for students and their families, or large class projects such as building a telescope or a school sundial. We currently have 59 partnerships (representing approximately 2650 students) in participating schools throughout the Puget Sound region.
http://www.astro.washington.edu/projastro/index.html

Astronomy Day Youth Program

We are currently in the planning stages for the Astronomy Day youth program. In past years students had a 'Galactic Passport' in which to acquire visa stamps as they visited the different events. The events included solar observing – sun spots, sun position, sun dial, ecliptic, spectroscopes, light and optics, robotics, moon features and cratering, making a comet, solar system walk about the park, telescope etiquette, how to observe, and safety precautions. I am looking for any additional ideas of interest to students of all ages, and BPAA people who would volunteer to help out at some of these stations.

A number of school and scouting groups have visited the Ritchie Observatory in recent weeks. Anna Edmonds and John Rudolph met with a group from the Sunrise School in Kingston. Paul Below worked with a group of Boy Scouts in a community service project to do some landscaping around the facility. Michael Walker gave a

presentation on the International Space Station to a Silverdale scout group. In addition there are many scouts wishing to work on Astronomy and Space Exploration merit badges and are looking for counselors within the BPAA to give additional expertise.

Educational outreach is a primary function of the BPAA. Whether it's the Beginner's Class at monthly Star Parties, docents greeting the curious public Saturday afternoons, the Sunday Robot Club, or more formal teaching situations, it seems there is no end of need in this group to share this avocation. The Ritchie Observatory is one of the most incredible resources any community has. Think of the potential as the big scope comes on-line for student and personal research. Soon we'll have a planetarium. There is a great curiosity in what the BPAA offers.

As the new education director picking up from Jim Young, I've just begun to realize how much he and a few others have done to meet this group's obligations to our community. Could you meet with school and scout groups to share your interests? Can you donate a few days a year to work with teachers to support science/astronomy education? It seems we may not feel we know enough, but to others, what we offer can be more than enough. I'd like to put together an informal group of people who could be called upon to meet with interested groups as they contact the association.

Thank you, Michael Walker
Education Director

FACILITY DIRECTOR'S REPORT

By John Rudolph

In accord with our New Year's Resolution to bring the 27.5" Ritchie telescope up to full operational status, the first low-tech steps were taken. One of the young members of the Electronics Club a.k.a. Robot Club, Benjamin Saunders, had constructed a very ingenious seismometer that was very sensitive to vibration. We used this device to test the vibration of the telescope support tower and had found that walking around almost anywhere in the building caused the tower and the supported telescope to vibrate. This vibration could be seen when viewing objects through the scope, so we knew that this was unacceptable for doing serious imaging with camera or CCD.

Several days during January and February found Dan Caster, Doug Tanaka, DonTrantow and Paul Below doing the Count of Monte Cristo act to drill, chip, pry, hammer and bash any material between the tower and the building structure that might make a connection enough to transfer building vibration to the tower. Most of the suspect joints were filled with styrofoam, relatively easy to remove except that some of the work had to be done by crawling through the 24" high attic space and being molested by curious flies. (That will be the next project-- rid the observatory of flies and wasps.) We found several places where mortar and grout had made very definite connections between tower and building. Finally, when all of these were cleared out, we tested with Benjamin's seismometer again and found to our great satisfaction that when Paul Below dropped his 230 pounds on four quadrants of the roof, second floor and ground floor, our instrument indicated 0.00 vibration of the tower except for minor effect on two sides of the tower on the ground floor. In anticipation of filling the void of the tower with sand to further dampen any vibration, we cut an 8" x 8" hole in the side of the tower just above the roof and under the concrete tower cap. Now we were ready to move to technology of a higher order.

Dan Caster exchanged the 30:1 gear box and stepping motor on the DEC with the 15:1 unit on the RA. This will have the effect of halving the RA movement of each step, hopefully helping to reduce vibration. He found that the yokes that hold the worm gear were broken on the DEC unit, probably from inadvertent manhandling of the telescope. He rebuilt the unit with more robust yokes and added neoprene washers to isolate the gearbox and stepping motor from the sliding support base. Consideration was given to replacing the stepping motors with servomotors and different software but we will see if this will be necessary when the telescope is put back together.

Imaging with camera and CCD will tell us how successful our efforts have been. Meanwhile, improvements to the building itself continue. Two new members, Nels Johansen and Frank Petrie have volunteered (i.e. been caught by the press gang) to do some much needed work. Frank is doing carpentry, erecting wood furring in the upper workshop so insulation and wallboard can improve our working comfort and Nels will be repairing the water-damaged wallboard at the helical stairway. And not to be outdone, Jim Vaughan is devising a way to control the Park lights with remote control switches, so the lights in the Park can be turned off from the observatory. What a team!

SEEING STARS **Astronomy 0.001**

Anna Edmonds

For the last two issues we've been talking about telescopes that collect the light that we can see. However, there are things "out there" that we can't see. They're just as important a part of our universe as those we do see. Today we have a variety of tools to help us gain information about a wide range of the invisible electromagnetic radiation, including radio, X-ray, and gamma ray telescopes.

The first of these telescopes to be developed was that using radio waves. In 1932 Karl Jansky at Bell Telephone Laboratory was trying to find where the static in short-wave radio telecommunications was coming from. He realized that some of the signals he was getting were coming from out in space, and that these could be developed into a new way to study the stars. The signals were like the waves our radios receive. Using increasingly sophisticated techniques, scientists have become able to resolve those signals into data many times more complex than optical telescopes can with visible light. (BPAA member Jim Young was one of the Bell Labs scientists working in this field.)

Radio telescopes are like optical telescopes in that their curved mirrors, or disks, receive the signals and focus them to a point. Then they transfer the signals to a radio receiver rather than a viewer's eye. The receiver then sends the data on to a computer where they are changed so that scientists can process and study them. These 'scopes look like a complicated TV disk.

In order to increase the power of the radio 'scopes, scientists have used the fact that radio waves can be sent through electrical wire to enable them to link two or more widely separated 'scopes. This technique is called "interferometry," meaning the blending of electromagnetic radiation from a collection of 'scopes. The farther apart these ganged 'scopes are, the more detailed is the information they gather. With the help of very precise atomic clocks at each of the 'scopes, the data are combined after they are collected. One of these sets of 'scopes, known as the Very Long Baseline Array (VLBA) links twenty-five radio 'scopes located between New Hampshire and Hawaii. Now the hope is to add a radio 'scope on the Moon to the Earth-bound instruments.

There is one major, growing problem for radio 'scopes: They are a threatened species. Just as Jansky was studying troubling static in the 1930s, now the static of cell phones, garage door openers, police radios, and wireless computer networks use frequencies that can spill over into radio astronomy bands. This "pollution" interferes with the weak signals coming from space, at times leading astronomers to false information.

The interferometry of radio 'scopes has helped astronomers discover unexpected black holes, pulsars, and quasars. Radio 'scopes have probed back in time to almost the moment of the Big Bang; they have greatly increased our understanding of galaxies and the afterglow of gamma ray flashes.

In the next issue we'll talk a little about other kinds of telescopes.

ASTROBIOLOGY
By Bill O'Neill

In the previous issue of the *Newsletter* I referred to the new Astrobiology Program at the UW, an extraordinary effort to bring together and cross-train scientists from many different disciplines to seek information about the origin, early development and distribution of life in the universe. The Program currently involves about two dozen UW faculty members and 15-20 graduate students in at least ten different departments: astronomy, atmospheric sciences, biochemistry, chemistry, genetics, geology, microbiology, oceanography, paleontology and space engineering. It's a novel scientific community with a focus of attention and a variety of perspectives, all concerned with **life,** whatever that means!

The more that is learned about the diversity and antiquity of life, especially microscopic life forms on this planet, the greater the possibilities seem for life developing anywhere liquid water may be found. Recent discoveries of complex ecosystems in the deep sea, more than a mile underground, and in frozen "deserts" have opened our eyes to previously unimagined habitats.

This term there is a seminar series at 2:30 on Tuesdays, entitled "Signs of Life", in which students and faculty members from the various disciplines are presenting some information and methods related to identifying and characterizing life on earth, and their relevance to the detection of life on "heavenly bodies." It's a privilege to witness how everyone, faculty and students, is learning from one another. Though there are really only two full-time faculty members thus far (David Catling, a British expert in atmospheric physics, and Roger Buick, an extraordinary paleontologist from Australia), the interactions among all the participants appear to be stimulating and productive. It was actually such a seminar series, entitled "Planets and Life", in 1996, that gave rise to the interdisciplinary collaborations which provided the nucleus for initiating the Astrobiology Program. A public series of guest speakers will be hosted in the large Astro/Physics Auditorium at 2:30 on Tuesdays during the term beginning in March.

The UW is also one of the sites of NASA's Astrobiology Institute (NAI), an international research consortium for astrobiology studies on Earth, as well as missions to search for evidence of life elsewhere, such as Mars and Jupiter's moon Europa. The NAI is what's known as a virtual institute--that is, there is little staff or intramural research--which organizes and funds efforts in institutions, such as UW, and in environments such as the poles and deserts. Don Brownlee's 'Stardust' project, underway to harvest pristine material from the 'tail' of a comet, is one of its best known efforts. A renowned academic scientist, Baruch Blumberg, was recruited as NAI's director and he described its many-faceted research program at a UW seminar last fall. Periodically, NAI invites scientists from several institutions to work together for a few weeks at one of its sites to foster the sort of interdisciplinary appreciation and collaboration thought essential for obtaining results and avoiding damage in this field. Many of UW's Astrobiology participants have taken part in such field trips. In case anyone in BPAA is sufficiently interested, NAI will be sponsoring an Astrobiology Science conference at Ames Research Center (near San Jose, California) this April - you can get information through a link on the NAI homepage at http://nai.arc.nasa.gov/. Wish I could go, but we have other travel plans.

Bill O'Neill (biophil@bainbridge.net)

BPAA Financial Report for month of January 2002

BALANCE SHEET:	**$**
Current Assets	13,469
Fixed Assets	241,559
Total Assets	**255,028**
Liabilities	-0-
Equity	255,028
Total Liability/Equity	**255,028**

PROFIT & LOSS:	**$ Jan.**	**$ YTD**

Income:		
Contributions	335	335
Membership Dues	1,225	1,225
Other	39	39
Total Income	**1,599**	**1,599**
Expense:		
Administration	155	155
Program	30	30
Utilities	271	271
Total Expenses	**456**	**456**
Net Income (Loss)	**1,143**	**1,143**

Eric Cederwall, Treasurer

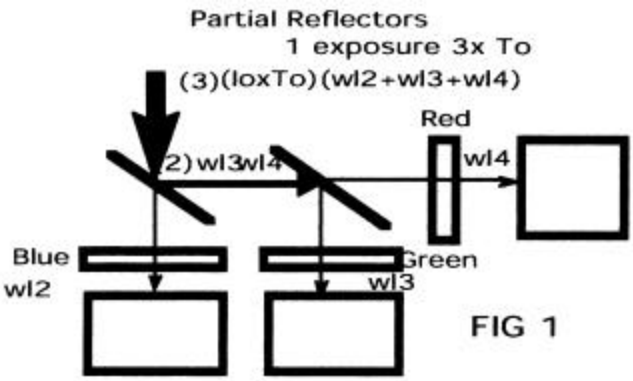
FULL COLOR ELECTRONIC SENSOR

By Mac Gardiner

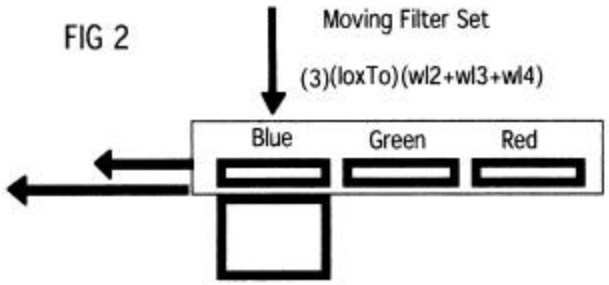
Photons come in colors; electrons don't. So, whenever we convert photons to electrons, we lose the color information. If we wish to perceive color in the final image, we have to sort the photons, by color, before the conversion process.

One way is to sort the photons with filters which block out all but the desired "color." "Red," "Green" and "Blue" images can then be generated, which can then be combined to form the true color of the original. This process discards all photons of other colors through each filter, which is okay if you have a huge excess of photons.

One can either split the image into three and filter each, (Fig 1)



or simply take three photos, using each filter successively. (Fig 2).



The price paid is that of time, extra equipment and/or moving parts.

Astrophotography nearly always contends with a scarcity of photons. Time exposures ranging up into many minutes are required to get an acceptable number of photons. A color picture can multiply the time required by a typical factor of three. This is bad enough on earth, but in near orbit space, dusk to dawn is 45 minutes rather than 12 hours (average), so the process of getting beautiful color images of wispy far off and faint celestial phenomena is badly compromised.

One other feature of a typical photon is important. Photons hitting a silicon slab are absorbed and converted to electron-hole pairs at different depths, depending on their wavelength (frequency/color). This often establishes the color limits of CCD conversion, due to photons passing the "collection" region before interaction, or being absorbed before reaching the "collection" region.

On the other hand, this "depth sorting" can be used to effectively utilize all photons by establishing three collection volumes, stacked at appropriate depths corresponding to "Red," "Green" and "Blue" energies of the photons. (Fig 3)

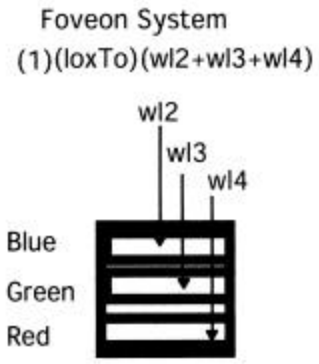


FIG 3

Neat, if you can build such a device.

Dr. Carver Mead claims that his company, Foveon Inc., has successfully done just that. On Feb. 24th, they demonstrated their Foveon X3 at PMA in Orlando. This system has a pixel matrix of 1280 × 960 (X3) with a pixel pitch of 5 microns. They claim extremely low power, high quality images, with "extremely low-noise readout and very high dynamic range." Both Richard Berry and I tend to be suspicious of any such non-quantitative assessment, but I know Carver Meade personally and trust his genius and his veracity.

However, their system uses CMOS technology, rather than CCD, and their emphasis is on high quality "superior to 35 mm photography" systems for professional and consumer digital camera markets at the present time. They have had numerous inquires about astronomical use, and reply that it should work fine, but they plan to delay development of that sector until the big money market items are developed.

It's obvious that an important use is for the ISS-AT. We need the simplified system, like the pixel pitch, and are grateful for the low power of a CMOS device. However, the quantum efficiency, noise and reliability in space must be verified.

In addition, all terrestrial uses, particularly for portable systems, show real advantages. Low power drain, simple procedures, and minimum hardware sound good to all of us. Anyone planning to go into Astrophotography should maintain a file on Foveon (www.foveon.com). It could be the next real breakthrough.

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:
The 2nd & 4th Saturdays 2-4 pm or
by special appointment.

Officers & Directors

Paul Below, President
(206)842-0469, 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