SEATTLE ASTRONOMICAL SOCIETY

The

Webfooted Astronomer

August 2002

The Beginning of Time

By George Best

> **August Meeting**
>
> Craig Hogan
> Vice Provost for Research
>
> Astronomy Department
> University of Washington
>
> Wednesday, August 21
> 7:30 p.m.
>
> Physics-Astronomy Building
> Room A102
> University of Washington
> Seattle
>
> Come early at 7 p.m. for coffee and to visit with your fellow members.
>
> Bring your slides to show after the program.

C**RAIG** Hogan, University of Washington Astronomy professor and author of *The Little Book of the Big Bang,* will discuss the beginning of time at the August 21 meeting. Hogan is also is Vice Provost for Research at the UW.

As an administrator, Hogan is the principal advocate for the research enterprise of the UW, one of the largest and most diverse research universities in the world. As a researcher, he is interested in astrophysical cosmology, the global evolution and structure of the universe. His current research interests lie in the possibility of observing signs of quantum gravity in the cosmic background radiation, and the generation and detection of stochastic gravitational wave backgrounds from events in the early universe. His primer on cosmology, *The Little Book of the Big Bang*, published by Springer-Verlag, is now available in six languages.

The Seattle Astronomical Society meeting will be held Wednesday, August 21 at 7:30 p.m. in room A102 of the Physics/Astronomy building.

Dark Skies Northwest will hold its monthly meeting prior to the SAS meeting from 6:30-7:30 p.m. in room A216 of the Physics-Astronomy Building.

Seattle Astronomical Society

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Little Bear's Corner

Rich Field Telescopes Reveal Secrets of the Night Sky

By Tim McKechnie

FINALLY summer has arrived, so we're dusting off the old scopes and planning to get out and check out the universe to make sure that everything is still as it should be. Especially during this time of summer travel, a small scope can be a very convenient traveling companion. Particularly if it is one of the increasingly available and affordable short body type scopes which are designed for wide field views.

What are RFTs?

These scopes are called *Rich Field Telescopes*, or RFTs. They have short focal lengths and wide apertures, giving them ratios of around f/4 or f/5. This makes them very compact, These are specialized instruments designed for one purpose—to show the widest, brightest fields and the most stars as possible. Consequently, they operate at low magnifications and are not at their best with large lunar or planetary images or splitting close double stars nor when used around major metropolitan areas. But when used on the objects for which the scopes were designed, the scopes perform very nicely. This is especially true if you are away from city lights out in the dark sky country where we like to go for summer vacations. These scopes travel well; they are solidly built with few complications; and their short construction allows them to be stored in a camera bag or just rolled up in a blanket for day trips. Some of them come with a mounting but most are made to be used with nothing more than a camera tripod. In addition, many of the refractor varieties can be used as spotting scopes for day as well as night time observing.

What can you see with an RFT?

Even though a big scope gives glorious views of the sky, there are some things that even the biggest scopes just cannot see. The Pleiades, for example, shows a great many stars in a 16-inch reflector but not all at once. You have to scan around a large area many eyepiece fields wide to see all of it. And it's hard to take in its full grandeur when you cannot see all of it in one assembly, so-to-speak. The Pleiades looks better and is more impressive in binoculars because the lower power provides a much wider field of view. An RFT gives an observer the best of both worlds by having

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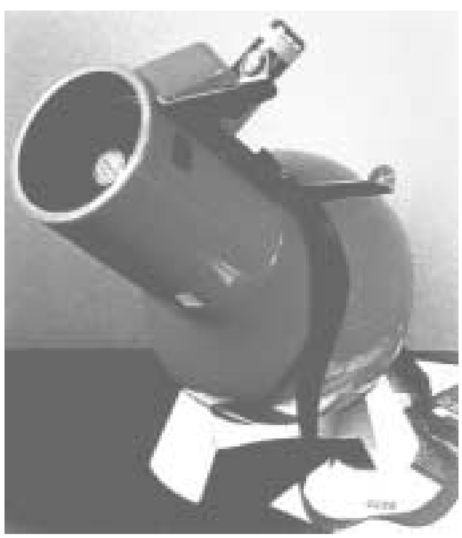
Little Bear's Corner *(Continued from page 3)*
the equivalent of a single low power binocular (a monocular) with the variable magnification of a telescope. So the RFT can be configured to view a number of difficult objects according to the need. Thus the Pleiades is most impressive at 40x in an 80-mm RFT. This is more power than you need for the Coma cluster, which is wider. However, it is magnificent at 16x in the same scope. Once you have become familiar with the Coma cluster layout, you can switch back to 40x to sweep for galaxies like NGC 4565, which are lurking in the background. And there is probably no better instrument for tracking down and observing the summer Milky Way than an RFT; particularly the dark Barnard nebulae in the Serpens and Ophiuchus areas.

Which RFT is right for you?

Today there are many RFT telescopes on the market from just about every manufacturer. Some of the common types are the 60 and 70mm AT scopes from Meade which are very affordable and computer adaptable, which gives these scopes a tremendous ability in tracking down elusive objects. A similar scope is the Celestron NexStar 80 and Tasco StarGuide 80, which also comes with its own tripod. The Celestron 80 has the same optical assembly as the Orion Short Tube 80 which fits a standard camera tripod. Orion also sells a 90-mm and a 120-mm RFT refractor while Celestron also has a 102 mm refractor. The 90 and 102-mm scopes do not come with any mounting but are meant to be attached to a heavy camera tripod. But the 120-mm Orion is a massive scope mounted on its own German equatorial.



Edmund Scientific's Astroscan® is first among rich field telescopes.

There have been many different telescope makers who at one time or other have built RFTs. Names like Cave, the Optical Craftsmen and Coulter still pop up from time to time at swap meets and on the Internet. While home-made scopes with optics from Unitron, Jeagers, Edmund and Vixen still provide good service to their owners. But perhaps the most well known and accepted RFT ever is the Edmund Astroscan. This little red “bowling ball” of a telescope has been on the market for over 25 years and is synonymous with Rich Field Telescope. It is a very solid, rugged 4-inch Newtonian reflector that is so handy it overcomes any minor inconveniences, such as being somewhat difficult to point at specific targets. Because of its construction, it is very simple to operate and is virtually indestructible. As such is an ideal beginners scope for very young children or as a handy and reliable traveling piece.

Rich Field Telescopes are excellent supplementary optics for owners of big aperture scopes who want something that can be used “quick and dirty” during periods of variable weather or if you just doesn’t feel like setting up the big scope. Also, if you are traveling light, you don’t need to leave your eyes at home. RFTs are the perfect optics for eclipse chasers who fly all over the world. The computerized versions can also be used as target acquisition tools. One former SAS officer is using a “goto” 80-mm scope to find and acquire the field of faint objects, while a similar tube assembly acts as a finder on his big reflector shows exactly the same field for positive identification. But the real value of an RFT is for those objects that simply cannot be seen to advantage with any other instrument. The Milky Way is at its best in an RFT as well as the large galactic clusters and the occasional comet. A good 4¼-inch f/4 reflector at 20x from a dark sky will show nearly the full dimensions of the Andromeda galaxy. Like a good pair of binoculars, an RFT should be in every observers optical tool kit.

You can contact Tim at Docstogie50@aol.com—Editor.

Classifieds

Display Needed for SAS

The club is in need of a promotional display that we can set up when we go to astronomy events. The present cardboard display needs to be replaced, and we’d like something that looks more professional and would be easy to set up. If you have experience in making such items and would like to consult us (or would just like to have the fun of making one), please call Mary Ingersoll (206-246-0977).

For Sale

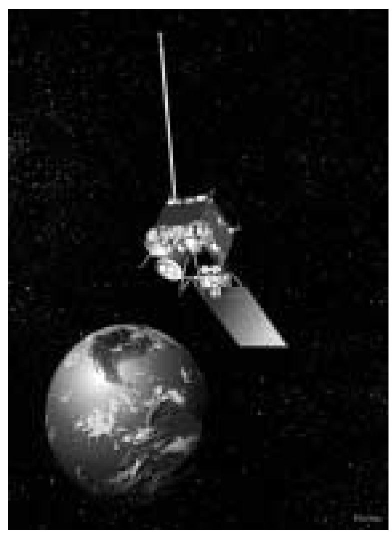
10-inch f/10 LX-200. Excellent scope with full go-to capabilities. Like new condition with no scratches on tube and excellent optics. $2100/obo. Alex Zecha, 206-368-5677, azecha@netscape.net.

NASA's Space Place

Satellites to the Rescue

A ship on the ocean is swamped by a giant wave. A small airplane loses power and crash lands on a mountain field. A snowmobiler in Alaska breaks a tread and is lost far from civilization. How do the brave people who rescue folks in peril find out where they are?

Search and Rescue Satellite-Aided Tracking (SARSAT) uses two types of satellites to help people (and their pets). Geostationary Operational Environmental Satellites (GOES) fly in place. They never stray from their spots above Earth. Polar Orbiting Environmental Satellites POES) are in constant motion. They orbit Earth several times a day. The main job of these spacecraft is to track environmental conditions around the world. But GOES and POES also hear special distress signals from ships, planes, and individuals. The satellites send the information to a control center in Suitland, Maryland. The National Oceanic and Atmospheric Administration (NOAA) operates the center. They learn who's in danger and where the emergency is. Then they send the Coast Guard or the Air Force to save the day.



Search and Rescue Satellite Aided Tracking (SARSAT) system helps find people in trouble and send rescuers to help.

Ships, airplanes and people use different kinds of equipment to transmit emergency signals. All these devices broadcast distress messages to GOES and POES. Personal Locator Beacons for individuals are available only in Alaska, but soon may be sold in the rest of the United States. Backpackers and others who travel to remote areas could carry these devices in case they get into trouble.

NASA provided the satellites used for SARSAT and NOAA operates them. SARSAT has helped to locate and rescue more than 12,800 people worldwide and 4,300 people in

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the United States. The Air Force and Coast Guard also rescued dogs and other pets that were traveling with their families when disaster struck.

Find out more about SARSAT at http://www.sarsat.noaa.gov. Also check out The Space Place Web site at http://spaceplace.nasa.gov/goes/orbits.htm to learn how these satellites orbit Earth and how GOES can hang over one spot all the time.

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

A Poo Poo Adventure

Before each Poo Poo Point star party I arrive early to check the locks at both gates to ensure that I can open them at the end of the evening. When I arrived at the gate for the July star party there were a bunch of Search and Rescue vehicles and a bunch of guys standing around.

A hiker had phoned 911 saying that he was dehydrated and needed assistance. The gate was locked and the Search and Rescue guys were unable to go up the road (from my own experience I know that you can't drive a vehicle around that gate). Apparently, the Search and Rescue teams train up on Tiger Mountain, but they always have to give the key back to the WADNR when they're finished. Somebody was supposed to bring them a key, but they didn't know when it would get there. They were pretty amused to learn that the Seattle Astronomical Society had a key and they wondered what we had to do to get one. So, I opened the gate for them, and they went up the road to get the hiker.

They had taken care of the hiker by the time the SAS caravan departed for the summit a little after 8 p.m. Yes, we did have a star party at Poo Poo Point and the conditions were very good. Amazingly, the weather began to clear on the Eastside around 5 p.m. and when we arrived at the South Point we had a completely clear sky with a few clouds to the South. The sky remained clear until about 11:45 p.m. when clouds began to drift in. But we had almost two hours of good viewing. I also believe that the transparency was above average, because Scott Canero and I were able to observe M4 low in the Southeast and then observed M80. I know that on previous star parties we were unable to find M4, so this was an indicator to me that viewing conditions were very good. We had five vehicles with eight astronomers at the event and with the exception of the mosquitoes we had a very pleasant evening.

—Steve Van Rompaey, Poo Poo Point Keymaster

From the President's Pen . . .

Sandpoint Bunker Project Update

By Mary Ingersoll

SINCE our meeting in May to discuss plans for Magnuson Park (Sandpoint), I've had many members, non-members and Sandpoint neighbors contacting me to learn how they can help the club. We are still in the process of making contact with park and city officials to become part of the park's plan for future developments.

In the mean time, we are making plans to have interested members meet at the park in the evenings this summer to observe from the Bunker site. David Brodeur and Karl Schroeder are making light meters to measure the differences between the various sites that we use in the city. Their plan is to make these measurements at Paramount Park, Greenlake, Sandpoint and one other site at the same time to have an accurate comparison. Those members who have been to the Sandpoint site have stated that they thought that it was the same or darker than Greenlake. With the readings from the meters, we will have evidence as to whether or not this is true.

Three of our members who attended the Table Mountain Star Party, found a telescope that may become the club's star party scope. The 6-inch refractor (without eyepieces) was offered to the club for $2500; several members have offered to donate money to aid in its purchase. The board is presently considering other costs and whether or not we can get the Springfield-mounted reflector restored at the same time. The question in the past regarding the Springfield was "if we get it repaired and able to use it, who's going to take it to the star parties? It's just to heavy to carry around." With a permanent pier installed at Sandpoint, and storage in the bunker, we could keep the scope on site and have a place to set it up for pubic viewing. The same could be done for the 6-inch refractor.

Until then, we welcome all your enthusiasm for making Magnuson Park another site for viewing for the club and public star parties.

August 2002

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1 Neptune at opposition	2	3
4	5	6	7	8	9 Rattle-snake Lake Public Star Party	10 Poo Poo Point Star Party
11	12 Perseid Meteor Shower Peaks	13	14	15	16	17 Green-lake, Cromwell Park Star Parties
18	19 Uranus at opposition	20	21 SAS Meeting	22	23	24 Tele-scope makers at Peter Hirtle's
25	26 SAS Board	27	28	29	30	31

Minutes

InfraRed Riding Hood?

By Greg Donohue

MARY Ingersoll reminded the membership that elections for new officers will take place at the November general meeting. All of the current officers have served in their roles for the past two years. According to the bylaws of the SAS, no one may hold the same office for more than two years, so each position must now be vacated to make way for someone new. Please take some time to consider contributing to the continued success of SAS through service as a member of the board for calendar year 2003.

Dr. Jeff Morgan, a Research Engineer at the University of Washington, addressed the membership at the July 17 general meeting on the topic of "Instrumentation at the Apache Point Observatory." The UW has a 30-inch telescope at the Manashtash Ridge Observatory near Ellensburg, Washington, and a 3.5-meter telescope at Apache Point Observatory (APO) in southern New Mexico. Dr. Morgan (http://www.astro.washington.edu/morgan) is responsible for instrumentation maintenance and development of UW equipment at both of these sites.

Developed in 1992, APO houses a total of 4 telescopes: The 2.5-meter SDSS (Sloan Digital Sky Survey) telescope (see the November 2001 minutes, "Was Chicken Little 25% Right?); the Sloan 0.64-meter Photometric telescope (the primary function of which is to try and obtain good photometric data of stars in the same field of view as the SDSS); the New Mexico State University (NMSU) 1-meter telescope; and the 3.5-meter telescope.

At an elevation of approximately 9000 feet, APO is located in southern New Mexico in the bluffs overlooking White Sands National Monument, and is situated less than a mile from Sunspot (the site of the National Solar Observatory). APO is run by ARC, the Astrophysical Research Consortium, an organization of six universities: the University of Washington (which hold majority interest in ARC and the APO facilities), the University of Chicago, Princeton, Johns Hopkins, the University of Colorado, and New Mexico State University.

One of the first remotely operable telescopes, the alt-az mounted 3.5-meter instrument was the first telescope at the APO site. Designed to accommodate rapid instrument changes, the 3.5-meter has several ports on which instruments can be quickly mounted

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Minutes (Continued from page 10)

and dismounted. The tertiary mirror rotates to select among the different ports, so one can switch between instruments in a couple of minutes.

Dr. Morgan discussed in detail four of the main instruments currently in use with the APO 3.5-meter telescope. One of these is the ARC Echelle Spectrograph, operated by the University of Chicago. This visible light spectrograph has an extremely wide bandpass, ranging from the near infrared (0.98um, 9800 Angstroms), through the visible range, and into the ultraviolet (0.35um, 3500 Angstroms). It has a 2-arcsecond FOV (field of view), and a very high-resolution (R) ~ 37,5000. For example, at 5000 Angstroms, a resolution of 37,500 means that changes in wavelength of as little as 0.13 Angstroms (5000 Angstroms/37,500) can be distinguished.

Dual Imaging Spectrograph (DIS) covers the same wavelength range (3500 – 9800 Angstroms) as the ARC Echelle instrument. But its 5-arcminute FOV is much larger, and its resolution is variable, from 570 to 3620, which allows doing spectroscopy on fainter objects than the Echelle. And whereas the Echelle can only take spectrographs of point sources (due to its small FOV), DIS can be used on extended objects such as nebulae.

University of Washington professor Chris Stubbs designed the SPIcam (Seaver Prototype Imaging Camera) for the 3.5-meter telescope. This visible light camera operates from 0.35um to .90um, has a FOV = 4.78 arcminutes, and a resolution that varies from 0.9 to about 1000, depending on the type of filters used. SPIcam does true 2-D imaging, but can only measure one color at a time.

Run by the University of Chicago, GRIM II (GRIsm spectrometer and IMager), the ARC near-infrared camera, combines broadband and narrowband imaging and low resolution slit spectroscopic capabilities into a single instrument. However, it is used primarily as a camera. GRIM-II uses a GRISM (Grated pRISM). A GRISM is a right-angle prism with a grating etched into a resin coating on its hypotenuse side. This results in a spectrum that comes out undeviated from the original beam. When the GRISM is removed from the beam, a normal image can be obtained. When the GRISM is inserted into the beam, you get a spectrum (without having to change the location of the detector).

Three more instruments for use with the APO 3.5-meter telescope are actively under construction. The first is the Near Infrared Camera and Fabry-Perot Spectrograph (NIC-FPS, "Nick Fips"), being built by the University of Colorado. Johns Hopkins is constructing the APO Near-Infrared Spectrograph (NIS). And UW is building the Multi-Band Camera (MBC).

All of this new instrumentation emphasizes the near infrared portion of the spectrum, and for good reason. First, the design of near IR detection equipment is now coming of age. Just as CCDs revolutionized visible imaging in the 1970s, so these new HgCdTe (Mercury Cadmium Telluride) detectors are doing the same thing for near-IR. And secondly, there are many current scientific problems that need observations in this wavelength regime.

Quantum Efficiency (QE) is a measure of how efficient something is at detecting photons. The specialized low-light photographic plates (used extensively in astronomy only 30 years ago) had a QE of about 3-5%. That is, the emulsion detects only 3-5 of every 100 photons striking it.

The best modern-day CCDs have QE's well above 90% at their peak wavelength. However, their QE drops off dramatically after about 0.90um, becoming virtually zero a 1.0 um. Due to the bandpass characteristics of the materials used to construct CCD's, the low QE above 9000 Angstroms cannot be improved

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Upcoming Events

Beginning Astronomy Meeting Aug. 17

The next Beginning Astronomy Meeting will be held at Karl and Judy Schroeder's on August 17. The meeting starts at 1 p.m. and generally runs till about 5 p.m. Dinner is provided and followed by evening observing, weather permitting. Bring a chair, something to drink with dinner, and lots of questions. Topics include telescopes, charts, viewing, planning, star parties, clothing. Interested individuals should contact the Schroeders in advance, (206)-362-7605 or e-mail Karl Schroeder, KSchroe225@aol.com.

Annual RASCal's Star Party Sept. 6–8

The Victoria Chapter of the Royal Astronomical Society of Canada will hold their Annual RASCal's Star Party Sept 6–8 at the Victoria Fish and Game Club, 700 Holker Plc. Cobble Hill BC, just 20 Minutes North of Victoria.

There will be guest speakers, vendors, door prizes, 2 telescope drawings, guided nature walks, and more. There are places to camp, and 3 motels are 5 minutes away. The cost is just $10 per adult, $5 per child or $20 per Family (Canadian). See http://victoria.tc.ca/%7erasc/RASCStarparty/rascstarparty2002.html for more information.

Minutes *(Continued from page 13)*
upon. Light above this range simply does not excite the valence electrons in the silicon.

The QE of the Rockwell 1024x1024 HgCdTe detector is 50-60% for wavelengths between 0.8 – 2.4um. These instruments pick up right where CCD's begin to trail off. These detectors can integrate for hours without saturating their pixels.

Near IR detectors will be used for images and spectrographs of such things as: embedded stars, stellar formation, brown dwarfs, and circumstellar disks. Dust obscures visible light, but becomes more and more transparent the farther you go out into the infrared.

Measurements of supernovae lend evidence that the expansion of the universe is accelerating, a quite startling discovery if it can be confirmed. However, all of the supernovae in the study, except one, have relatively small Z values. More high-Z supernova observations are badly needed. But higher-Z values mean that the objects are more distant, and the Hubble expansion causes redshifts in their light. For Z ~ 1.0, the wavelength of the incoming light is pushed to about 1.0um, just where CCD's fail. SN1997ff has Z=1.7, the largest yet measured. Its originally visible light photons (0.55um) are redshifted to 1.49um. This single observation seems to verify the acceleration, but it is hard to build a convincing case with only a single observation. Near-IR detectors may soon start adding to the inventory of high-Z supernovae.

There are challenges facing near-IR astronomy. A virtual "forest" of OH-lines clutters the near-IR spectrum (due to OH in our atmosphere). Near-IR detectors with very high resolutions are needed to "peer between the trees" of this forest. In addition, nearly every part of the new near-IR detectors must be cooled to near LN_2 (liquid nitrogen) temperatures, whereas only the detectors of CCD's typically need cooling.

The NIC-FPS and NIS should be online by 2004. It will be exciting to follow the developments and discoveries that come out of these and other similar instruments in the coming years. Maybe new lyrics to an old song will be in order: "Hey infra-Red Riding Hood, you sure are *looking* good. You're everything that a big brown dwarf could want…." Yah, I know—keep my day job!

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