SOUTHERN SKIES

Volume 14 Number 3 Summer 1994

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Journal of the Southeastern Planetarium Association

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Southern Skies

Volume 14 Number 3 Summer 1994

A Message From Your President

It's hard to believe that another SEPA conference has come and gone. If you're like me, you must begin eagerly awaiting each and every meeting as soon as the previous one has ended. I look upon the annual SEPA conference as a "refueling station" of sorts--a periodic stop in which I can replenish my professional drive and enthusiasm after a grueling year of running "ye ol' planetarium". From conversations over the years with you, my colleagues, I know I'm not alone in this feeling. Because of the uniqueness of what we do, the planetarium profession is full of potential rewards. But, it's also that same uniqueness that can bring a sense of isolation as many of us struggle valiantly against a (perceived, at least) lack of understanding and support within our parent institutions. Our conferences serve to once again remind us how special we are, and how important our mission is within society. Seeing and hearing about the ideas and work of colleagues, socializing and commiserating with them, and gaining insights into the latest trends and innovations in the field, rejuvenates a worn and tattered planetarian's spirit as few other events can. Wow, I'm already looking forward to Macon...and Nashville...and...oh well, I guess we'll have to actually squeeze some work in at our own facilities in the meantime.

While on the subject of SEPA conferences, I should take my hat off to the folks at Discovery Place and Kelly Planetarium for the great job they did in organizing and hosting our 1994 meeting. Pulling off a conference is a big responsibility, even under the most ideal of circumstances. Though they had a shorter-than-usual notice and, as a result, a shorter-than-normal preparation time, the excellent planning and hard work of Sue, Casey, Kirk, Jack, James, and the other Discovery Place staff meant that the conference went off just fine. I know it was a worthwhile meeting for all those who attended, and will remain in our fond memories for many years to come.

Richard McColman
Morehead Planetarium, Chapel Hill, NC

Thanks are also in order for all the sponsors who helped support the conference financially. It's easy to forget just how important the vendors and other sponsors are in offsetting the costs of our planetarium conferences through their generous contributions. To be sure, we'd still be able to hold some sort of meeting without the conference sponsors, but those meetings would be more expensive, yet bare-bones affairs for the conferees. Most of us had already known that '94 would be a particularly tight year for sponsorship dollars, given a big international conference held roughly a month afterward within our own region. Nonetheless, a group of committed sponsors came through with much needed financial support, and I know we all appreciate their efforts and their dollars.

Of course, I should mention that SEPA has a new slate of elected officers who will be "stepping up to the plate" this coming January. Rick Greenawald and Duncan Teague will be assuming their respective duties as President-Elect and Secretary-Treasurer. And of course, Kris McCall will be relieving me of the reins (and the slings and arrows) when she takes over as President. (Kris will also have the additional burden of planning and hosting our '96 conference and playing mother at the same time. Because of this, I'm sure Kris will appreciate any extra assistance from the rest of council in handling the additional work load--at least as far as the organization's business is concerned.) Also, John Hare will be continuing as SEPA's IPS Representative. Congratulations everyone--may the next two years be rewarding and productive ones.

While on the subject of personnel, I'm happy to announce that Linda Hare will be continuing on in her role as *Southern Skies* Editor--at least for a while. I know we all appreciate the often Herculean efforts that Linda puts forth getting out this document, in terms of quantity, quality, and regularity. Though, or perhaps *because*, she will no longer be shouldering the Secretary-Treasurer's duties, Linda will be around a bit longer to fulfill the Editor's role. Now with the additional help of Bishop Planetarium's Mike Cutrera, I know the Journal will be bigger and better than ever.

Finally, I should relay a couple of notes on the organization's progress. SEPA's *Goals for Astronomy Education in a K-12 Curriculum* (reprinted in this issue) has now been sent out to the relevant education officials in the states of the SEPA region. In addition, I have asked one SEPA member from each state to serve as liaison between SEPA and their state's education department. (These individuals are: Jayne Ray, Alabama; Bob Tate, Georgia; Mike Ryan, Florida; Paul Campbell, Kentucky; Mike Sandras, Louisiana; Gary Lazich, Mississippi; Cynthia Zeger, North Carolina; Rick Greenawald, South Carolina; Duncan Teague, Tennessee; Jane Hastings, Virginia; and Elizabeth Wasiluk, West Virginia.) This is all with the purpose of helping to infuse a better astronomy emphasis within state science curricula in our region.

I'm sure we're all aware how poorly equipped most schools, school systems, and teachers are in teaching students about nature on the cosmic scale. One aspect of this phenomenon has been dramatized in an educational study and documentary video produced by Harvard University and the Smithsonian Institution (*A Private Universe: Misconceptions That Block Learning*, Pyramid Film and Video, 1989). In the study, 23 randomly-selected Harvard students, faculty, and alumni were asked to explain the causes of Earth's seasons and the phases of the Moon. Regardless of their science education backgrounds, 21 of the 23 participants in the study revealed fundamental misconceptions regarding these basic astronomical concepts. The study went on to show that such scientific misconceptions are generated during students' early educational experiences, and once formed, are difficult to overcome. This ignorance of astronomical matters is most ironic, given the fact that astronomy and space science appear to have an intrinsic ability to capture the imaginations of people in modern society--particularly young people.

The first paragraph (under "Statement of Purpose") in our *Constitution and By-Laws* states that SEPA's purpose is "to promote the spread of knowledge of astronomy and related disciplines in the school curriculum...". With some persistence on our part, I believe that the *Goals* document can help push that process along.

No doubt, Bob Tate also had our Statement of Purpose in mind when he proposed that SEPA become an Associated Group of the National Science Teachers Association. Now that SEPA is officially associated with NSTA, it is important for us to define how we might best take advantage of that affiliation. One of the best ways we can have an impact is to send a representative to NSTA's Committee of Associated Groups (CAG).

Unfortunately, with SEPA's modest financial capacity, we cannot afford to send a representative to NSTA without additional financial assistance. Accordingly, I have asked SEPA-NSTA Liaison Cyndi Zeger and Past President Bob Tate to investigate possible grant funding sources which might provide SEPA with this supplementary funding. If we are successful in securing a grant, or grants, for this purpose, we should find ourselves better equipped to carry out at least one aspect of our educational mission.

Now that my batteries are recharged again, I suppose it's time to get cranking on another year's work. May we all keep the juices flowing until the next SEPA meeting.

Goals for Astronomy Education in a K-12 Curriculum

Since astronomy is one of the basic sciences, students should be introduced to astronomy as both a body of knowledge and as a process for learning about the universe. Through the study of astronomy, students should acquire the appropriate basic knowledge, process skills, and attitudes important to the scientifically literate citizen. It is the position of the Southeastern Planetarium Association (SEPA) that the following concepts should be mastered by students in a K-12 curriculum:

1. **Current knowledge of the solar system**
   - (1) The Sun is a star at the center of the solar system.
   - (2) The Moon orbits the Earth, causing the phases of the Moon.
   - (3) Relative positions of the Sun, Earth, and Moon cause eclipses.
   - (4) The solar system encompasses nine planets, moons, asteroids, comets, and meteoroids.
   - (5) The planets revolve around the Sun in specific orbits.
   - (6) The planets and their moons exhibit a variety of physical characteristics.

2. **Relationships between time concepts and astronomy**
   - (1) The measurement of time is based on motions of the Earth and Moon.
   - (2) The Sun's direction in the sky at sunrise or sunset, the appearance of the constellations, and the seasons change due to the orientation of the Earth's axis in space.
   - (3) The weather changes with the seasons.

3. **Current understanding of the nature of stars**
   - (1) Stars form from clouds of gas and evolve over millions/billions of years.
   - (2) Stars differ in size, temperature, brightness, color, and mass.

4. **Current knowledge of the structure of the universe**
   - (1) Gravity influences the existence and motion of all objects in the universe.
   - (2) Galaxies are large systems of stars held together by gravity, and billions of galaxies exist in the universe.
   - (3) Galaxies differ in size and structure.
   - (4) The Sun is only one of billions of stars that constitute our galaxy, the Milky Way.
   - (5) The recession of galaxies leads astronomers to conclude that the universe is expanding.

5. **Methods and tools of astronomers**
   - (1) The scientific method is used as a means of rational inquiry about natural phenomena and forms the basis of science itself.
   - (2) The universe is studied mainly through the electromagnetic spectrum.
   - (3) Different types of telescopes are used to study the various parts of the spectrum.
   - (4) The usefulness of telescopes is enhanced by cameras, spectroscopes, photometers, and other devices.

6. **Spaceflight**
   - (1) Spacecraft have revolutionized astronomy by allowing observations that can only be made outside the atmosphere and at other planets.
   - (2) The basic requirements for spaceflight include energy, propulsion, orbits, communication, and life support for piloted flights.
   - (3) Spaceflight provides a wide variety of benefits to modern civilization.

7. **Astronomy and culture**
   - (1) Astronomy and astrology differ.
   - (2) Astronomy and its history affect our understanding of humanity's place in the universe.

Cosmology in the Old West

Jim Chapman, Planetarium Artist
Sudekum Planetarium, Nashville, Tennessee

To join S.E.P.A., or to renew your S.E.P.A. Membership,
simply fill out this form and mail with $15.00 to:
Southeastern Planetarium Association
Linda Hare, Secretary/Treasurer
3602 23rd Avenue West
Bradenton, FL 34205

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FEATURED PLANETARIUM

Edited by Dave Hostetter
Lafayette Natural History
Museum & Planetarium
Lafayette, Louisiana

FREEPORT McMoRAN
DAILY LIVING SCIENCE CENTER

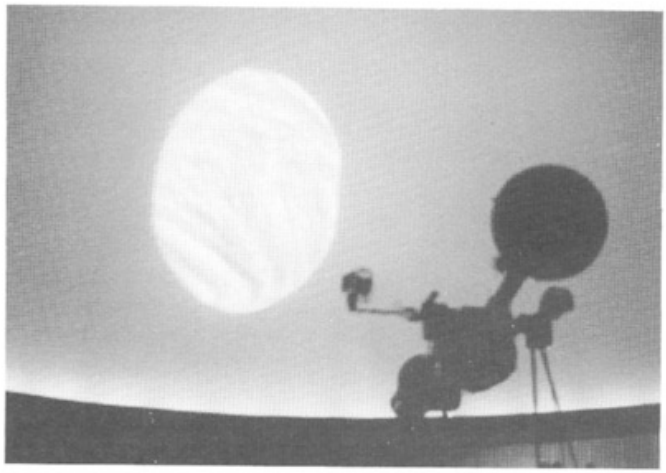
Kenner, Louisiana
Contributed by Michael Sandras
Planetarium Curator/Observatory Operator

The Freeport McMoRan Daily Living Science Center (FMDLSC) is a hands-on science center located in Kenner, Louisiana. Kenner is located about 20 minutes from downtown New Orleans, while the FMDLSC is less than a mile away from the New Orleans International Airport. The facility opened in October of 1989 and contains the hands-on center, planetarium, observatory, and a small house used as a classroom. This facility is only one of five museums located in the part of Kenner known as Rivertown. The Rivertown Museums, other than the FMDLSC, include the Louisiana Wildlife and Fisheries Museum, The Louisiana Toy Train Museum, The New Orleans Saints Hall of Fame, and the Kenner Mardi Gras Museum. All of these museums are within a two block area.

The entire Science Center, including adjacent facilities, has all been made possible by a generous donation from New Orleans-based corporation, Freeport McMoRan. The planetarium is managed by the Louisiana Nature and Science Center (LN&SC) on the City of Kenner's behalf. The LN&SC also manages another planetarium about 25 miles away in New

Orleans East. The observatory is managed by the Pontchartrain Astronomy Society. Even though the planetarium and observatory are managed by different organizations, the two facilities work together closely.

The FMDLSC Planetarium is 26' in diameter with no tilt, and seats 43 in a unidirectional manner. A Spitz A3P is used in the planetarium. The A3P was completely refurbished by Spitz in 1988 before introduction into the facility. There are eight slide projectors controlled by a Joe Hopkins Engineering ScreenMaster System 3. The planetarium also has several special effects and lighting projectors. A video projection system is also used by the



facility in connection with many of its educational shows. The sound system incorporates Pioneer components and includes compact disk and cassette tape systems. Several displays such as scale models of Stonehenge, Armillary Spheres, and NASA Launch Vehicles are also on display.

The current line-up being shown in the planetarium includes *Bear Tales and Other Grizzly Stories, More Than Meets The Eye, The Sky Tonight-Winter Tales,* and many live presentations tailored to suit the needs of the patrons or students in attendance. Besides the commercially made productions named above, the FMDLSC planetarium has produced many of its own programs and plans to continue these in-house productions in the future.

Since the FMDLSC opening, the facility has done quite well considering its relatively small size and lack of advertisement. One of the main reasons for its success is due to the fact that the facility was set up with school groups in mind. Since 1989, the Science Center has averaged about 60,000 a year, and the planetarium about 19,000. The staff has been very proud of these numbers, considering the facility's site. For example, the planetarium is managed by myself and two part-time workers.

Although 95% of the attendance comes from scheduled school groups, many public shows are also offered. A typical day at the planetarium consists of one public show and three or four school shows. It should be pointed out that our current one day record is 21 shows, and all of those were live performances!

Thanks to the efforts of the volunteers of the Pontchartrain Astronomy Society, many presentations that take advantage of both the planetarium and the observatory have been given. The observatory contains a Celestron C-14 Schmidt Cassegrain telescope and is controlled by an IBM computer system. The observatory also has a 10" Newtonian Reflector and a 6" Achromatic Refractor used as portable instruments. The combination of both planetarium and observatory presentations has been quite popular with high school students and very effective in adding to the astronomy labs offered by the University of New Orleans.

Future plans for the FMDLSC planetarium include an updated video projection system, including laser disc capabilities and an increased amount of slide projectors. The Science Center will be doubling in size by November so that it can house the Martin Marietta Space Station Mock-up. This space station mock-up was used in Martin Marietta's proposal to be the primary contractor of America's proposed space station. This proposal was beaten out by Boeing's proposal. Both Boeing and Martin Marietta will be assisting in the display of this station along with the aid of NASA and Freeport McMoRan. Needless to say, even though we are a rather small operation, we are quite proud and happy with the facilities, productions, and educational programs we have offered to the community. We hope that our zeal for bringing Astronomy to the public does not fade. Any SEPA member who is in the New Orleans area should feel free to contact me for a tour of the facility.

Michael Sandras has been curator of the Freeport McMoRan Daily Living Science Center Planetarium and Observatory since it opened in 1989, the Observatory Operator and Astronomy lab assistant at the University of New Orleans since 1988, and has worked in astronomy related fields since 1984. He has been president of the PAS on four different occasions and has been active with other astronomy clubs and events in the Louisiana and Mississippi area. Michael has had articles and photographs published in Astronomy, Sky & Telescope, and The Observers Guide magazines, as well as local newspapers, and has worked on local access television in assisting the local public school systems with their teaching of Astronomy. He spends his spare time in the pursuit of astronomy as well as travelling to many regional star gazes.

LASER TALK

Edited by Mark Howard

Ed: Because of the length of the following article, it will be continued. The second half will appear in the next issue of Southern Skies..

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Criteria For Producing In-House Laser Shows

by Mike Murray
Taylor Planetarium
Museum of the Rockies
Montana State University
Bozeman, Montana

INTRODUCTION

There is no denying that the phenomenal evolution of planetarium technology and production values has done wondrous things for our star shows. It has also allowed our capabilities as multi-purpose/multi-media theaters to blossom. The diversification of our offerings has allowed us to better serve the interests of a larger audience, increase our value to the community and our parent institutions, and help raise needed revenues to keep our facilities operating.

One of these "auxiliary" forms of programming has, of course, been the laser-light show. And certainly many of us have noticed the high-tech improvements made by laser hardware manufacturers over the years. Yet I can't help but notice that the "marriage" of laser projection technology and planetarium theater capabilities is not always utilized to its fullest potential. Part of the situation may arise from the impression by some of what laser-light shows are supposed to look like: the "wham-bam-flash" of bright laser patterns, graphics, and effects on the dome, with maybe an occasional starfield, slide, or special effect "thrown in" for variety. After watching laser shows and laser show audiences for nearly 20 years, the trends I see in their responses and attendance should be obviously telling us that this program design just doesn't cut it anymore, no matter how good the laser effects are!

This in itself has prompted many facilities to implement "in-house" or original laser show productions; each planetarium theater is unique in terms of technical makeup, production techniques, staffing, budget, audience expectations, etc. We tailor-produce star shows for maximum effectiveness, so why not our laser shows? (Having ALL the gate receipts vs. a percentage when dealing with a light show company has its advantages too!) Now don't get me wrong -- laser performance companies provide an invaluable service to many facilities who don't have the money or staff to put on their own shows, and most now do encourage "storyboarding" their lasers with planetarium effects. But, often times the people who can achieve maximum impact are the producers on staff, provided they already have some knowledge and experience.

Producing your own shows may all sound good and fine, but a lot of preliminary thought and research must be done to satisfy all the criteria needed to operate a successful "in-house" laser show program.

SELLING THE CONCEPT

Proper education of the supporters/parent institution. It is VITAL that administrators/supporters understand the true concept of the laser shows as a valid component to a planetarium's portfolio of programs -- that it is NOT a "selling out" of educational values for the pursuit of money, but a justifiable form of artistic presentation that can help diversify a planetarium's offerings just as many museums diversify theirs.

There are a number of "concerns" and misconceptions that museum boards and administrators have when approached about doing such programs, so you need to do some research and be prepared to answer their issues with objectivity and confidence. One of the most common arguments deals with "conflict with the institution's mission", meaning perhaps that their perception of laser shows as a pure entertainment program has no "educational" value. Examine the mission statement! Most museums have a broad mission allowing them to serve a wide range of educational and *artistic* interests. The laser show is an artistic medium that should easily fit within most mission statements -- if not, see if you can get it rewritten (but be patient -- this kind of process involves a lot of people and the occasional "red tape").

Another common misconception is the question "won't laser shows draw the 'wrong kind of people' to the museum?" In some people's minds, loud rock music and lasers conjure up stereotyped images of destructive young druggies running around out of control. While the nature of the program does draw a younger faction, "incidents"

arising from intoxicated patrons are actually quite uncommon in most facilities, and young people are not the only ones that come to laser shows anyway! One line of reasoning I like to use is that the laser show provides a constructive alternative to the "hard-core" party scene -- cruising the streets, nightclubs, rock concerts, etc. Besides, what does 'wrong kind of people' mean anyway? The role of the modern museum is evolving to attract a greater audience, creating a wider range of experiences for wider interests. It is not our place to discriminate against patrons based on their age or interests. If we offer greater services, then we need to be prepared for the greater diversity of people walking through our doors.

Train all planetarium/museum personnel as to what the laser shows are, how they should be described, and all the procedures involved in working with them. Give them ideas as to what to expect, but don't paint the "gloom and doom" picture -- just let them know that emergency procedures are there as a precaution. Hold brainstorm meetings with all relevant museum staff so they feel they have input and an opportunity to "buy in" to the program.

Tours and demonstrations of the planetarium and laser show itself for staff (and their families) can be invaluable. They provide workers with the knowledge they'll need to deal with the public, and can even be a great source of word-of-mouth publicity in the community.

PROGRAM OBJECTIVES

There are a number of basic questions you'll need to ask yourself before you get into issues like show types, schedules, how often they change, and the plethora of logistics:

What kind of an area are you serving? What is the population base of your service area? Who will be your target audience? What types of things do these people like to do for "entertainment"? How much competition might there be (concerts, nightclubs, theme parks, other nearby planetariums with laser shows, etc.)?

Based on the many surveys I have read or done with the public and planetarium directors, if the goal is to draw a large audience for the longest period of time (and it usually is!), a good formula is the rock-n-roll format aimed primarily at the 15-30 age bracket. For consistently high numbers, shows seem to draw better when patterned to one musical group versus a "themed" program; it's more distinct and memorable (the audience knows what the show was "about"). This is not to say that the "mixed bag" show couldn't be done on occasion if the theme is strong enough, just that the distinctiveness of a show loses power if they're in varied-group formats time after time.

Have laser shows been run at your facility before? If so, what were the circumstances (schedule, attendance trends, costs, effectiveness of advertising, any survey results)?

How large is your facility (seating capacity and space for equipment)? This may influence the type of shows you can run, schedules, and running dates.

What kinds of effects do you need from the laser?

a) Basic "spirographic" patterns?
b) Computer graphics (digitized figures, animation, etc.)?
c) Beam bouncing or "horizon scanning"?
d) Theatrical fog/beam effects?
e) Single-color imaging, multi-color imaging, or both?
f) Multi-imaging (multiple scanner sets with multiple sources to allow for simultaneous display of separate images)?
g) Wide-dome or even all-dome coverage?
h) Beam "facing" capability?
i) Blanking effects?
j) Laser-through-media effects (diffraction gratings, spiderweb interferometry, ripple
k) wheels, lenticular wheels, etc.)?
Portable or fixed system?

What kind of show design do you have in mind? We need to get away from the attitude that people come to laser shows just to see flashing lasers. They come to planetarium laser shows because they are in a *planetarium* -- because the wrap-around environment creates a feeling of more direct experience, whether it be standing on an alien planet or being immersed in mood-provoking abstract art. Use more of the star machine, automation, slide banks, panoramas, all-skies, video, and special effects (astronomical *and* abstract) to create a truly multi-dimensional show. To what degree you plan to utilize each of these elements, depends on the makeup of your facility; the quantity and quality of your projection systems (including the laser projector).

To this end, some facilities barrage audiences with a nearly constant hodge-podge of slides, strobes, incandescent effects and overly-bright lasers. Based on my observations of audience reactions and survey results, people do not seem to be very impressed with this style anymore. To them, the show design gets too predictable after about 10-15 minutes.

The careful timing and visual choreography of *all* the theater's elements is what makes a successful presentation. The laser images should not only pattern to make some artistic sense with the music, but should balance with a host of other carefully choreographed effects the planetarium does so well. A laser show does not mean that the laser has to be on all the time!

Digistar has become one of the most impressive elements for laser shows, based on our experience as well as other Digistar facilities. If you have it, flaunt it! -- but in many cases *the laser must be off to achieve maximum impact!*

LASER HARDWARE AND INSTALLATION

Costs. Now for the shocker. Yes, indeed it is expensive to buy and install your own laser system. A modern system with good laser graphics capabilities (a minimum requirement for most operations) can run anywhere from $30,000 to $150,000 installed. Some savings can be met by buying used systems, but keep in mind that because of their age, you may have to factor in a higher operating budget for maintenance and replacement parts. Buying used usually also means getting older technology, thus upgrades may be needed sooner than if you bought a modern one.

There are ways to raise money for such a system. As popular as laser shows are, there might be several local businesses/corporations interested in "underwriting" all or parts of the hardware costs. In exchange, you can provide them with credits in your shows (in laser light, of course!), company previews, or special events for company employees. Detail a formal proposal and sell it in person with your Development Director. There are many other approaches to saving costs -- call some planetariums with their own systems and ask about what approach they used. You are bound to get some ideas that will work for your situation.

If it turns out that you're stuck having to cough up most of the costs yourself, try justifying to your administration that the revenues made from the laser show will pay for the installation after a specified amount of time. However, it is far better to be conservative in your revenue estimates because you can get pressured into precarious production demands and unreasonable ticket pricing demands if your revenue estimates don't "match up" to what was expected.

Of course, a common limitation turns out to be a small operation with a shoestring budget and/or being connected with a school system (secondary or college). Many of these just can't get the capital needed to buy their own systems. If this is the case, check to see what resources may already exist within your area: Does your local university have any equipment/expertise that you could tap into? Is there anyone with laser equipment you could negotiate a deal with to purchase, borrow, or rent? Are there any "entertainment" companies in your area who might have hardware you could use? It's the old scrape and scrounge routine – try it!

Technical layout of your theater. What is your seating pattern (unidirectional or concentric)? This will determine the prime projection point for your imagery, as well as where and how to install your laser projector. Basically, the most effective central location for imagery in a unidirectional theater is approximately 45 degrees up the front springline. For concentric seating, get it as close to the zenith as you can, otherwise distorted viewing angles can really make some of the patterns look "squashed".

How much space do you have for laser hardware? The system needs to be well mounted for stability, and isolated enough from the audience, but also easily accessible to technicians for maintenance. Many are mounted on high platforms inside the theater, sometimes causing problems with theater aesthetics, noise, light-tighting, and accessibility.

If you have a catwalk behind the dome, you might want to consider mounting it there. Of course, the idea of "violating" the dome with a metal saw blade makes many of us want to scream, but there are some nice ways to minimize the negative effects. In Bozeman, we used a very thin jeweler's saw blade (the width of the cut is thinner than the diameter of one of our perforated holes) to cut a small rectangle on the back of the dome. By mounting the laser projector as close to the dome as possible, we could keep the opening small. In addition, we took some of our dome paint and touched up the edges of the dome cut and removable piece so that when the section is put back in place, you really have to search to see the boundary. The benefits of this design have been enormous; it's far easier to access, doesn't need to be moved for maintenance, is completely isolated from the audience, and excess noise and light are easier to baffle.

Another important technical consideration is power feeds. Many lasers require 3-phase 220-volt power. You'll need to make sure you have adequate power lines with isolated breakers (check the power specs on your laser documentation for breaker sizes).

Many laser heads require water cooling. Can you run water lines to and from your potential projector location? For example, a 1.5 watt Argon laser can require a water flow rate of up to 3 gallons/minute. That's a lot of water going down the gutter (and onto your utility bill), so you might want to consider a water tank/circulation system (make sure you have adequate filtration and cooling!).

CDRH licensing requirements. There are government regulations requiring that you submit design and installation specifications of your laser system to the Center for Devices and Radiological Health for approval. If the system is within code, they will send approval to the Food and Drug Administration who will issue you a variance to operate. *This process can take up to six months, so plan ahead!* You should get the regulation guidebooks and application materials from CDRH at the beginning of the planning process to determine installation and operating parameters. Request the "Reporting Guide for Laser Light Shows and Displays", variance application, and regulation manuals from:

Office of Compliance, HFZ-300
Center for Devices and Radiological Health
8757 Georgia Avenue
Silver Springs, Maryland 20910

Questions can be directed to the Optical Radiation Products Section. Consumer Industrial products Branch, at 301-427-8228. This may seem like a bunch of crazy paperwork, but it really doesn't take that long to prepare, and you can't legally operate without it!

SUPPORTABILITY/MAINTAINABILITY OF THE EQUIPMENT

Support from the manufacturer. Laser projection systems can be sensitive pieces of machinery, and require some knowledge of their inner workings in order to maintain optimal performance. There are several questions you should keep in mind when shopping for the right system: How reliable is it? How much maintenance will be required? Is there sufficient documentation? How easy is it to get information and product support, and do you expect this to continue over the operational lifetime of the system? Many of these questions can be answered by other users, so by all means find out who else is using systems like the ones you're interested in and call them!

Some other issues to consider: How quickly can you get replacement parts? Is it easy to get advice from the manufacturer over the phone, or are they hard to reach or want to charge for such advice? Is the manufacturer willing to sell you a complete set of backup parts?

Maintaining the system. In the planetarium world, some high considerations have to go toward maintenance costs, down time, staff and contract expenses. Having to pay an outside technician every time some little thing goes wrong can get prohibitively expensive.

Probably the most cost effective way of maintaining your own laser projector is to train yourself (or some other capable staff member) to maintain and repair the system. It is reasonable and professional to expect the laser company you are buying the system from to provide the bulk of that training, either when the system is delivered or installed. This is crucial, because if you or your technician need to work out a problem over the phone later, diagnostic routines and proposing solutions can come much easier (plus both ends won't get frustrated trying to do "training" over the phone!)

Operating Budget. Does your operations budget reflect the need for proper installation, maintenance, and backup? Keep in mind the cost of refurbishment/ replacement of your laser tube. Better yet, could you afford to have a second unit on hand?

(In the next issue of Southern Skies, Mike will discuss: Production and Operations, Publicity and Support, and Future Development.)

Active in the planetarium field since 1976, Mike Murray has worked in various facilities with laser show programs, including the Strasenburgh Planetarium in Rochester, NY, and the John Young Planetarium in Orlando. Currently the Assistant Director in Bozeman's Taylor Planetarium, he is responsible for original laser show productions which consistently run at near full capacity.

A QUIZ

Question: WhaT do tHe following peoplE have in common?

Answer: The next time Sue Griswald says "5 O'clock", they will be reAdy and waiting!

Duke JohnSon

Duncan Teague

jOn FraNtz

Daryl McCollIster

Tom CAll

Tony BrookS

Jay WootEn

Because of their adVenture, this group of SEPAites will forever be knowN as

_ _!

It's five o'clock -
do you know where your bus is?

Astro-Video Review

ASTRO-VIDEO REVIEW

by Mike Chesman
Bays Mountain Planetarium
Kingsport, Tennessee

Recently, I obtained a laserdisc entitled *Patrick Stewart Narrates "The Planets"*. The item was copyrighted 1993 but it seemed remarkably familiar to me. Sure enough, checking my collection I found another disc from 1991 simply called *"The Planets"*. As it turned out, both discs featured the electronic score of Gustav Holst's celestial orchestral suite as performed by Isao Tomita. A quick glance at the credits showed that both discs were produced by Don Barrett. Hmmm!

My memory told me I had one other laserdisc of Holst's music, this one featuring a full orchestra. The disc was *Isaac Asimov's Voyage To The Outer Planets And Beyond*. Guess what? Another production by Don Barrett, this time copyright 1988. Just maybe this is Mr. Barrett's favorite music of all time? More likely he has hit on a formula that allows him to recycle his product every few years. But, in his defense, each version is getting better.

All three of the discs feature extensive use of NASA imagery. The two most recent discs are almost identical edits featuring your favorite computer flyovers of Venus and Mars, JPL simulations of Voyager missions, and numerous older film animations of Pioneer, Mariner and Viking spacecrafts. The bottom line question: Are these so called music videos any good? Well, they're not the most fun things to watch all in one sitting, but in small doses they comprise interesting and well edited vignettes of each planet. Note, however, they do not cover the complete solar system because Earth and Pluto are not represented in Holst's original 1916 score.

So, what are the differences among these discs, and which should you purchase? The Asimov version is visually quite different from the more recent releases, and features no actual images of Uranus and Neptune. However, it does contain some neat Apollo footage and animated sequences of historical or archival use. Except for some brief spoken introductions by Isaac Asimov, there is no narration on the bulk of the disc. Text overlays are used to convey information. For most planetarians this will be an unwanted intrusion over the images.

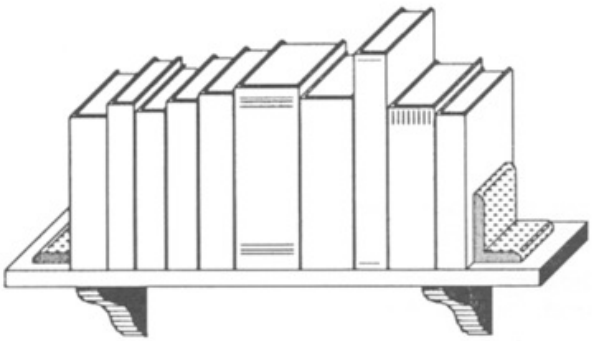
The early Tomita disc also uses text overlays so as not to intrude on the listening experience. Appropriate to draw attention to the unusual electronic textures brought to the score, though again I fear the planetarian will find these written materials an intrusion on some otherwise sharp looking video. The disc also includes some abstract video interludes which have no bearing on the subject matter, but are interesting nonetheless.

The latest disc wisely removes all the text overlays and includes occasional comments by Patrick "Mahhrrs" Stewart. This is a good move, as more information can be conveyed quickly. Yet even as a Tomita fan, I must say that his electronic score does not provide the proper musical bed for Stewart's narration. The full orchestra version would have suited "Captain Picard's" resonant english accent much better. The public will probably not be as picky, and find the experience wholly enjoyable. Visually, this is the disc planetarians will enjoy most and it forms a wonderful compilation of NASA materials that you would otherwise have to hunt down from numerous sources. It is a good disc to have in your resource library.

Many laserdisc catalogs list these discs under music videos. So beware if you're hunting out a laserdisc featuring Holst's music. Make sure you know which disc you'll be getting. The Stewart disc carries the catalog number 72333-80041-6. At $30 a pop you want the right title. All three items are also available as videotapes for about one third less.

One more suggestion in case Mr. Barrett wants to try another version. On the laserdisc, use the digital audio channels for just the music. After all, these edits started out as a music video. On the analog audio channels, give us Patrick Stewart with the backing music. And please, can we have a more appropriate traditional score. I realize the timings would be different and it would require re-editing the whole piece. But, hey Don, I bought three of these things, I'm a shoe-in to buy number four!

p.s. Don Barrett has produced lots of other planetarium related videos. Some chronicle the manned space program, another the Voyager mission, and don't forget his Space Shuttle disc. All contain interesting high quality footage and good editing. You owe it to yourself to check them out.



REVIEWS

(Something special for this issue.)

Opening remarks and introduction of Ms. Marcia Bartusiak (Guest Speaker at SEPA '94) by Jon U. Bell, Planetarium Director Indian River Community College Ft. Pierce, Florida

I've been a fan of this lady and her work for quite some time. Marcia Bartusiak began her journalistic career as an investigative reporter for WVEC television in Norfolk, Virginia.

In the past ten years, she has pursued freelance work, writing on science and astronomy for pretty much all of the major science publications, including Discover, Air and Space, Science, Omni, Popular Science, Science Digest, The NY Times, and so on; and Marcia is also a contributing editor to Discover magazine.

She is a Knight Fellow at MIT, and later this year, will be pursuing research work with this institution.

Marcia lives a little west of Boston, Massachusetts; her husband, Steve Lowe, is a mathematician working on computers and voice recognition technology.

Ms. Bartusiak has written two books, *Thursday's Universe*, and most recently, *Through A Universe Darkly*. Her writing style is clear, lucid, accurate, and highly readable! To tell the truth, I picked up a copy of her book *Thursday's Universe* at about the same time I'd gotten Stephen Hawking's *Brief History of Time*. It proved to be a tremendous help, for whenever Hawking would confuse me, there would be Bartusiak, explaining the same thing in well-written English.

In the course of her work, Marcia has talked with just about everybody in the astronomy profession - Stephen Hawking, Margaret Geller, Fred Hoyle, Kip Thorne, and once, while driving through England, she gave a lift to Jocelyn Bell, who had gotten stranded in a remote location; I think some of you here tonight can identify with that. (Several conference participants had gotten left behind on a field trip the day before, when they failed to show up for the returning bus.)

Even when she writes about astronomers long since dead and gathering dust, you get the feeling that she is basically reporting on an interview she has just had with them.

An article that Marcia wrote, concerning the role of women in astronomy, was featured in a recent issue of Sky and Telescope, and that will be the subject of her talk to us tonight. Ladies and Gentlemen, please help me welcome a lady who was certainly born on a Thursday, for she has very far to go indeed - Marcia Bartusiak!

Ms. Marcia Bartusiak's Presentation

I'd like to take this opportunity to thank you for something that happened in the 1950s. I can't go back and thank the person responsible, but I believe that everyone here this evening can serve as a sort of representative. Let me explain.....

My early childhood was spent in a suburb of Philadelphia, a small town called Woodlyn. And when I was about five years old, my parents took me to the planetarium in Philadelphia. The experience is permanently etched on my mind. We entered this cavernous room, lighted as if it were twilight. Row after row of chairs, huge chairs with big headrests, circled around. We sat down toward the center and soon the room began to darken.

Then, I got the scare of my life. Out of the floor in front of me rose this giant ant. It resembled a monster I had just seen on TV, in one of those Japanese science-fiction movies. My fears swiftly disappeared, however, when the "ant" lit up and projected a vast array of dots upon the ceiling above. I was in awe. City lights near Philadelphia were fairly bright in the 1950s. So, I had never gotten a really good look at the nighttime sky. But, now I was seeing it in all its glory. I was hooked. From that moment on, I developed a love affair with the heavens.

So great was the experience that my life's work now involves writing about astronomy and "what's out there". That planetarium experience was a life-altering one for me, even at the tender age of five. I can't go back and thank whoever directed the show that night, but I can thank you, for creating an experience that is, most likely, a child's first encounter with science. And you all make it such a wonderful adventure. Planetariums hold a very special place in my heart.

This evening, I would like to return the favor and provide a suggestion, an approach that perhaps some of you have already adopted. On the other hand, some of you may disagree with me. It involves doing away with what I call the "women-in" syndrome.

You've read the stories: women in government, women in business, women in science. To borrow a phrase from U. S. Supreme Court Justice Ruth Bader Ginsburg, it is time for newspapers, magazines, special exhibits, and museum shows to stop spotlighting women, especially women scientists, as "one-at-a-time performers". In the end, such see-the-woman-at-work programs and stories preach only to the converted, never reaching those who are truly unaware that women are making important contributions in a variety of fields.

I am well aware that women continue to face discrimination and sexist attitudes in the workplace. And, yes, I have heard the arguments that young girls need to see more role models, especially in books, articles, and shows about the sciences. But, it is my belief that these young girls are not helped if female scientists are depicted, like so many ornaments on a Christmas tree, as mere appendages to the scientific enterprise, shuffled off to that general ghetto headlined "women in science".

Reporters, editors, museum personnel must begin to ask different questions about the issues they are covering, so that women's contributions are fully integrated into regular news coverage, into regular programs, and no longer relegated to tacked-on sidebars or special annual productions. I have always felt, whenever I see one of these "woman in science" shows, that women are not newsworthy year-round, not full members of the scientific enterprise. But, indeed, they are.

There is at least one way that women's achievements can be brought into the mainstream. I learned it while researching a certain aspect of astronomical history for my latest book, *Through A Universe Darkly.*

As many of you are probably well aware, histories of astronomy tend to be written from one overriding perspective; they show how advances in astronomy, its new instrumentation and its myriad discoveries over the centuries, have expanded the borders of the known universe--our sense of both space and time. And, for a number of historical reasons, the central characters in this story have been predominantly male. And that's not too surprising.

Until the second half of this century, male astronomers (with a few exceptions) generally assumed that their female colleagues were better at tedious data inspection than at creative thinking. So, they didn't allow them full participation. For that matter, the doors to the best observatories were essentially closed to women, as it was thought improper for men and women to spend the night together on a dark, isolated mountaintop. (The lack of proper toilet facilities was another popular excuse.)

With women astronomers denied access to the largest telescopes at the time of some of astronomy's greatest discoveries (and all the fame that entailed), their accomplishments, done with pen and paper back at observatory headquarters, have not been conspicuously noted in the standard textbooks, even to this day. Instead, the spotlight is routinely focused on the men who extended our cosmic horizons--observers such as Harlow Shapley, who in 1917 moved our solar system from the center of the Milky Way to its outer fringes, and Edwin Hubble, who later made us see that the Milky Way galaxy itself was but one of billions of other galaxies roaming the voids of space. That is a compelling story and one well worth telling.

But, instead of always looking at astronomy as the evolution of our "spatial awareness", we should try to look at it from different angles from time to time. For example, we can study astronomy's advances over the centuries as a search for the cosmic formula. That was the viewpoint I chose to pursue in my book.

Some 2,600 years ago, the very first question asked by the world's first philosopher, the ancient Greek Thales, was simply this: What is the universe composed of? And astronomy continues to be driven by this rudimentary question. When viewing the history of astronomy through this alternate lens, a whole new cast of characters emerges, names not prominently mentioned in the standard textbooks. And, lo and behold, many of the principal figures are female.

We come to meet, for instance, the 19th-century English astronomer Margaret Murray Huggins. Her husband is the one who is more well-known. William Huggins. He helped prove that the Earth and the stars were built out of the very same elements. This finding overturned the belief, held since the time of Aristotle, that the heavens were a hallowed province, a realm filled with an unearthly substance. But, Huggins found that stars were not made out of ether; Huggins astounding spectroscopic work proved that the stars contained iron, sodium, calcium, magnesium, indeed a whole assortment of elements.

Well, in the 1870s, Huggins met Margaret Murray of Dublin, who had studied astronomy as a hobby since she was a child. She had even built her own spectroscope. The attraction was immediate, due to their mutual interests, and they married. He was 51, a bachelor up to that point. She was 25, less than half his age.

And, from that point on, they were a team. She was especially helpful in Huggins' newest venture, photographing spectra. Photography was just being introduced to astronomy at that time. Margaret wrote about what it was like. "Our exposures on each star had to be very long. I have, I think, worked on one for about three hours. I can go and stand well at good heights on ladders and twist well. In our star work, having got my

star into good position, I look at it, say, for three seconds, then close my eyes, say, for six or seven seconds, then look again for three seconds. By looking at flashes in this way I rapidly judge as to whether the star has been kept where it should be by certain means, and if not, rapidly adjust".

Having no children, she worked with her husband in a very productive partnership, shared only by their dog Kepler. A dog, I might add, noted for his astute mathematical abilities. With a piece of cake in his hand as enticement, Huggins would ask the dog to solve various problems, such as the square root of 16, or 6 + 12 - 3 / 5. And the dog would bark out his solutions. You weren't supposed to notice that the answers always seemed to result in 3 or 4.

By the turn of this century, at the Harvard College Observatory, Annie Jump Cannon was setting records for classifying stars off photographic plates (she categorized nearly 400,000 over her professional lifetime). The stellar classes she established were O B A F G K M. Additional categories were later added to the end, R, N, and S. The line-up is usually remembered by that infamous refrain, "Oh, Be A Fine Girl, Kiss Me, Right Now Smack". This system, of course, is still used today throughout the world.

By the way, if you're looking for a change in that refrain, Harvard professor Owen Gingerich runs a yearly contest in his introductory astronomy course. Among the past entries were: Organs Blaring And Fugues Galore, Kepler's Music Reads Nature's Score. Also: Out Beyond Andromeda, Fiery Gases Kindle Many Red New Stars. My favorite (probably done under stress) is: Oh Brutal And Fearsome Gorilla, Kill My Roommate Next Saturday.

To return to the Harvard Observatory at the turn of this century.....Here's a fact not too well-known. Annie Jump Cannon had a colleague whose work inspired the Hertzsprung-Russell diagram, that famous chart which shows how a star's mass is directly related to its luminosity, and at last allowed astronomers to figure out how a star evolves. Her name was Antonia Maury, and she was Cannon's complete opposite. Annie Jump Cannon was a very cheerful woman and dressed very fashionably. Maury, on the other hand, was rather serious and was completely unconcerned with her appearance, often showing up at the office with mismatched stockings.

Cannon worked on grand classifications. Maury was a person obsessed with the finer details. She noticed that two red stars could appear perfectly identical, except that the widths of their spectral lines differed. One being very broad; the other very narrow. She developed a whole new classification scheme to include this fact. But, just about everyone ignored her work, except for an obscure Danish scientist named Hertzsprung. He was determined to find out why those spectral line widths differed. It led to the discovery of red dwarf stars and red giant stars.

More than once, Hertzsprung wrote Maury's boss at Harvard, Edward Pickering, that Maury's work was the linchpin in his discovery. To neglect her work, he wrote, "is nearly the same thing as if the zoologist, who has detected the deciding difference between a whale and a fish, would continue in classifying them together". Pickering still didn't listen.

Women at Harvard back then had a hard time earning the respect of their peers. By the 1920s, a determined Harvard Observatory graduate student named Cecilia Payne (later marrying to become Payne-Gaposchkin) carefully analyzed many of Cannon's cherished plates. She, in fact, was one of the first astronomers to apply the new laws of atomic physics to astronomical bodies. In doing this, she uncovered the very first hint that the simplest element, hydrogen, was the most abundant substance in the universe. The reverberations that have resounded from this single, plain fact still echo long and hard through the corridors of astronomy: Here at last was the fuel for a star's persistent burning; here was the gaseous tracer that enabled radio astronomers to reveal a universe once hidden; here was the remnant debris from the first few minutes of the universe's creation. Payne-Gaposchkin's discovery did no less than change the entire face of the material cosmos.

Perhaps I'm prejudiced, but I consider Payne's discovery equal to Hubble's discovery of other galaxies. (How odd it is, then, that Hubble garners 55 lines in the "International Encyclopedia of Astronomy", while Payne-Gaposchkin manages a mere 7--and with no mention of her work on hydrogen.) Yet, what Payne had accomplished was outstanding. She cut through a major roadblock. Until then, it was generally thought that the proportions of elements in the heavens were about the same as on the Earth, iron being the predominant element. And that stymied any attempts to figure out how stars burn. How can you burn iron?

Payne's name, alas, is for the most part missing from most astronomy books. At the very last minute, just as she was about to publish her graduate research, her more conservative superiors pressured her to retract her statement that hydrogen was as much as a million times more abundant in the stars than the other elements. Her findings were so radical that they convinced Payne to soften her thesis. She added a small line in her paper that her finding on hydrogen was "improbably high and almost certainly not real". Privately, however, she held on to her conviction.

It's hard for any graduate student to challenge the leading authorities of the day, especially a woman at that time, the 1920s. Their word could make or break her reputation. So, she acquiesced.

Ironically, the very man who suggested that she add that little sentence, Henry Norris Russell, the noted Princeton astronomer of Hertzsprung-Russell diagram fame, confirmed her discovery in the Sun a few years later, and he largely takes the credit in the history books.

More recently it has been a woman, Vera Rubin of the Carnegie Institution of Washington, who largely convinced the astronomical community that something else resides in the universe, an unknown substance that has come to be called dark matter. Her painstaking measurements of a host of galaxies suggest that those luminous collections of stars could be mere whitecaps, whose gleaming presence diverts our eyes from a hidden ocean of matter right below all that hydrogen that Payne-Gaposchkin found.

Finding out the nature of this extra stuff may change only certain details in the story of the universe; on the other hand, this dark matter--this missing mass--has the potential to alter the entire tale.

What a delight it was, as I was writing my book, to see these and other women scientists attain a stature on par with their equally distinguished male colleagues--without a fix, without a whiff of tokenism. They were all major players in my story: Margaret Huggins, Annie Jump Cannon, Antonia Maury, Cecilia Payne, Vera Rubin. Others I didn't mention here tonight include Margaret Burbidge, who was a key member of the team that discovered how elements are cooked up in stars. And Margaret Geller, the Harvard professor who just this past decade remade the cosmos, showing how galaxies are arranged in vast bubblelike structures. The universe has texture.

I never started out with the intention of bringing women astronomers into my story. I only asked a simple question: How did astronomers come to learn the composition of the universe.

And in this particular instance, women were brought into the spotlight simply by changing the angle to the story, an angle often overlooked and undervalued.

I believe the same can be true in other presentations. The women are there. And rather than take the easy route--setting up a special program and mentioning the work of women all at once in a sort of hodgepodge--why not dig a little deeper and make women a visible presence in the regular day by day programming. Then and only then will the little girls, walking down the aisle of the museum or watching a planetarium show, truly believe that women are full participants in the scientific enterprise, not just a special case.

What was formerly invisible becomes visible, simply with a shift of the lens. Like the universe's dark matter, women have been lurking around astronomy's more notable stars all along.

Thank you.

Through A Universe Darkly
A Cosmic Tale of Ancient Ethers, Dark Matter, and the Fate of the Universe

by Marcia Bartusiak
Harper Collins Publishers, NY, NY
copyright 1993
ISBN 0-06-018310-1
cost $27.50 hardcover from Walden books

Reviewed by Patrick McQuillan
Assistant Director of Astronomy
Peninsula Planetarium
Virginia Living Museum
Newport News, Virginia

I first became aware of Marcia Bartusiak's new book while looking through the list of books that were available as first selections for my new membership in the Astronomy Book Club. I was joining in an attempt to increase the number of books in my meager astronomy 'library'. Several years ago I read Marcia Bartusiak's first astronomy book *Thursday's Universe*. It was an enjoyable, easy to read, and interesting book. So, I thought I would take a chance and order her new book.

I was not disappointed in the least. *Through A Universe Darkly* is about the quest to understand our universe and our place in the universe. But, rather than present a chronological retelling of the history of astronomy, Ms. Bartusiak looks at the struggle to unravel the universe's mysteries by starting with the question asked by Thales of Miletus over 26 centuries ago: "What is the essential composition of the universe?". This theme is followed throughout the book and leads to a very interesting retelling of the history of astronomy.

Through A Universe Darkly has gotten a lot of attention recently due to the fact that female astronomers are mentioned quite often. The book has been praised as one which finally tells the story of all the female astronomers who have contributed to the field throughout history. But, this is not a book about "Female Astronomers", it is a book about the search for the answer to Thales' question. The reason female astronomers show up in the tale so often is simple: female astronomers have made some big contributions to the field of astronomy.

The book is divided into two sections. The first section is titled "Light" and tells the tale from the time of the Ancient Greeks up until about 1970 when it was realized the bulk of the universe might not be shining brightly. The second section is titled "Dark" and tells the tale of the search for dark matter in the universe. This is the so called "missing mass" problem that astronomers have been trying to resolve for several decades.

The best part of the book is the fact that Marcia Bartusiak has personally met almost every big name in

the field of astronomy alive today. She has met, and worked for or with, many of the big names in astronomy from the first part of this century. So the story has a very first person feel to it.

There is a lot more than just plain old historical information here. There are lots of the kinds of stories I like to call "the dirt". You know what I mean. The stuff you like to mention in lectures and planetarium shows that give real insight into a historical figure and usually get a laugh. Stuff like: how did Tycho Brahe get a metal nose; why Edwin Hubble joked that Cecilia Payne-Gaposchkin was the "best man at Harvard"; why Fred Hoyle 'officially' came to be 'supervised' by Paul Dirac; why George Gamow added Hans Bethe's name to his famous paper detailing the process of nuclear synthesis when Bethe never participated in the work; how Hoyle once moved a several ton magnet with tennis balls; and the reason officially given for not hiring any women at the Mount Wilson Observatory in the mid fifties. If you want the answers to these questions you will have to do like they say in that infamous commercial: Read The Book! You will not be disappointed.

SEPA '95
Mark Smith Planetarium
Macon, Georgia
##########

SEPA '96
Sudekum Planetarium
Nashville, Tennessee

##########

Look for further information
in future issues of *Southern Skies*

MEMO

DATE: Before October 1, 1994
TO: All SEPA Members
FROM: *Southern Skies* - Assistant Editors
MESSAGE: Please get in touch with us with information you would like to see included in upcoming issues of *Southern Skies*.

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SMALL TALK

Edited by Elizabeth S. Wasiluk
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All right, summer is here and for me, a break in the starshow routine.

The planetarium projector is crated off for much needed repairs and I am free to do as I please until August 22.

I really wanted to attend SEPA in Charlotte. Sue Griswold puts on a great time ALWAYS, but alas, I was putting the year to a close and for those of you who teach you know how rough it is to take off the last few days of the school year. I'm sure there were others who wanted to go to SEPA and couldn't make it, and there are always people there who somehow manage to miss a certain highlight. Why don't you jot stuff down and send it to me and I'll print it. Maybe what you thought was a highlight was missed by some people, maybe others won't think it's a highlight. Let's see...

I finally decided that I was going to the IPS conference in Cocoa. How about you? What were your reasons on choosing one or the other? Did you go to both? What were/will be your idea of the highlights of IPS? People always seem to miss something or another that goes on or disagree on the merit of what goes on. Use "Small Talk" to air your views.

Finally, did you end up having to stay home to get the finishing touches on that comet crash or that 25th anniversary program and need someplace to gripe? Use "Small Talk" to air your complaints, name names, etc. We'll even stage a pity party for you if you like, or at the very least print the names of others who did likewise. Maybe I can run a contest as to who has the lamest excuse for staying home.

Well, it's the last day of school, in the wee hours of the morning...I have one more teacher's workshop planetarium program to put together for Monday and I'm out of here.

Before IPS rolls around, I'll be headed to Governor Dummer's Academy in Byfield, MA to attend a "Frontiers In Science" workshop co-sponsored by Tufts University. I had a great time at the workshop last year and am looking forward to this year's events which look even better! Best of all, they pick up the tab!

Meanwhile, each one of you needs to ponder over the above and jot your thoughts down and get them to me, you can fax them, mail them, or call and tell me over the phone. (I love getting calls from fellow SEPAites. A welcome change from the usual, "I spotted a UFO" and "I'm bringing 125 fourth graders to the planetarium on Thursday" sort of phone call.) You can even jot them down on a napkin at the IPS conference and hand them to me...so you have no excuse not to.

So tell me, where were you when the comet crashed???

NOSTALGIA

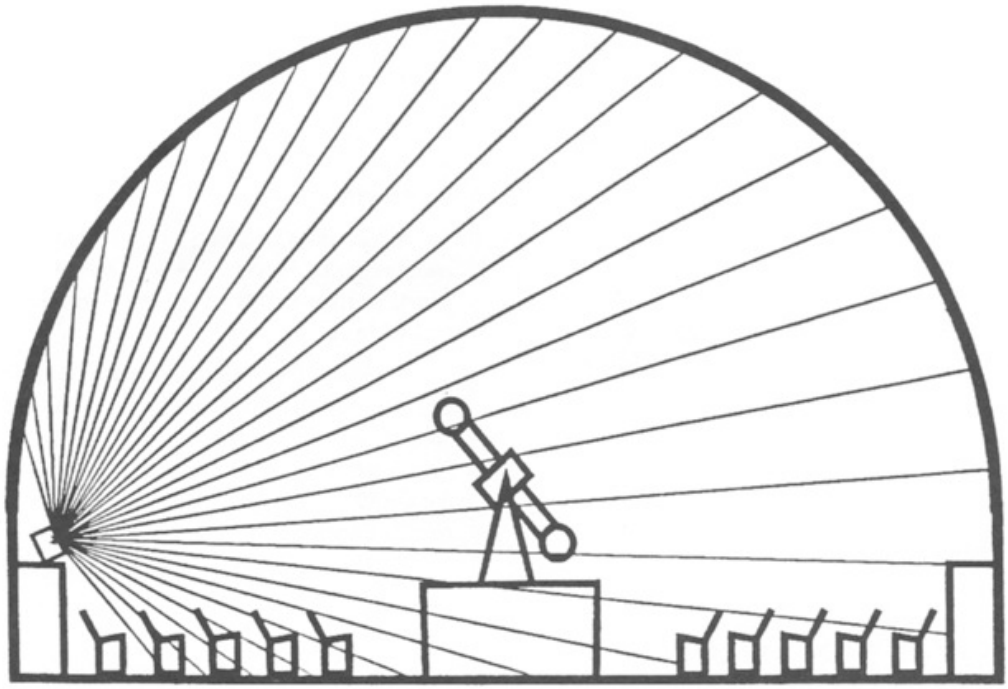
Ed. This was taken from Southern Skies, Summer 1971, but could also be used, as is, today!

This is **YOUR** newsletter. It needs YOU. Please help make **SOUTHERN SKIES** a relevant vehicle. **YOUR** articles and comments are needed and requested.

COMPLAIN!
COMPLIMENT!
CAJOLE!
CONDEMN!

But don't just sit there. If you have something to say that would interest our fellow colleagues, write it down and send it to **SOUTHERN SKIES**.

We'll print it.



Ahead,Warp Factor Nine!

by Richard McColman
Morehead Planetarium
Chapel Hill, North Carolina

Ed: This article has appeared in The Planetarian.
The Warp Factor special effect was demonstrated at SEPA '94, to lots of oohs and aahs!

There can be little argument that science fiction has had an impact upon modern planetarium programming. The advent of the more popular sci-fi movies and TV shows, in particular, has influenced the teaching methods that many of us use in our facilities. In fact, many planetarians rely heavily upon such media and literary mechanisms to hold the attention of the frantic-paced media-bombarded planetarium audience - both kids and adults alike. In the next few paragraphs, I'll introduce you to a device you can build and use in just this category of show, and one that should be both spectacular and, in a way, familiar to your patrons - the all-dome "warpspeed effect".

Origins

Way back in 1966, Gene Roddenberry's science-fiction classic *Star Trek* introduced the term "warpspeed" into our modern culture, and the concept of faster-than-light travel soon carried-over into other sci-fi media, including George Lucas' *Star Wars* trilogy, where it was dubbed "hyperspace". While this may be a dubious scientific concept according to our current understanding of the physical universe, "warpspeed" has nonetheless become a near-universal term for "the fastest with the mostest". Therefore, if we want to concoct a story line in which we "travel" the interstellar realm in our domes - and wrap up the story in under 40 minutes - employing "warpspeed" seems almost essential to the task.

What I've wanted in a "warpspeed effect" of course, is a device that would depict blurred star-streaks radiating from a central, invisible point, with the streaks growing longer and faster as they moved outward (Figure 1).

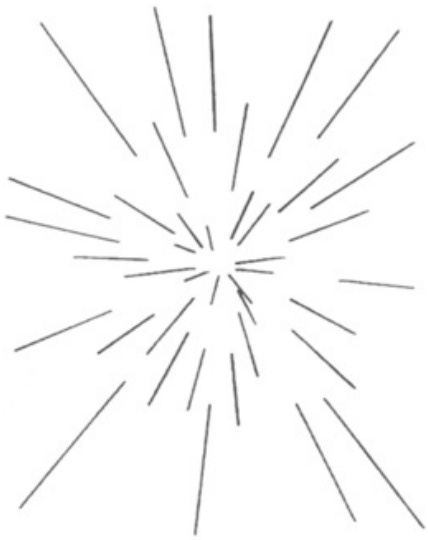


Figure 1

Morehead Planetarium recently began its run of the Oregon Museum of Science and Industry/Kendall Planetarium's *Orion Rendezvous: A Star Trek Voyage of Discovery*, and while the original script didn't call for one, I felt the show cried out for a warpspeed effect for an intro to, and exit from, several "wormhole transit" sequences. Having studied and repaired a small Talent "meteor shower" projector while at Gibbes Planetarium a few years before, I had decided it should be possible to create a warpspeed effect using a similar, but more complex set of patterns for moire' projection. By using two Kodalith slides - one (stationary in a projector gate) with a series of thin, transparent radii extending from the center, and another (centered and rotating in the same projector very close to the first slide) with lines slanted off from the radii - I'd surmised that an effect with radiating star-streaks could be achieved (Figure 2). Ultimately, we created the effect at Gibbes, though I was surprised just how dim it was when projected a mere 5 to 6 meters (about 16 to 20 feet) using a 500-watt filmstrip projector.

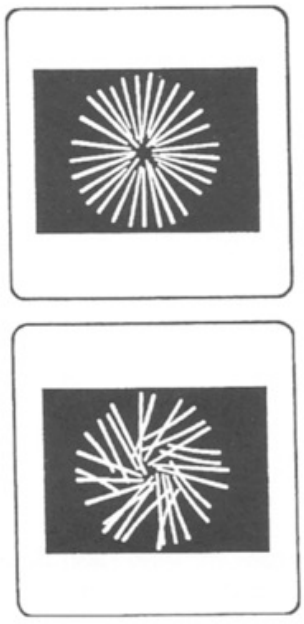


Figure 2

After revisiting the problem at Morehead, I discovered that the main problem lay in the size of the moire' image patterns in the projection device *versus* the projection coverage needed for the planetarium dome. In a 35mm slide rotator, the mechanism and slide mounts typically create about two to three millimeters separation between the stationary and rotating pieces of film. This essentially means that the resultingly thin "out of focus" lines on the *rotating* film chip act like tiny apertures and dim the intensity of the light passing through the stationary image's radii, pushing the moire' streaks toward invisibility. It is theoretically possible to remove the film from the slide mounts and fashion a way of positioning them - almost touching - in the gate of the projector. But, outside of the "sandwiching" protection of a glass mount while in a high-wattage slide/filmstrip projector the film will buckle and distort horribly. On top of that, the projected moire' pattern still isn't bright enough to cover more than a relatively small area of the dome. The solution seemed to require an optical system that would spread the light (and heat) out into a larger cone as it passed through a (correspondingly larger) focal plane.

Using My (over)Head

The ultimate solution turned out to be an old A-V standby - the ubiquitous *overhead projector* (Figure 3)! While some of these units do possess rather high-wattage lamps, the fact is that their focal planes, nonetheless, stay comparatively cool. The optical design of the typical overhead projector means that the light and heat at the focal plane is spread out over an area nearly 30 times that of a slide or filmstrip projector In fact, it's so cool that, not only is there no heat-absorbing glass in the system, but the condenser lens is actually made out of acrylic plastic!

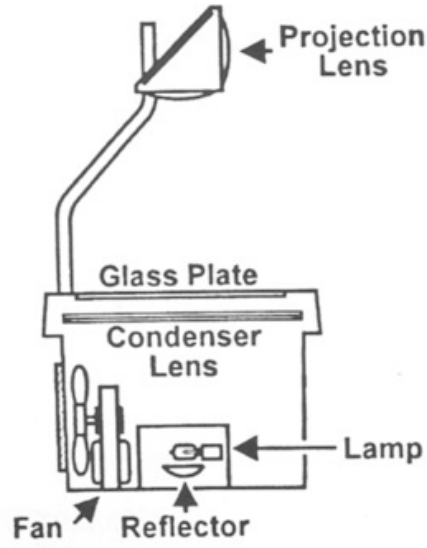


Figure 3

Another advantage of the overhead projector is that the lamphouse assembly is extremely efficient. Inherently, any optical system has a certain amount of inefficiency (loss of light transmission), but the smaller the light-path's length compared with its width, the more light ends up getting transmitted through the system. One look at the squat overhead projector lamphouse reveals just how efficient it is - the typical overhead projector lamphouse can be two to four times more efficient in light transfer than the typical slide or filmstrip projector.

In the case of the overhead-projector-based design, the stationary and rotating slides can be replaced with a black-spray-painted and radii-scored glass plate and a line-masked and black-spray-painted, rotating plexiglass wheel (described in detail later). Though these two elements are no closer together than in my original filmstrip-projector attempt, they are proportionally much closer due to the overall size of the optical system. In designing the warpspeed effect, I found several other potential problems that needed to be addressed. They were:

1) **Size.** Although the standard projection lens on an overhead projector puts out a fairly wide-angle image (Figure 4), it is by-no-means large enough to accomplish the "all-encompassing" impression we needed with the warpspeed effect. The effect needed a substitute projection lens with a shorter focal length, and a lens selection that wouldn't vignette the image - while covering at least 70 to 80 percent of the dome.

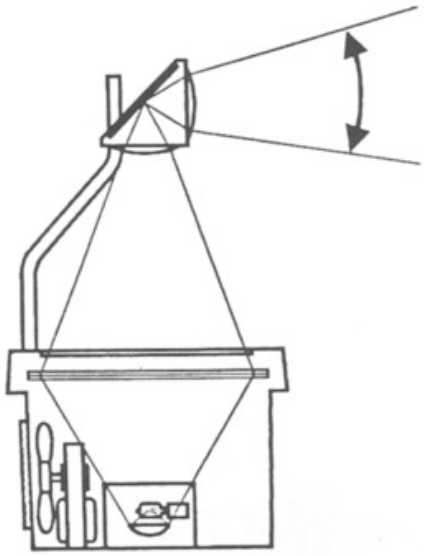


Figure 4

2) **Brightness.** Although needing to increase image size, adequate image brightness is still essential. This is an especially critical issue for larger domes.

3) **Image clarity.** Usually, the larger the projected image, the less sharp and distinct it will be, as well. In order to be effective, the device would have to remain comparatively sharp - despite its large size.

Refining the Design

Let me take you on a tour of how we designed and built Morehead's "overhead-based" warpspeed effect. The first order of business, after acquiring an overhead projector, was for us to get rid of the standard projection lens, as well as its support arm (since the latter had the wrong dimensions for holding a shorter focal-length lens). The second task was to find a suitable replacement lens. We started with the assumption that we'd need to cover at least 70 percent of the dome for warpspeed illusion to be effective. On a lark, and after trying several lenses with less-than-satisfying results, we tried using the acrylic double-Fresnel condenser lens from another overhead. Though this unit exhibited considerable "ghosting" (extraneous light scatter) when projecting large clear areas from the focal plane, the image was razor-sharp across the entire field. In addition, this lens had about a 5.5-inch focal length along with a projection angle that approached 180 degrees (Figure 5). Best of all, there was no image vignetting, and the brightness was superb!

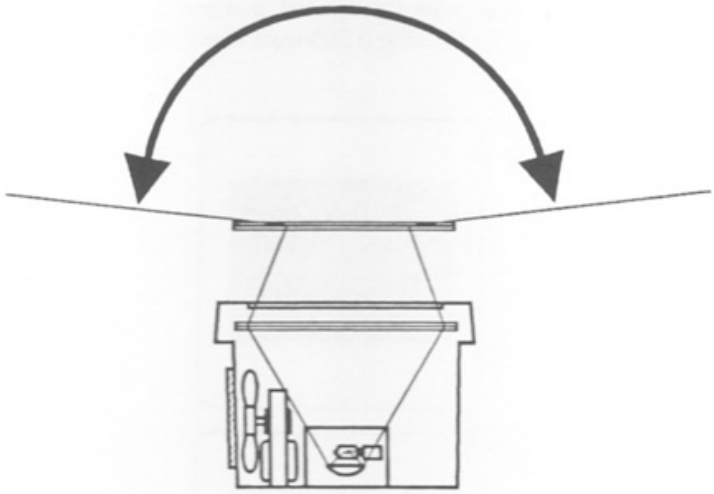


Figure 5

The only problem with the double-Fresnel - the ghosting - had been evidenced when projecting an experimental image of a ruler laid across an otherwise uncovered glass plate. On the other hand, our final images would be mostly opaque with only thin, clear lines passing light through the glass plate. How much would ghosting be a problem in that case? As it turned out, not very much. So we decided to go with the double-Fresnel as our projection lens.

Building the Effect

The beauty of the warpspeed's final design is that it requires very little in the way of specialized tools or expertise. For nearly all parts of the effect, you'll only need access to a small drill press and drill bits, a tapping set, a portable variable-speed electric drill, a band saw, and a few miscellaneous hand tools.

Unlike with a standard image rotator, the rotating plexiglass disk in the warpspeed effect doesn't need to be on a ball bearing assembly attached at its circumference. Instead, since the warpspeed star-streaks in our familiar sci-fi media appear to emanate from outside the radiant point anyway, it works out well to have the disk rotate on a fixed spindle at its center. We decided to mount our spindle through a hole in the lamphouse's glass top-plate. Since it doesn't have one already, you'll have to drill a hole, or get a glass supplier to do it for you.

The Glass Plate

Actually, drilling through glass seems more difficult than it actually is. First, you'll need to purchase a glass bit of the proper size for your spindle assembly (we used a 1/4 inch bit). Next, you'll need to remove the glass plate from the projector - this usually requires taking out the condenser and loosening some retaining screws or nuts on the underside of the projector's hinged top. Once out, measure and mark the center of the glass plate, and find a flat piece of plywood roughly the same size to keep under the glass for extra support throughout the drilling procedure. It's important to note here that you *must* use a special lubricant, such as mineral spirits, to cool the drill bit, and you *must not* use a fast drill speed. That's why it's important to use a variable-speed drill for this operation. However, if you try to start the hole with a handheld drill, you'll find that the bit will want to wander all over the place. Start the hole, therefore, using the drill press on its slowest speed ratio. Though the drill press' slowest speed is still probably too fast to drill through the glass, all you want it for here is to create a "starting dimple" in the glass plate as a pilot for your hand drilling. Use only enough pressure with the drill press to start the drilling action - *and no more.* This rule also applies when working with the handheld drill, by the way. But, before any drilling, be sure to form a small "cup" around the drill-point mark on the glass plate, using silicone rubber sealant. This cup will serve to hold a reservoir of lubricant in which the drill bit tip will be immersed (Figure 6). Be careful, go slowly throughout the procedure, and patience will reward you with a cleanly-drilled, unbroken glass plate.

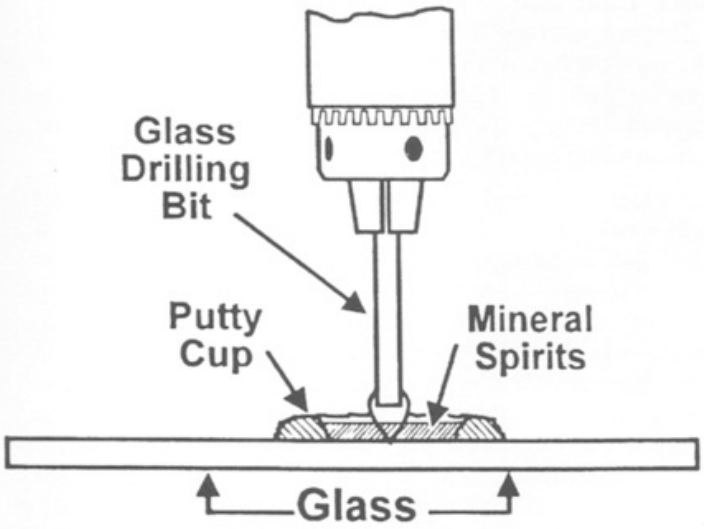


Figure 6

Now it's time to begin creating the image for your glass plate. While it would be possible to do this using large-format litho sheet film, it's easier and less expensive to spray-paint the top of the glass plate flat-black, and then score transparent radii into the paint layer using a metal cork-backed ruler and an X-acto knife. After applying the paint, double-check it by holding it up to a bright light source to make sure it's opaque. If not, spray it again to provide adequate opacity. Make sure to spray-paint the glass with it's underside flat-down against a plywood scrap or paper-covered table-top, by the way. This will mask the underside from any paint overspray.

The next step is to score the radii. Since anything you create will be magnified greatly on the dome, it's important to make your radii quite thin - in this case, less than 0.5mm wide (though we've actually found that the effect will look much better still if you keep the radii width to no more than 0.2mm). Unfortunately, a single pass with your X-acto knife won't cut it (excuse the pun),

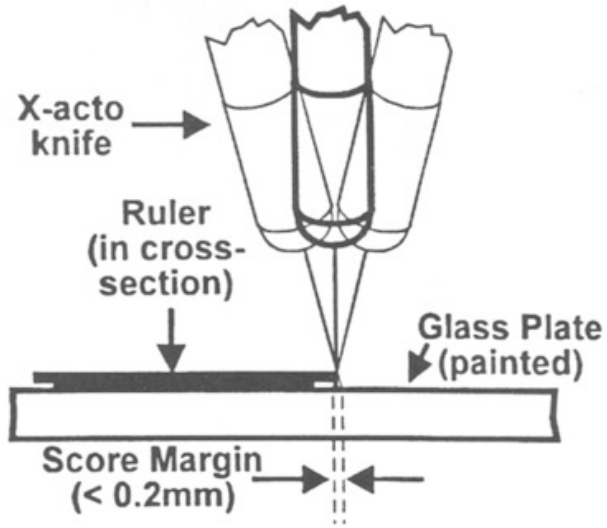


Figure 7

since the scores, and the resulting edges of separated paint tend to fold away slightly from the knife blade, only to collapse back together again once the knife has moved out of the way. This is where the cork-backed ruler comes in. With the metal straight-edge of the ruler elevated slightly above the glass due to the cork backing, it is possible to tilt the knife handle on successive passes along the ruler and have the blade-tip score the paint layer in separate, parallel cuts as in Figure 7 (though the knife

angles are grossly exaggerated here). By making three or four such "offset cuts" with the knife, you'll find that the paint will easily peel away from the glass in super-thin strips. The result is a precise, transparent line which will pass light from the projector's lamphouse. (By the way, if you are thinking of substituting the glass plate with plexiglass because you would rather not try drilling glass in the previous step - *don't!* While glass works great because its hardness can stand up to the punishment of the knife blade, the much softer acrylic sheet will become optically distorted, and will scatter the collimated light beam from the projector's lamphouse.) Once you've gotten the procedure down, create a radii pattern similar to the one depicted in Figure 8. Note that the inside end-points of many of the lines do not extend as far toward the center as others. This is intentional, and serves to break up what would otherwise appear as a very artificial-looking "spiral vortex" of star-streaks in the center of the effect. If you ultimately find you have too much of this vortex after assembly, you can always paint out some of the inner lined areas with flat-black brush-on enamel model paint.

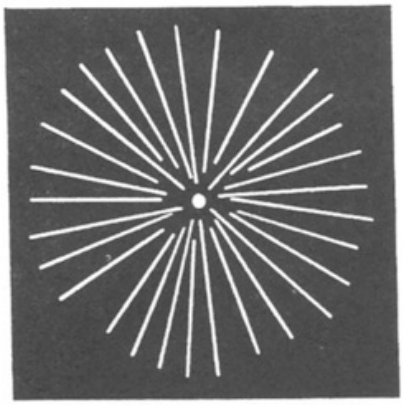


Figure 8

The Wheel

The disk, or wheel is a little easier to make, as it is constructed out of plexiglass and is simply masked and painted after measuring and cutting. While the diameter of the wheel isn't super critical, I would recommend one close to the measurement along one side of the projector's glass plate. We used 1/8-inch plexiglass because of its lighter weight, marked it on its protective paper backing with a compass, and cut it out on a band saw. We then drilled a 3/8-inch hole in the center of the wheel for our spindle bushing (which we'll address later) - though you may choose a different size center hole, depending on the exact size and design of the spindle and bushing you'll use. We then removed the paper backing from the plexiglass wheel.

To create our transparent "interference lines" on the wheel, we used 1/16-inch graphic-arts "line tape" (available from office-supply, or graphic arts stores), and applied it to the wheel in a pattern similar to the one shown in Figure 9. If you have trouble locating line tape, you can use regular masking tape, cut to this same narrow width. Just find a piece of scrap plate glass, tear off several strips of tape (slightly longer than the radius of your wheel), press them down on the glass, and cut thin, straight strips using the metal ruler and X-acto knife. Then press the masking-tape strips onto the wheel. Either method will work, but the graphic arts tape is easier to use. Just make sure to press the tape-strips down with a good pressure, or you'll find later that the paint will have seeped under the tape in uneven patterns.

Figure 9

Now, spray-paint the wheel (again, with the underside flat on a plywood scrap or tabletop) with flat black paint using two or three adequate coats. After satisfying yourself that you've achieve good opacity, pull the tape off before the paint fully hardens. (If you make sure to pull the tape off at roughly right angles to the applied lines, you'll find that it will separate from the surrounding paint layer much more cleanly.)

Now is a good time to quick-check how your effect will work. Place the glass plate over a light source - a slide box or table works well here - and hold the wheel over it (centered hole to hole) by way of a bolt pushed up through the wheel hole. Now, apply a rotational motion to the wheel, via the bolt, with your fingers. Rotation in one direction should create streaks that appear to move away from the center, while the other direction moves them toward the center. You'll also notice that the closer in orientation an "interference line" is to a radius, the faster its streak will appear to move. Conversely, the greater the angle of the interference line against a radius, the slower the streak will move. Also, notice how the speed of the streaks increases with distance from the center of the wheel. Mixing interference lines of different

angles on the same wheel, by the way, will add to the sense of flying through three-dimensional space - as some "stars" will appear to move rapidly (those which "pass" the viewer close-by); and others, more slowly (those that "pass-by" at a greater distance).

It is possible that you may be dissatisfied with the work on this first wheel - but don't fret! By studying the interaction of the rotating wheel with the stationary glass plate, you can learn a lot about how to get it right the next time, and it shouldn't take very long to make another wheel anyway. (If you've got a real aptitude for math and geometry, though, you'll likely figure out the best wheel pattern even before you mask the first disk.) Also, before you finish with the disk, you can refine the "distant first appearance" of the radiating star-streaks by tapering the inside ends of the slanted lines to a pointed geometry using black model paint. This has the effect of making the "distant approach" of star-streaks (or, in the case of receding stars with opposite disk rotation, "disappearing stars") a bit more gradual and less abrupt.

Playing Spin-Doctor

Now we come to the moving mechanicals of the effect - the center spindle, and the motorized wheel drive. Basically, we constructed the spindle assembly out of a shaft-bushing from an old disassemble Clarostat potentiometer (volume control), and a few bits of hardware - including some nylon circuit-board standoffs, a machine screw, nut, and washers (Figure 10).

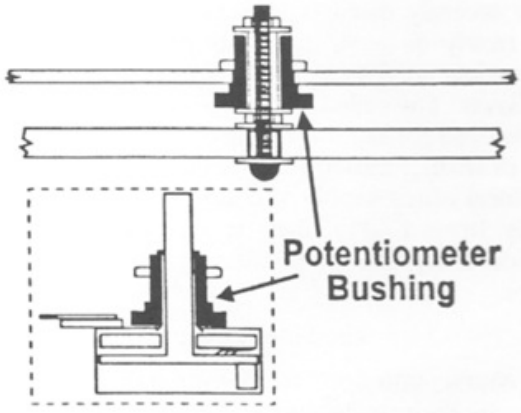


Figure 10

If you construct your spindle this way, make sure that (1) the diameters of the nylon standoffs closely fit those of both the glass and pot-bushing holes (the latter should also allow the pot bushing to freely rotate); (2) that the "glass-hole standoff" is slightly shorter than the glass thickness so the machine-screw can be tightened to the glass); and (3) that the "pot-bushing standoff" is slightly longer than the metal potentiometer bushing (for free rotation). Also, make sure that the bottom flange of the pot-bushing is smooth, as it will need to smoothly spin with the weight of the wheel atop one of the spindle's washers. You can file it down smooth if it's not already. Also, put some lightweight grease on the parts that will rub together, to promote smooth motion and minimize wear. And be sure, after final assembly, to apply a little light-weight thread locking compound (gloss enamel model paint works well) to the threaded joint between the machine screw and its nut, as well as the pot-bushing and its nut. This fine point will help keep the assembly from loosening during operation.

The design for the warpspeed effect calls for the drive motor to be out of the way of the optical path. Accordingly, we chose to have the motor rotate the wheel via a rubber roller at the wheel perimeter. This is perhaps the most critical part of the effect, as it requires the most specialized fabrication and component selection. The major parts of the motor drive assembly are the motor itself, the motor shaft hub, the rubber drive roller, the motor swing-lever, the lever pivot, and the tensioning spring. The assembly is depicted in Figure 11. It is

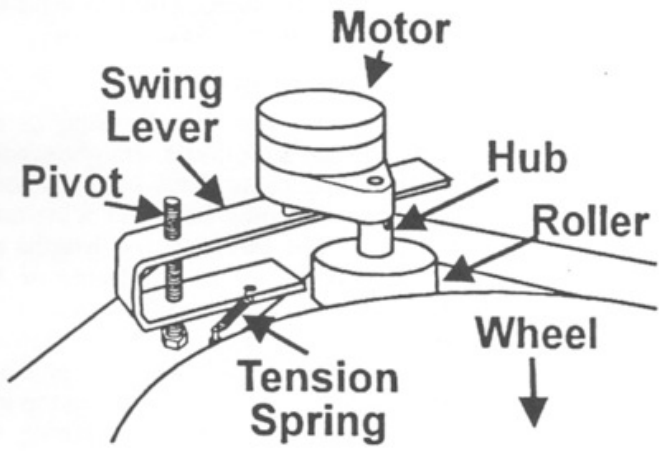


Figure 11

important to choose a motor that will run fast enough, but simultaneously have sufficient torque not to bog down with the necessary pressure and friction against the plexiglass wheel. We chose a small 40 RPM D.C. gearhead unit which fulfilled both of these requirements as well as allowing for direction reversal and variable speed. The rubber roller we used is a 3/4-inch length cut from (using a band saw) a #4610816, 2-inch diameter replacement rubber spindle for a Ryobi oscillating spindle sander that we picked up at a local home builder's supply warehouse. The motor shaft hub is a 1/2-inch diameter piece of aluminum dowel stock. After cutting to length, we center-bored the dowel stock to the diameter of the motor shaft, and drilled and tapped it for a set screw. If you don't have the tools or expertise to make this part, see about getting it made by a local machinist. The aluminum

hub is then glued into the center hole of the rubber wheel using a suitable adhesive.

The lever, pivot, and spring are constructed to allow for sufficient friction between the rubber roller and the wheel, as well as making up for any imperfections in the edge-cut of the wheel. We constructed the lever out of thin, soft-grade aluminum bar (the kind usually available in hardware stores), and bent it to form an offset "U". We then drilled small holes to mount the motor and to anchor the tension spring, and drilled and tapped through both sides of the U-curve in such a way that the lever could be threaded onto a machine bolt. This last feature allowed us to use the machine bolt (mounted through a hole in, and protruding up from, the top-frame of the lamphouse) as a pivot pin. The height of the lever and motor can also be adjusted on this pivot by running the lever up or down the threads of the bolt before final wheel mounting. A small machine screw is mounted into the lamphouse frame near the pivot-bolt to serve as a fixed anchor point for the tensioning spring. If, when running the motor drive, you find that the spin-planes of the roller and wheel are misaligned (making the wheel tend to ride up or down the side of the rubber roller), you can bend the end of the swing-lever to correct for this discrepancy.

Projecting the Image

For the mounting of the lens and focusing of the effect, we constructed a rather simple and straightforward mechanism using three lengths of threaded rod, some flatwashers and lockwashers, some hex- and wing-nuts, and a piece of plywood. The threaded rod lengths are mounted through three holes in the top-frame of the lamphouse (two on one side, and one on the other), using some nuts, washers, and lockwashers. These form a three-point suspension system onto which a plywood "lensboard" (painted black) can be mounted using top and bottom wing-nuts on each rod. Besides anchoring the lensboard, the threaded rods and wing-nuts make for a way to adjust the height (focus) of the Fresnel projection lens relative to the projector's glass plate. The lensboard itself must next be cut and drilled to dimensions to provide a frame-like opening and mounting for the Fresnel lens (which is mounted to the board using small sheet-metal screws). Three additional holes should also be drilled to match the spacing of the threaded rods. What you should end up with is a mount which will, as closely as possible, center the lens over the glass plate and the rotating plexiglass wheel. Figure 12 shows the arrangement of the projector, tilted over to the approximate angle needed for projection, and Figure 13 shows the coverage-potential possible from the effect.

As I stated earlier, the near 180-degree projection angle of this effect is made possible by the same type of double-layered Fresnel lens used as the condenser in an overhead projector. Edmund Scientific (101 E. Gloucester Pike, Barrington, NJ 08007-1380, phone: 609-573-6250)

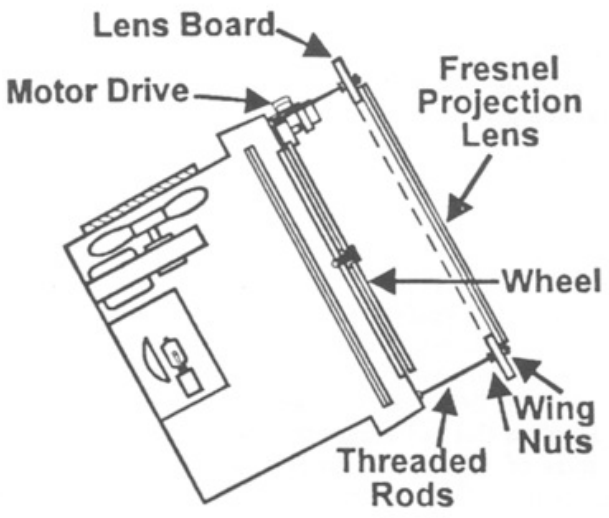


Figure 12

sells a #A71,316 double-Fresnel, which is a comparable item, for about $36. (When mounting this lens, you should try orienting one side and then the other toward the dome, as one orientation may provide more even focus across the field.) Or, you could purchase two #OL9004 single Fresnels from C&H Sales (2176 E. Colorado Blvd., Pasadena, CA 91107, phone: 800-325-9465) for about $15 each, and sandwich them together (with the faceted surfaces placed together) on the lensboard. This second option is a surplus item, so its long-term availability may be limited.

I've recently discovered yet another alternative that works nearly as well, but costs much less. Bausch & Lomb makes an 8 1/2" x 11" plastic Fresnel lens in its "Sight Saver" line called "Magna Page" (order # 81-90-07), which is used for reading/seeing small print or details in a book or map. I picked this item up for just $3.99 a piece at our local office supply warehouse. As with the single Fresnels from C&H Sales, you'll need two of these sandwiched together with their faceted surfaces placed together.

The Final Touches

Of course, you don't want your star-streaks projected all over the floor, seats, and audience, so once you get the device positioned and aimed in the theater, you'll want to mask off the appropriate area of the glass plate which is below the horizon line. This can be done by temporarily removing the plexiglass wheel, turning on the projector, and placing strips of low-tack drafting tape across the scored plate in positions projected along the base of the planetarium dome. Once you's done this, you'll have a pattern on the glass which you can duplicate onto a cut-our black construction paper mask. When that's done, mark the position for the mask, remove the drafting tape, attach the mask over the glass plate, and replace the plexiglass wheel.

Finally, light-block the effect - making sure not to block off the cooling air flow (we used a stapled black cloth "skirt" to hang down from the perimeter of the lensboard) - and hook up the fan, lamp, and drive motor to your theater control system.

Summary

One great attribute of the warpspeed effect is that it *can* cost very little money. We acquired the overhead projector used in ours from the university's surplus warehouse for only $10.00! Though it had a couple of problems (a dirty lamp socket, and a bad thermostatic fan switch - which we bypassed in our application, anyway), it took just a few minutes to fix it up. Since there is very little that can go wrong with them, old overhead projectors can be easily refurbished at almost no expense, and are often liquidated by school systems, who have used tons of the things over the years. For this reason, I'd highly recommend contacting local school district equipment departments to secure some of these beauties. The only other appreciable hardware expenses associated with the effect are the drive motor and the Fresnel lenses. Surplus miniature D.C. gearhead motors can be picked up for as little as $20 to $30, and again, the lenses can be had for less than $40. The scrap plywood and plexiglass, and the bits and pieces of miscellaneous hardware, glass drilling bit, and paint will not inflate the cost of the project significantly. This means that, with a little searching and ingenuity, it is possible to create a spectacular sci-fi planetarium effect for less than $100.

The final warpspeed effect takes up a relatively small amount of space - especially given its decreased height with the projection lens substitution. Though it may be a bit larger than the average planetarium effect, it is really quite small when considering its capabilities. Not only is it bright (even in the largest theaters) and sharp, but its dynamism, all-dome coverage, and resultant peripheral vision filling character provides a spectacle that leaves audiences, and planetarians alike, astounded as with few other effects possibilities.

So the next time you are looking for just the right effect for that new interstellar travel planetarium show, just issue the order,

"Warpspeed...engage"!

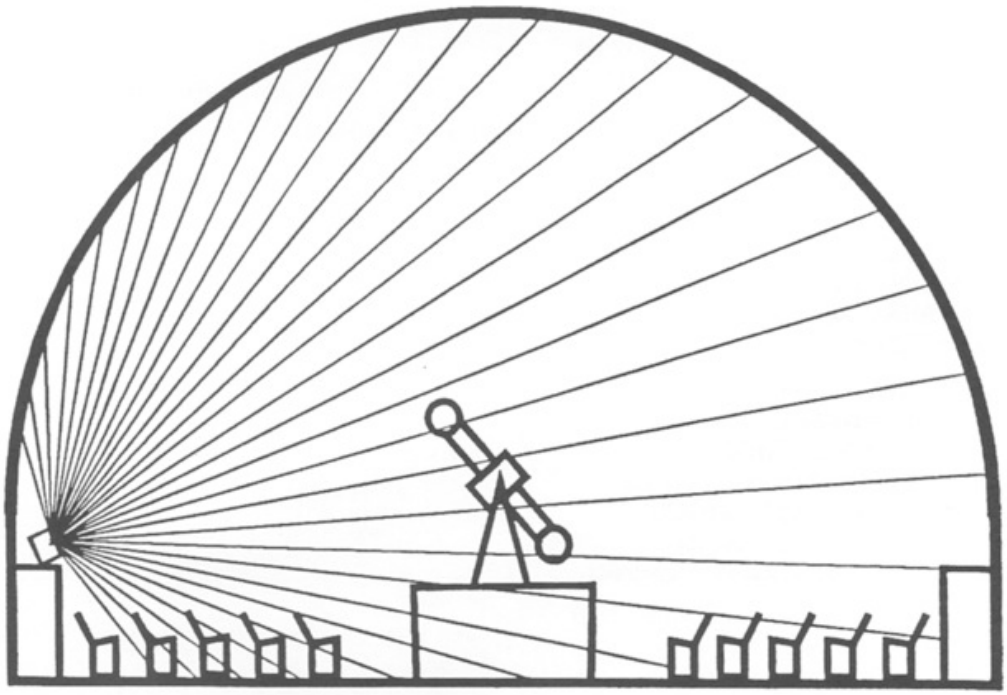


Figure 13

IPS REPORT

by John Hare
IPS Council Representative
Bishop Planetarium
Bradenton, Florida

The largest planetarium meeting ever is now history. Over 500 planetarians, vendors, and other participants gathered in Cocoa Beach, Florida, July 10th through July 16th.

As is always the case, there were lots of valuable paper sessions, workshops, speakers, vendor displays, social activities, field trips, and a wonderful setting for extended and informal "shop talk" sessions. Every continent was represented except Antarctica. The large number of international delegates brought a greater depth and variety to the conference.

Osaka, Japan will host the next IPS conference, scheduled for July 1996.

SEPA members in attendance at IPS had an opportunity to meet on July 13. Twenty-two showed up. Members present at that meeting, plus numerous comments from other members at the SEPA Conference and elsewhere, gave me an overwhelming mandate to cast the SEPA vote for London in 1998.

London, England was the overwhelming choice for the 1998 site, winning out over strong bids from Paris France, and Pittsburgh, Pennsylvania.

IPS President Elect, Jim Manning, selected San Diego, California, as the site of the 1995 IPS Council meeting. The Council meeting is scheduled just before the ASTC meeting which is also in San Diego.

A slate of candidates for the offices of President Elect, Treasurer, and Secretary were presented.

President Elect: Jon Bell-Ft. Pierce, Florida
Thomas Kraupe-Munich, Germany
Dale Smith-Bowling Green, Ohio
Treasurer: Keith Johnson-Reno, Nevada
Secretary: Katherine Becker, Omaha, Nebraska

Katherine Becker, the incumbent Secretary, submitted her resignation effective July 17, 1994. No reason was stated. Joyce Towne of the Fels Planetarium, Philadelphia, Pennsylvania, has agreed to serve as interim Secretary until the as yet un-named winning candidate takes office on January 1, 1995.

Three new regions were accepted as affiliate members of IPS, bringing the total number of affiliates to 18. The Council of German Planetariums was accepted along with two newly formed regions, the Russian Planetarium Association and the Ukrainian Planetarium Association.

During the course of the conference it became apparent that a number of the Russian and Ukrainian Planetariums, as well as a few other third world facilities, were in dire financial straits, or were unable to obtain basic materials and equipment. An emergency meeting of the SEPA Council authorized that $200.00 of SEPA support be made available for such needs. A number of other regional organizations, private individuals, and facilities, likewise pledged support. IPS President Bill Gutsch is in the process of setting up a clearing house to coordinate the support efforts.

Solitude

The night sky.

Cold...lonely...distant...

Countless specks too far away even to

Imagine the solitude.

My solitude.

Yet the soul of the night sky

Touches me directly - one on one.

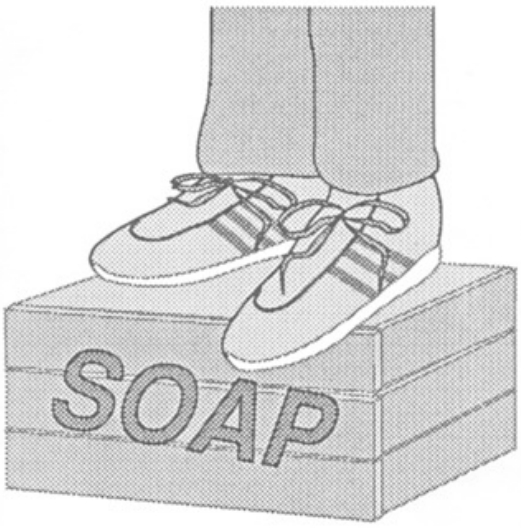
A deeply personal bond, leaving language useless to communicate our

Covenant - rather, it is a spiritual understanding - a knowing.

Look up - we are soul mates.

Paul Kaplan

Paul is a composer for film, television, theater, and the planetarium. Ever since early childhood, Paul has gazed in awe at the night sky, and marveled at the mysteries of the heavens.



STOP APOLOGIZING FOR BETTER PUBLIC SPEAKING

by R. L. Beck, President
Sunwest Space Systems, Inc.
St. Petersburg, Florida

It's soapbox time!

Have you noticed how often people start a talk, presentation, or demonstration with an apology? I have, and it was particularly noticeable at SEPA '94. I'm sorry this isn't OMNIMAX... . I'm sorry I haven't been at this very long. I'm sorry I didn't bring something with me. I'm sorry, I'm sorry, I'm sorry. Do you do this with patrons?

There were comments in the audiences about the apologies. One man saying, "Enough already, get on with it.". Another said, "Oh, please. Cut it out." Expletives deleted. When our projectors fail or time runs out we all tend to apologize. It is important to acknowledge to the audience you are aware a problem has occurred.

However, apologizing before you start kills the effectiveness of your presentation. If your work or equipment is so bad you have to apologize before you start, don't start. If you are simply embarrassed that what you have or what you are doing is not as good as what your peers have or do, take this advice. Do the best you can with what you have, and let the audience judge whether an apology is required. If necessary, be better prepared.

A pathetically poor presentation is noticeable to anyone, but many planetarium patrons will probably not know if a presentation is merely acceptable or extremely good. At conferences and other meetings your peers in astronomy will generally make allowances for different styles and setups. Stoning is illegal, so the worst you'll get are comments like, "That would be great in OMNIMAX", or "It's a shame he didn't bring...". This audience understands and the other won't know.

Apologizing up front makes a negative start and only a truly outstanding presentation has any hope of being saved. Just do your best and give yourself some credit. At least you are doing something.

Ronnie Beck is President of Sunwest Space Systems, Inc. ("A Space Science Company - Equipment, Education, Publishing since 1979") in St. Petersburg, Florida, and a member of SEPA and IPS.

NOSTALGIA

Ed: The following is taken from *Southern Skies, Summer 1971* - Jack Horkheimer, Editor. See page 32 of this issue of *Southern Skies* for the 1971 Conference schedule.

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UPCOMING! PLAN TO ATTEND!

SEPA ANNUAL CONFERENCE
IN ATLANTA
June 4 and 5, 1971

Fernbank Science Center promises to be the exciting hub of SEPA's annual Conference next month...June 4 & 5. As anyone can tell by glancing at the itinerary below, this conference should prove to be of exceptional interest to all members. Two days jammed with lectures, workshops and demonstrations should also keep everyone busy.

It is hoped that all SEPA members will be able to attend and benefit from the mutual exchange of ideas and professional comradery that the newest Planetarium Regional offers.

Registration fee is $15.00. Lodging facilities may be had at the Rodeway Inn, 1706 Clairmont Road, N.E., Atlanta, Georgia; (404) 634-6291. Room rates: $14.00 and $18.00.

Whereas most of the activities will take place at the Fernbank Science Center, Dr. Krogdahl's dinner lecture on June 4 will be given at the Rodeway Inn and Dr. Morris' luncheon lecture on June 5 will be scheduled for Pittypat's Porch.

Growing Up With Planetariums

a paper presented at the Biennial Conference of the International Planetarium Society July 10-16, 1994

by Gary M. Lazich
Davis Planetarium
Jackson, Mississippi

The Occasion

The concept for this presentation comes from an award-winning diary-documentary film, *Growing Up With Rockets*. While few of us have "grown up" with rockets, most of us have "grown up" with planetariums. The time, place, and theme of this conference invite us to reflect on that experience.

The silver anniversary of Apollo 11 recognizes, in part, our own investment as planetarians. It celebrates the first piloted landing on another world - a landing envisioned in planetariums. It anticipates future planetfalls - landings which may be enabled by planetariums.

Growing Up

Twenty years ago, Max Ary, in *The Planetarian* (March and June, 1974), described three stages of evolution during which planetariums functioned first as mausoleums, then as classrooms, and finally as multimedia theaters. As planetariums have grown and developed, so have we.

While rockets were launching the first satellites, I was launching my career - first with handheld Harmonic Reed projectors, then, later, with a Renwal Cosmorama. When I was old enough, my parents took me to Adler Planetarium, the oldest of Ary's "mausoleums". Today, the show would rank as stilted and cliche, with few visuals, intermittent classical music, and a live narrator who ended his lecture by wishing us. "Good morning!". No matter - I had seen the lecturer make the stars come out in the daytime; I wanted to learn how to do that!

During grade and high school, I fed my imagination with deep-sky wonders glimpsed through telescopes as well as with vistas depicted in space art collections. In college, I refurbished an observatory and assembled my first slide-tape presentation. While studying astronomy at Northwestern, I committed myself to a career in education and began researching classroom planetarium activities.

After graduation, I visited the Cernan Earth and Space Center in suburban Chicago to get a directory of planetariums and walked into my first professional job. I learned to present, then to create programs using an automated Spitz System 512, tilted-dome panoramas, multi-image programmers, zoom/slews, and a hemispheric film system.

At the Paulucci Space Theater in northern Minnesota, another 512 installation, I learned how to fund program and facility development, including the installation of another hemispheric film system and the first film of its kind on the Space Shuttle.

South Carolina State College gave me the chance to work with a Viewlex-Minolta Series IIb and to develop a tongue-in-cheek Hallowe'en sky tour.

At Broward Community College in south Florida, I directed the installation of a new Zeiss System 1015, auxiliary projection with SPICE automation, and several original programs.

Now, at the Russell C. Davis Planetarium in Mississippi, I work in a sixty-foot dome with a Minolta Series IV projector, a hemispheric film projector, DORK automation, and a BCC laser projector.

In dome size, at least, I have come "full circle" from the Adler to the Davis but, when I deliver off-site presentations to children, I bring a little "star Machine" to demonstrate how the big ones work.

Having worked with toy star projectors, lecture hall theaters, classroom installations, and multi-media facilities, we now witness the "next generation" of planetariums: those involving computer graphic and interactive video projection. Here at Cocoa, optical and video star projection work in harmony, creating an experience impossible to replicate with either alone.

Do these "new wave" facilities herald the extinction of the planetarium, as some have feared, or do they represent its maturity? Science fiction writers suggest the latter. In one of his books, Larry Niven describes a starship pilot suspended within a "womb room" where computer graphic starfields help him navigate his ship. During an episode of *Star Trek: The Next Generation*, an alien science minister tells Captain Picard, "When I was a child, my parents used to take me to the planetarium. I used to sit there in the dark watching the stars. It was like being in a spaceship, going to other worlds, meeting other people...I have been prepared for the realities of space travel since I was nine years old sitting in a planetarium.".

Overcoming Obstacles

Regardless of the technology employed, planetariums exert an almost magical power to elicit childlike wonder in their visitors. Why?

One answer may involve the way we have grown up with our planetariums. We have each had to overcome false starts, dead-ends, and retreats, as well as our share of obstacles.

Inadequate funding or housing often lead us to seek other places to ply our trade, sometimes prematurely. Improper construction at some facilities has led to

deterioration, eventual closure, and layoffs. Other facilities suffer from persistent building leaks, the need to remove asbestos, or the lack of suitable work space.

Excessive expectations can prove even more disruptive. Some facilities are supposed to pay for themselves using hours of unpaid overtime despite minimal staff, abrupt transfers of administration, and periods without funding. Administrators want results, not excuses; audiences want production values typical of a *Star Trek* film; we ourselves often try to develop too many programs on limited resources. Disappointment can sometimes lead to drastic consequences!

Professional disrespect sometimes hinders our efforts - problems with receipt of mail, appropriation of admissions income, patronization of funding requests, staff infighting, and denial of promised teaching assignments. Some of us endure years of work without salary increases, conference attendance, participation in decisions affecting our work, and resolution of job concerns.

Occasionally we experience personality conflicts with our supervisors which may make evaluation problematic. Especially when our supervisors work in other disciplines - museum management or academic administration - we may encounter differences in temperament, pacing, style, philosophy, and even ethics.

We may even suffer personal tragedies - financial reverses, substance abuse, separation, divorce, catastrophic illness or injury, the death of a family member. Two years ago, while I was working in Mississippi and my family was in Florida trying to sell our house, our two-year-old son Jonathan slipped out of the house and drowned in our backyard swimming pool.

Any of these obstacles could easily stop us - yet we persevere and continue in our profession. Alan Friedman, in an article in *The Planetarian* in March 1991, described us as the happiest professionals he knew. Perhaps we are the *happiest* because we are the *most resourceful*. We overcome obstacles through a shared vision of possibilities.

During or prior to each of three layoffs, I continued to network at conferences - among them IPS '82 in Vancouver, IPS '86 in Tucson, and GLPA '91 in Youngstown - where I received invaluable encouragement and counsel. Despite difficult job circumstances, I sought to reframe problems as challenges and crises as opportunities. Painful setbacks became occasions to pray for the grace to transform each one. At Jonathan's wake I read an excerpt from *The Little Prince* about the laughter of the stars. To this day Vega and the "smiling" crescent Moon (visible the evening of his funeral) remind me of him.

Pitfalls and Prospects

Given the windmills we tilt at, a latter-day Dulcinea might ask (as our spouses often do), "Why? Why do you do it?" To entertain, educate, edify - certainly - but also to harness power - the power to move the heavens with the turn of a knob or a few keyboard strokes, to foster a cosmic perspective regardless of dome size or sophistication of equipment.

A Kiowa creation myth asks, "What good is power unless it is used to make a good world with people to live in it?" Like model railroaders with their layouts, we create worlds within our domes. What kinds of worlds we fashion and how well our audiences "live" within them depend on how well we exercise the power granted us. To use it properly, we must skirt two pitfalls each of us sooner or later confronts as we grow up with planetariums.

We fall into the first when we misuse power through ineptitude, neglect, or carelessness - as did Professor Marvel in *The Wizard of Oz*. We rattle off sky legends and cosmic facts with equal oblivion to their significance. When questioned, we resort to pompous discourse, silly exaggerations, even pseudoscientific melodrama. We launch major production efforts without mastering the skills needed to do so. We bring young children into round, dimly lit rooms with vaulted ceilings, then plunge them into starlit darkness without warning. When our efforts fail, we try to hide - inside offices, behind massive consoles, or within computer automation.

To escape this pitfall, we must acknowledge the power our audiences already possess. They wear "ruby slippers" fashioned from their own dreams and visions of the starry sky and outer space. Like the literary Wizard, we find our proper role when we help them discover this power. In a sense, our domes can help them return "home" - to the universe we inhabit - if we strive for competence in our professional activities.

As we grow more competent, we may spiral into a second, more dangerous pitfall by abusing power, wielding it for personal gain - as Frodo was tempted to do in *The Lord of Rings*. We crave larger domes, more projectors, more powerful sound systems, more precise automation systems, more elaborate and costly programs - to satisfy us, not those we serve. We seek to have our way - with our staffs, our audiences, even our administrators - threatening, bluffing, promising as needed. We fashion circles of rationalization that conceal our true motives, even from us, wearing them like rings to make ourselves invisible. We demand perfection in our productions and feel angry or depressed when we fail to achieve it. Ultimately, we find ourselves stretched thin as our desire for control drains our capacity for joy.

To escape this pitfall, we must surrender our desire for control and share the power that would otherwise corrupt us. Management by directed consensus, participatory programming, and outreach to other departments can involve others in our efforts and safeguard us from the temptation to manipulate.

If we avoid or escape these traps, we open ourselves to the proper use of power - as Ray Kinsella did in *Field of Dreams*. We heed the voices within and around us, test their authenticity, then proceed with courage to accomplish what they suggest. Our sincerity and competence can transform skepticism into assent and even enthusiasm. Ultimately, we may see our dreams take shape as visitors and sponsors discover the power of the planetarium environment, whether in a one-person portable or a fully-staffed multi-media theater. Only then can the planetarium turn their attention away from its technology and toward the cosmos it seeks to represent - that "greatest of mysteries" in which we are both tour guides and fellow travellers.

Like Kinsella, each of us hears "the voice". "If you build it, they will come": skywatchers, poets, scientists, explorers, artists of all ages coming to life in our facilities and programs. "Ease their pain", the pain of disillusionment: with a faltering space program, with growing light pollution, with neglect of science education, with a seemingly incomprehensible universe. "Go the distance" : the distance between our visions and our realities, the distance each of us must travel to realize our dreams.

Like Kinsella, we may ask, "What's in it for us?". Not high salaries and large office suites! Personally, a great deal of hard work; perhaps confusion, frustration, disappointment; hopefully, in the end, the satisfaction of a "world" well made. Culturally, a great deal more: the chance to toss ideas about the cosmos back and forth like baseballs with our predecessors and our audiences; the opportunity to discover and rediscover the truth of Carl Sagan's assertion: "We are, all of us, descended from astronomers.".

"People will come...people will most definitely come!" - but, only if we learn to cherish the power of the planetarium, to wield it well and wisely. Then, we can empower them to go: to the Moon; to the planets; even, perhaps, to the stars.

ADVICE/SUGGESTIONS WANTED

The Cumberland Museums, of which the Sudekum Planetarium is a part, has undergone a change of administration in the last six months. In an effort to improve the level of service provided, they are taking a hard look at ticketing procedures for the Planetarium. Rather than reinvent the wheel, we are hoping that someone else has already devised the ultimate solution to our problem.

Tickets for all shows on a given day are available as soon as the museum opens. Museum members get free tickets when they show their membership card at the front desk. Paying visitors can buy tickets when they first enter the building or at anytime they decide they want to go to the planetarium.

Currently, the planetarium staff counts tickets for the front desk so the desk has the correct number of tickets for each show. The front desk dispenses these tickets as described above. At the end of the day, the planetarium staff has to count tickets to determine exact attendance and set up tickets for the following day.

Many times the front desk will tell the planetarium that the show is sold out. Many times all the seats are not filled; probably because someone, possibly a member, decided not to attend. Every effort is made to fill the unclaimed seats with any people who might be waiting around hoping there will be room.

The above described process is much simplified. The question is how can we do this more efficiently and still maintain good, personal customer relations? How does your facility handle this dilemma? ANY suggestions would be appreciated.

Kris McCall
Sudekum Planetarium
Cumberland Science Museum
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Nashville, Tennessee 37203
Phone: 615-862-5160
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The Basic Foundation of Astronomy Education

by George Fleenor
Bishop Planetarium
Bradenton, Florida

Ed: This paper was presented at SEPA '94.

Over the course of the last several years, occasions have arose that made me stop and think about how things used to be. All this contemplation, had me worried about whether or not this was a sign of aging. In various meetings with amateur and professional astronomers, there appeared to be a hidden agenda that was interfering with my thought process. When I first learned of this years' theme for SEPA, "Back to the Basics", the whole image crystallized. We as planetarians are on a mission, a devotion to teaching astronomy! Even though we all take different routes to accomplish the same objectives, we share common tools which enable us to reach these goals - Enthusiasm, Accuracy, and Technology. "**E.A.T.**"ing is very important to survival of the planetarian.

During the 1993 SEPA conference I had the honor of chairing several afternoon paper sessions. One of these papers, delivered by Jim Mullaney, made a significant impression on me. Jim's presentation, "Making the Photon Connection", addressed an important issue - the use, or lack of use, of the telescope in the planetarium. The information was very beneficial, but Jim's enthusiasm was most inspiring. Jim made me realize how important our enthusiasm is, in teaching astronomy.

When I first became truly interested in astronomy, I was in middle school. I had the good fortune of having a science teacher who was very enthusiastic in teaching the unit on astronomy. This enthusiasm caught my attention and awakened my imagination. While a member of the schools' science club, I attended my first (recollected) visit to a planetarium. As we entered the theater, the atmosphere was very unique. The whole room was basked in blue light and a strange, very futuristic machine stood in the middle. We were greeted by a very hyper individual who seemed to be bouncing off the walls with enthusiasm. When the lights lowered, revealing the starry sky, I was overwhelmed. The sky was so real, and the tour that followed was so exciting, that I began to fall deeply in love with astronomy. No real special effects were used, only the dynamics supplied by our host planetarian. The place was Bays Mountain Park, the host was Mr. Phil Groce (yes, Phil is that old!). On later returns another face graced my presence at the planetarium, and he too was extremely enthusiastic - Mr. Mike Chesman. Who would have known that it would be this man who would change my life by hiring me as a planetarian. At such a young age, how was I suppose to know how many hours planetarians work? Thanks a lot, Mike!

For the last fourteen years as a planetarian, I have had the opportunity to meet many enthusiastic, inspiring people. The basic foundation of astronomy education is enthusiasm. Our primary goal, as planetarians, is to promote and educate in the area of astronomy. Enthusiastic teaching reaches so many individuals who perhaps never would have given astronomy a second thought. I can not imagine what life would be like without possessing the knowledge and some understanding of the universe. What would it be like to peer into the sky and see the stars as mere points of light? Think of how bland your life would be! Knowing a little astronomy, puts a new twist on how we view ourselves and the world around us. It is this thought I try to keep in mind, when encountering patrons. Hopefully, through a brief encounter, these individuals will walk away with new insight and excitement just as I did when I first visited the planetarium.

Repetition can sometimes affect how enthusiasm is displayed. How many times can we answer the same question over and over again? While conversing with several amateurs and professional astronomers, this very question arose. I was amazed at how little patience some of these individuals had in dealing with the public. This is where planetarium professionals shine most. On a daily basis, encounters are made with those of the unknowing and those who wish to know. It is important that each reply is made with great enthusiasm, as if it were the first time. Remember, each individual is just that and how you relate to them is very important. The way an individual views astronomy as a science, might be based on the enthusiasm expressed in answering the question.

While being enthusiastic, it is also very important to be as accurate as possible. Astronomy can be a tricky subject to teach and the facts are ever changing. It is very important to keep abreast of current findings and most importantly how they are displayed on the dome. Simple things like waning gibbous moons in an early evening sky should not be tolerated. Planetarians can be artistic, creative, and still be astronomically correct. The delivery of accurate information only certifies our profession.

Technology has certainly changed how planetarians operate. The basics were originally a star filled sky, a lecturer and a pointer. Today, even with the overwhelming technology, these still are essential to the operation of a planetarium. Technological innovations in star fields, automation systems, video projection, special effects, and audio, give the planetarian powerful tools for education and motivation. In today's society, we have to deal with a new breed of child, a more sophisticated, sensitized child, exposed to unbelievable technology.

Children today still have the same curiosity, however, they are living a faster pace of life. In many cases the planetarian is faced with striving for new means of maintaining the modern child's interest. Each planetarium must adapt a form of inspiration based on the technological society around them locally. In our area of Florida, I have found it necessary to take a "S.T.A.R.W.A.R.S." approach. "STARWARS" is an acronym for Students Taught And Rewarded With Action Remember Science. With such facilities as Disney, Epcot, MGM, Universal Studios, and others near by, students visiting our theater can get board easily if we don't keep up with them technologically. Every show we do we strive for action that will maintain their interest and stimulate their learning experience. This also involves pre-show and post-show questions.

In the observatory, technology has given us the opportunity to reveal the real universe in a new way. The recent availability of video and CCD technology is forever changing the views shared through the eyepiece. As remarkable as the CCD is, don't let it be the only way your audience observes. Nothing can compare to truly seeing the image first hand. The use of the CCD, coupled with direct observation, takes the observer on an educational trip of discovery they will never forget. As Jim Mullaney so inspiringly noted, the observer needs to "make the photon connection".

As planetarians we embark upon a new century and ever changing technology, however, the basic foundation of astronomy education is the same. Using our knowledge of the past, coupled with enthusiasm, we can touch the lives of thousands. Practicing "STARWARS" in your area, will allow you to whet appetites hungering for knowledge - lets **E.A.T.**!!

NOSTALGIA

SEPA 1971- CONFERENCE SCHEDULE

Friday, June 4, 1971

3:00 -	4:00	Registration
4:00 -	5:30	Welcome and tour of Fernbank Science Center - Mr. Andrew J. Olson, Directorof Special Projects, Fernbank Science Center
5:30 -	8:00	Dinner - invited speaker - Dr. Wesley S. Krogdahl, University of Kentucky. "The Creation of the Universe"; a popular account of the theory of the expanding universe without invoking space-time curvature
8:00 -	9:00	Demonstration of the electron microscope
9:00 -	10:00	Demonstration of telescope

Saturday, June 5, 1971

8:00 -	9:00	Late registration and coffee at Fernbank
9:00 -	9:30	Jack Gross - Bays Mountain Park Environmental Center - "Oceanography in the Planetarium". Jack Gross is past editor of *Southern Skies* and is currently involvedin the completion of the new Planetarium at the Bays Mountain Park Environmental Center at Kingsport, Tennessee
9:30 -	10:30	Informal discussions - Dr. Krogdahl
10:30 -	10:45	Break
10:45 -	11:45	Rowland Jones - Sale Planetarium - "The Planetarium Approach to Navigation"
11:45 -	12:15	Jack Horkheimer - Miami Space Transit Planetarium - "Conceptual Astronomy: An Emotional Method"
12:15 -	2:30	Luncheon - invited speaker: Dr. John Morris, National Geographic Society.
3:00 -	3:30	Miss Jacqueline Avent - Sudekum Planetarium - "Planetarium Techniques for the Lower Grades"
3:30 -	3:45	Spitz - McGraw Hill - Mike Bennett - Educational Director for Spitz Planetarium Company
3:45 -	4:00	Viewlex - Norman Rabinowitz
4:00 -	4:30	Workshop - Edward Gilbert - A Standardized Test in Elementary Astronomy
4:30 -	5:00	John Burgess - Fernbank Science Center - "Planetarium Presentations for the Deaf"
5:00 -	6:00	Special Planetarium performance by Fernbank
6:00 -	6:15	Break
6:15 -		Southeastern Planetarium Association Business Meeting

The Yaroslavl Planetarium and Provincial College: A New Type of Educational Institution in Russia

by Mikhail Grouzdev, Ph.D.
Center Director

Ed. The following is taken directly from a paper I picked up at IPS '94.

The Russian concept of the planetarium has always differed from that in other countries. Russian planetariums primarily fulfil a very important educational function, with almost no emphasis on public entertainment.

The Yaroslavl Planetarium has been in operation since 1948, but during the past few years it has undergone significant changes. These changes very much reflect the shifting currents in education in today's Russia. In 1992, on the grounds of our planetarium, a new educational centre was created, officially entitled the Yaroslavl City Scientific-Pedagogical Center: Planetarium and Provincial College. We call it the Provincial College for short. While the decision to found this institution was made by the mayor of Yaroslavl, the impetus for the school's creation came directly from scientists and educators within the community, and not from bureaucrats. This in itself is extremely atypical for Russia. Before I became the school's and Planetarium's director, I myself was the chairman of the Department of Physical Geography at the University of Yaroslavl. In a serious academic spirit, we wanted to establish a completely new kind of educational institution. In the former Soviet Union all curricula were exactly the same from one school to another. The concept of a student's individual needs simply did not exist. Our task was to establish a precedent whereby students' personal dispositions, aspirations and needs could be addressed in a more stimulating environment. There were many obstacles on the way to our goal. There were no teachers trained to teach in this way. There were no textbooks suitable for our needs. Nor did we have the technical equipment for what we sought to do.

We proceeded along the following lines. Instead of hiring teachers trained under the old system, we invited specialists from the university to work directly in the classroom while continuing their own projects in their home departments. This choice had several advantages. The contact that such a staff had with their university gave them more exposure to new trends and concepts in education. Furthermore, these educators had greater experience working in one-to-one and seminar settings, which were uncustomary in regular public schools. This staff also proved to be able to write their own textbooks, and actually did. The very fact that these teachers were involved in their own research helped to introduce an atmosphere of collegiality and innovation into the school.

We have two basic programmes. One serves 50 full-time high school students. I am proud to say that all of the students from our first graduating class were accepted into universities, and several were accepted without having to take the usual rigorous entrance examinations. Three of our students even won places in a nationwide English contest, and were given year-long scholarships to study in the U.S.

Our second function is to provide extension programs for the greater community. Students from other schools come to our planetarium to attend special classes on physics and astronomy. No other school in the area has the equipment and special instructors necessary for teaching these subjects. The fact that our school is combined with the Planetarium allows us to conduct university-quality classes in these disciplines. We also teach university-level courses in psychology, law, computer science, foreign languages, and other subjects. Although our technical facilities are modest, we are nonetheless able to serve as a computer resource centre for other schools. We are also developing a summer camp programme for young people, which allows them to learn and have fun at the same time.

But what really distinguishes our school from traditional ones is that our students undertake independent and original research projects under the direction of our faculty. Not only does this help our students to further develop their own interests, but also to prepare them for future independent research projects in university and beyond.

Yet we still have a long way to go towards making the centre (Planetarium-Provincial College) what we want it to be. We are always looking for ways to fund maintenance and new projects. For example, we would love to upgrade and replace our thirty year-old equipment. We are also very interested in establishing contacts and permanent relationships with other institutions abroad. Finally, we would like to create exchange programmes with other schools and planetariums, in order to share ideas and cultural knowledge.

I would love to hear any ideas or suggestions you might have, whether they concern fundraising, exchanges, or academic concerns. Given where we started, we have had to almost reinvent the wheel to arrive where we are today, and we are always anxious to find new and interesting models for development.

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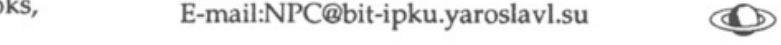

NEWS FROM SEPA STATES

ALABAMA

FLORIDA

FLORida PLANetarians met May 14th at the **Museum of Arts and Sciences Planetarium in Daytona Beach**, hosted by Roger Hoefer. There were 21 people in attendance, representing 6 Florida Planetariums and 3 vendors. The next meeting will be at the **Bishop Planetarium in Bradenton**, in October.

Indian River Community College Planetarium at Fort Pierce - Jon Bell reports that *African Skies*, an original in-house production, played to enthusiastic audiences in February and May. The show was live, featuring pantomime actors, a dancer, and a singer, along with a few stage props to provide a highly interactive theater piece. *Bear Tales and Other Grizzly Stories* also played at the same time. By the time you read this, Jon will be an old married guy. He and Lisa planned the wedding for July 23.

Jon also reports the following - "The folks at the local PBS radio station somehow found out I'd sung opera in a past life, and asked me to put together and host an Opera Showcase program for them, providing modern understandable summaries of 18th and 19th century operas. I did, and the shows aired in May and June. They were very well received (typical listener comment: "You know, normally, when the opera comes on on Saturday afternoons, if I'm out working in the yard, I'll walk all the way back into the house to change the station; but your program was so good, that I didn't go out of my way to turn it off." So it looks to be another rousing broadcasting success story here."

Bishop Planetarium, Bradenton - The Bishop Planetarium is currently running *One Small Step...* There is also a new Museum exhibit, *The Final Frontier: A History of Space Exploration.* The current Saturday morning children's program features *Loonie's Moon* in the planetarium and *From the Stone Age to the Space Age* in the Museum. On July 23, everyone helped Snooty the Manatee celebrate his 46th birthday.

Buehler Planetarium, Davie - The current starshow is *The Little Star That Could.* Laser shows are *Laser Genesis* and *Laser Rush.* The newest Intern at Buehler is Alexandra Lovell who was previously an Astronomy Researcher for the BBC TV network in London, and has worked at the Planetarium at the University of Leicester.

GEORGIA

Carole Helper
Mark Smith Planetarium
Macon

The **Mark Smith Planetarium** did not suffer any damage from the flooding in Georgia. The worst we had to overcome was going 19 days without water, and having to put up with 'port-a-potties'. Everything is back to normal now.

The **Wetherbee Planetarium in Albany** did not escape damage from the flooding. The last heard was that they had three feet of water in their facility, and they had suffered quite a bit of damage.

The **Rollins Planetarium in Young Harris** is still looking for a Planetarium Director. They are acepting applications until they feel they have enough to make a good choice, so if you are interested, get that application in.

KENTUCKY

LOUISIANA

Dave Hostetter
Natural History Museum and Planetarium
Lafayette

The Lafayette Natural History Museum continues to wait for a decision by the City Council regarding its proposed move to a larger building. Public programs continue in a small, temporary dome, with school programs being done in the schools. About 450 people enjoyed an eclipse party despite broken clouds, and preparations are being made for Spaceweek and other summer events.

Mike Sandras reports from the **Daily Living Science Center in Kenner** that a mock-up of the Martin Marietta

version of the space station is being installed in a new section of the Daily Living Science Center.

Gary Meibaum, at the **St. Charles Parish Library in Luling**, is looking forward to having planets that work after 8 years without them, budget permitting. He is planning to open *The Cowboy Astronomer* soon. He has created 6 page coloring book handouts for the programs *Larry Cat in Space* and *Planet Patrol*. He gives them out to kids for free, and other facilities running those shows that would like to do the same can get a copy by writing to Gary.

MISSISSIPPI

Gary Lazich
Davis Planetarium
Jackson

Jackson's newly renovated **Davis Planetarium** re-opened its **McNair Space Theater** to the public on April 29th. The opening public feature, *More Than Meets the Eye*, includes a hemispheric film tour *Journey to Kitt Peak*. *Bright Lights, Big Country*, the Planetarium's first original laser feature, blends contemporary country music with animated images generated on the new choreoGRAPHICS production system from Laser Images. On June 3rd, the Planetarium premiered *The Great Silence*, an original feature on the search for extraterrestrial intelligence adapted from a program produced by the Verne Theater in Finland. Radio astronomer Dr. Gerrit Verschuur attended the premiere, praised the program's contemplative approach, and spoke with Davis Planetarium Foundation members about SETI. Daily matinees of *The Space Shuttle: An American Adventure* will help Jackson celebrate SpaceWeek in July.

Mississippi's Student Space Station concluded its first after-school program for disadvantaged high school students with a three-day mission over the Memorial Day weekend. Prospects appear excellent for continued funding of this program through a county private industry council and a local Urban League chapter. The next two-week summer mission (94-B) will take place from July 24th through August 7th and will include students from throughout Mississippi.

The Rainwater Observatory and Planetarium in French Camp hosted the Mid-South Regional Star Gaze in mid-April. Guest speakers included Dr. Pat Lestrade (Gamma-Ray Bursters), Dr. Gerrit Verschuur (SETI), and Gary Lazich (Sky Lore from Planet Earth). The fenced observing site, located in the middle of a cow pasture, now features plumbing and electricity in addition to its 20 telescopes and observing aids. Volunteers have completed a new structure that will house the Goto S-2 projector obtained from Huntsville, Alabama. The Observatory will offer a comet watch in July (featuring its new tracking 32" Dobsonian) and a Perseid meteor watch in August.

NORTH CAROLINA

Cyndi Zeger
Woodson Planetarium
Salisbury

Woodson Planetarium at Horizons Unlimited in Salisbury is busy being an instructional component of Horizons Unlimited's *Discovery Camps*. Hot air balloons, rockets, physical science experiments and of course star shows are integrated with other science, history and health activities to reinforce students' experiences with the scientific method. *Bear Tales and Other Grizzly Stories*, live sky shows, and *More Than Meets the Eye* are running for student groups who visit as part of their summer camp experience with local community groups such as the recreational departments, the YMCA and a variety of church and civic organizations.

Andy Allen, NASA astronaut, visited North Carolina in June. Mr. Allen visited the **Morehead Planetarium**, **Horizons Unlimited**, and **Discovery Place**, sharing his experiences as a Space Shuttle pilot. Andy was an excellent speaker and addressed not only the challenges of space, but also the challenges of growing up and being a parent and a productive citizen. It was a real treat for the community of Salisbury to have the opportunity to meet and hear the message of this astronaut. Arrangements for Andy's visit were made by Paul Sewell from Rockwell International.

Kelly Planetarium at Discovery Place in Charlotte served as an excellent host for the SEPA conference. Those who attended were delighted by the new astronomy exhibits, the OMNIMAX and 3-D Laser shows, and the planetarium show, *Star Seekers*. A special "THANKS" to Sue Griswold and her staff for all their hard work.

SciWorks Planetarium at the Science Center and Environmental Park of Forsyth County in Winston-Salem will open *Oasis in Space*, A Spitz production on July 8th. Other summer events include a special late night observing session for SpaceWeek on July 22, a link with NASA Select for the Comet Shoemaker-Levy 9 crash with Jupiter and a Perseid observation on August 13th.

Schiele Planetarium at the Museum of Natural History in Gastonia is featuring the Hansen show, *Cosmic Catastrophies*, as the weekend summer show. The revised

version of *More Than Meets the Eye* is showing weekdays. Thanks to Jim Lynn and Steve Morgan for showing SEPA delegates the planetarium show, *Magellan Report from Venus*, and the 360 degree cinema production, *The Eruption of Mount St. Helen's*. SEPA members who visited the Scheile museum had a great time - in fact there were seven who had such a good time that they stayed on after the bus had departed to return to Discovery Place.

SOUTH CAROLINA

Rick Greenawald
Hooper Planetarium
Greenville

Glenn Dantzler of the **Settlemyre Planetarium** reports that the staff will be very busy hosting a Winthrop College's Space Science program for rising ninth graders who have scored in the top 3% of the PSAT. This program will take the entire month of June with students learning about physics, astronomy and aerospace sciences. Glenn also hopes to have the theater's first panorama system installed and operational by the start of the next school year. Glenn also mentioned that he was recently published in the Internet magazine.

Jim Brown of the **Stanback Planetarium** says that initial planning to host a physics conference in the fall is under way (there will be more information on this in the future). Jim has also become the clearing house for NASA press releases to Internet. If you wish to be added to his list for this service let him know by way of E-mail, his E-mail address is: zf_jbrown@scsu.scsu.edu.

Jeff Guill of the **Gibbes Planetarium** reports that the staff plans to do a new Christmas show for this year, although the exact show to use has not yet been chosen. Jeff also reports that they have a new part-time console operator/technician on staff, his name is Bryant Siegfried. Jeff is also looking to add a staff member to take Starlab out in the midlands area. He hopes to have the program in place by September.

From here in Greenville, there is not much to report except that the summer will be full of teacher workshops here at Roper Mountain which translates into no production work being done in the planetarium until mid August, at least. As reported at SEPA, the **Hooper Planetarium** suffered damage to a fair number of its operating systems due to an intense electrical storm which damaged equipment all over the center. The full extent of the damage has not been accessed as of this writing, but has already exceeded $1,000.00 in repairs. All power was turned off, and it obviously does not provide enough protection. I am hopeful that we will soon be able to install lightning arresters on our main junction boxes to prevent this problem in the future. *(Ed. note - Got a call with a lightning update from Rick Greenawald who is now answering to the name of Thor. The repairs on the above talked about damage came to about $1,800.00. Exactly one week after the repairs were made, and the planetarium was up and running, lightning struck again. The damages this time have reached the $1,000.00 mark and are still climbing. Rick has promised an article in a future Southern Skies on "Lightning Protection in the Planetarium".)*

TENNESSEE

Kris McCall
Sudekum Planetarium
Nashville

The Sudekum Planetarium of the Cumberland Science Museum in Nashville reopened on June 4th showing an original production called *Once Upon A Time*. The planetarium had been closed since May 11th for major renovations including cleaning and painting the dome and installation of new carpet and seats. Kris McCall would be happy to share details regarding specifications and contracts with anyone who might be planning similar work in the future.

As a result of the aforementioned renovations, the Sudekum Planetarium has dredged up some equipment that is taking up valuable space. There are a number of coils of multi-conductor cable from Spitz. There are also a variety of boards and components for a 512. If anyone is interested in more details, please get in touch with Kris.

Since securing the bid to host the SEPA conference in 1996, the staff of the Sudekum Planetarium is already hard at work planning an exciting, informative, and entertaining meeting. Negotiations are underway to have Ken Fulton, the Light-Hearted Astronomer, and David Levy, comet discoverer/author speak to the delegates. If anyone is interested in having David Levy lecture or present workshops at their facility in the spring of 1995 or early summer of 1996, please get in touch with Kris to arrange a tour which could reduce costs.

VIRGINIA

WEST VIRGINIA

POSITION ANNOUNCEMENTS

Planetarium Director/ Astronomy Teacher

Young Harris College is seeking applicants to fill a tenure-track position as planetarium director and astronomy teacher.

Young Harris College is a two-year institution beginning its second century of affiliation with the United Methodist Church. The school is located in the beautiful Georgia mountains, two hours north of Atlanta. The college, noted for its long history of academic excellence, specializes in the liberal arts and prepares students to transfer to senior colleges and universities. Fall enrollment was 534 and the student'/faculty ratio is about 17:1.

The position is open September 1, 1994.

MINIMUM QUALIFICATIONS: Training in the operation of Spitz 512 or similar planetarium equipment. To teach astronomy, candidates must have a master's degree and at least 18 graduate semester hours in astronomy/physics.

RESPONSIBILITIES: Planetarium work: Provide programs for public school students, college students, and the community at large.Teaching: Introductory courses in astronomy.

Applications should include a cover letter, resume, at least two letters of recommendation, and copies of graduate and under-graduate transcripts. Review of applications will begin immediately and continue until the vacancy has been filled.

Please send all information to:

Dr. Clay Dotson
Academic Dean
Young Harris College
Young Harris, Georgia 30582
Telephone: (706) 379-31111

Science Educator/ Planetarium Coordinator Immediate Opening

Sunrise Museum seeks an innovative, energetic individual to join a dynamic, audience-focused program team. Will coordinate the development and presentation of Planetarium programs for school groups and general public audiences on weekends and participate in science program development in newly renovated hands-on physical science hall. Flexibility and versatility a must as the Museum works to expand its audience; the museum's programs are market-driven and interdisciplinary in their approach. It is projected that Planetarium programs will be presented for a minimum of 25,000 visitors in FY 94/95. Must have strong public speaking and writing skills, broad background in physical sciences with emphasis on astronomy and space science. B.S. and 2 years of museum or comparable experience preferred.

Sunrise Museum is an art and science museum currently located in two historic mansions in the hills of Charleston, West Virginia. A campaign is underway to move the museum to a new facility in downtown Charleston which will quadruple its physical exhibition space and will solidify its role as the key provider of Science and Art programming in West Virginia. The target date for the move is 1998/99. The current facility houses a 60-seat Planetarium with a Spitz A3P projector (installed 1962). The Planetarium will be a key element in the new facility and will likely be combined with a 70mm theater. The Science Educator/Planetarium Coordinator will play an important role in the development of the downtown plan and the research and selection of equipment for the new facility.

For further information contact:

Andrea Ambrose
Sunrise Museum
746 Myrtle Road
Charleston, West Virginia 25314
Phone: (304) 344-8035
Fax: (304) 344-8038

POSITION ANNOUNCEMENTS

Planetarium Director

ANTICIPATED STARTING DATE: September 1, 1994

MINIMUM QUALIFICATIONS: Master's degree plus ten years of managerial experience preferably in a non-profit organization. A demonstrated commitment to science and education.

RESPONSIBILITIES: Under the authority of the Christa McAuliffe Planetarium Commission, create a vision, develop goals, and establish the environment, resources, and strategies for the attainment of these goals; generate public and political support as the public spokesperson; develop coalitions and partnerships with business and industry, educational institutions, local government, and community agencies; and serve as the chief fiscal, business, and administrative officer of the planetarium and oversee the creation and management of the budget.

COMPENSATION: Salary Range: $41,062 - $53,373. Complete benefit package including fully paid health and dental insurance, retirement plan, annual and sick leave, paid holidays, and optional voluntary benefit programs.

TO APPLY: Forward letter of intent and resume to:
CMP Director Search Committee
Postsecondary Technical Education
5 Institute Drive
Concord, NH 03301

APPLICATION DEADLINE: July 18, 1994

Christa McAuliffe Planetarium is an Affirmative Action/Equal Opportunity Employer, M/F. Protected group members are strongly encouraged to apply.

Planetarium Producer

Support the production operations of Astronaut Memorial Planetarium & Observatory through the operation of planetarium equipment and the "870" motion picture system. Help produce new educational programs, laser shows, and "870" projects in order for the facility to provide current and informative programs for students and other visitors.

SALARY: Approximately $21,000.

MINIMUM QUALIFICATIONS: Bachelors degree in related field or equivalent experience working in a planetarium or science center. Darkroom skills and audio production skills. Good communications skills in a public education environment. A high degree of creativity.

NOTE: Applications will be accepted June 29, 1994 until finalists have been identified. The College reserves the right to extend searches or withdraw positions with or without notice.

HOW TO APPLY: A BCC application form is required and can be obtained at the Cocoa, Melbourne, Palm Bay, and Titusville Campuses, or the Patrick Center. Applications will be mailed to out-of-county/state applicants upon request.

MAIL COMPLETED APPLICATION TO:
Associate Vice President for Human Resources
Brevard Community College
1519 Clearlake Road
Cocoa, Florida 32922

INFORMATION:
Call 407-632-1111, EX. 2561 or 3150.

POSITION ANNOUNCEMENTS

PLANETARIUM TECHNICIAN
(Electronic Equipment Technician II)

Under supervision of the Museum of the Rockies Planetarium Director, the person in this position maintains and develops the technical systems of the planetarium, including the planetarium system and all supporting audiovisual and electronic control equipment and capabilities.

REQUIRED QUALIFICATIONS - You must address each (1-10) on your MSU employment application form.

1. Bachelor's degree in electronics or related field plus 2 years of full-time work experience in maintenance and repair of a variety of specialized electronic devices, including circuit modification **or** an equivalent combination of relevant education and experience.
2. Experience in mechanical assembly.
3. Experience supervising and training others in the maintenance and repair of electronic and mechanical equipment.
4. Education or experience in the design, fabrication, and installation of special effects and custom equipment.
5. Education or experience troubleshooting electronic and mechanical equipment and systems.
6. Experience or education using and maintaining a variety of equipment such as oscilloscope, voltmeter, and other electronic diagnostic tools, tape recorders, drill press, or lathe, etc. (Please list equipment used.)
7. Knowledge of and experience following safety rules and regulations related to the electronics industry.
8. Experience in planetarium technical operations.
9. Experience with the Digistar computer graphics projection system and ancillary devices.
10. Experience with R.A. Gray MC-10 media controller automation system and its component devices and electronics.

(8-10 - can serve to enhance an applicant's overall suitability, but are not required for consideration.)

STARTING SALARY: $2,032.32/month

APPLICATION PROCEDURES: To be considered for this position, please submit the following: 1) Cover letter, 2) MSU Application Form, 3) EEO Form. Applications received by 5:00 p.m., September 1, 1994, will be given preference review, however applications will be accepted until a suitable candidate is chosen.

APPLY TO:

Personnel Services
9 Montana Hall
Montana State University
Bozeman, Montana 59717

PLANETARIUM MANAGER

The Denver Museum of Natural History seeks a dynamic and experienced Department Manager for its Gates Planetarium. The Museum is seeking candidates with strong management, organizational and marketing skills to develop and implement a new vision for its Planetarium. This Planetarium currently hosts over 125,000 visitors per year in its programs, classes and activities. The recent addition of video and computer systems provides new opportunities for creative program development. Future additions will include the development of exhibitry to enhance its programs.

Position responsibilities include all aspects of administration including financial management and long range planning, supervision of five full-time and several part-time and volunteer staff, development of fundraising and marketing strategies, supervision of creative development of programming and maintenance of equipment.

Candidate must be an experienced professional with a strong background in planetarium program development, astronomical/aerospace sciences, informal education, and management. Bachelor Degree in science, education, engineering, management, or astronomy. Advance degree in Astronomy preferred. Demonstrated leadership in communication skills in a similar organization with 3 years of supervisory experience required.

Salary range is competitive with excellent benefits. Submit a letter of interest with resume to:

Personnel Office
Denver Museum of Natural History
2001 Colorado Boulevard
Denver, Colorado 80205

Information contained in "Position Announcements" is correct at the time *Southern Skies* goes to the printer. Some of the information may change by the time this publication reaches you. It is suggested that if you are interested in any of these positions, you should call the numbers listed for further information.