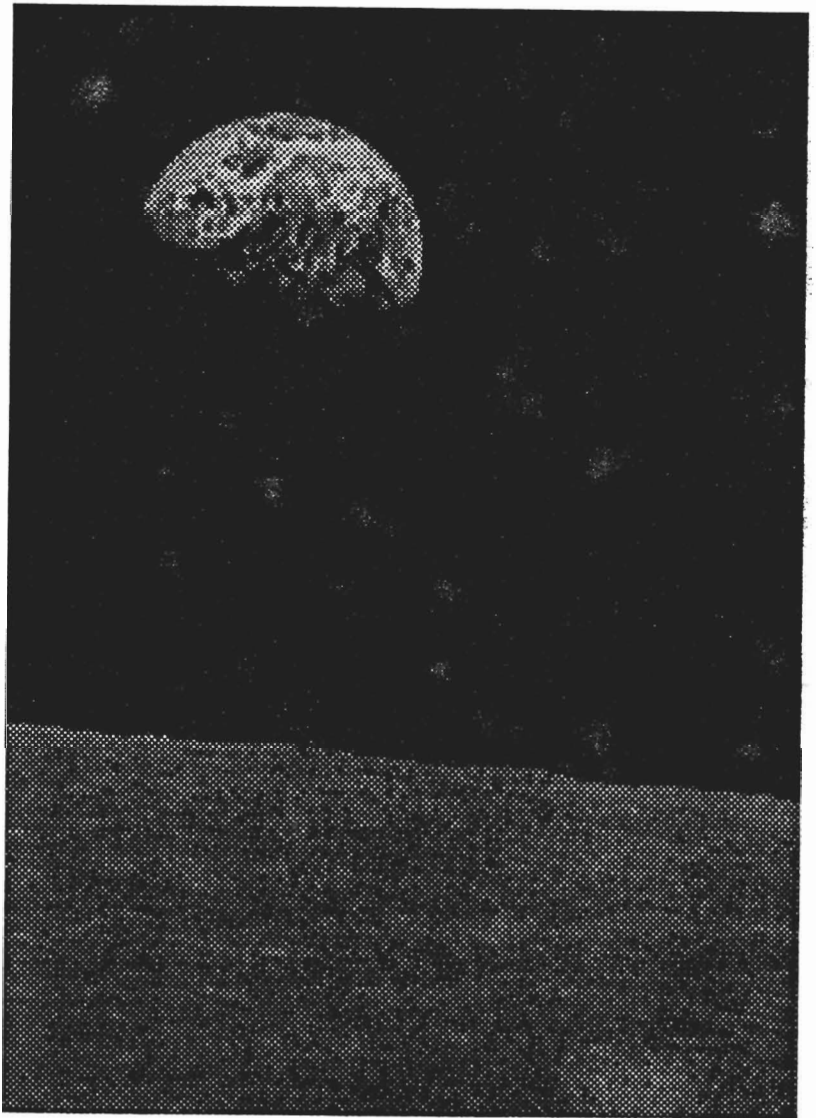




# SSAS

The Astronomical Society Newsletter

May, 1990



*A Tribute to Earth Day, 20 years ago.*



# Club News

## Newsletter Change

It probably would have gone unnoticed if I didn't tell you about it myself, so here it is. In order to pack even more interesting and wonderful news into this newsletter, I have switched from 12 to 10 point type for most of the text. If you find the smaller type too difficult to read, tell me, and I will switch back. Forget about my years of education, and my degree in design. It only took me endless tedious hours to go to the new format, and I'd be real happy to let assorted sundry non-designers tell me what to do. Just kidding!

## Loss of Faith; Bush Planted

Nice headline, huh? What I mean is that Faith Burbank, head of the Science Center for quite a few years, has decided to resign. She has been very helpful to the SSAS in the past, and we shall miss doing business with her.

Replacing Faith as head of the Science Center will be Cathy Bush. Unfortunately, I don't know anything about Cathy, but if her name is any indication, she ought to be perfect for the job.

## Let Our Telescopes Go!

If you have any equipment (binoculars, telescopes, etc.) belonging to the club, please, please, please, bring it to the next business meeting. We seem to have lost track on some of it, and would like to figure out exactly what we have.

## Back in the "New" Old Science Center

For the last few months, the SSAS has had its business meetings in the "Summer House". While this wasn't as bad as it would have been during a colder Winter, we did get a bit spooked by the menagerie of stuffed rodents and birds. The raccoon bit Gabe, once, and subsequently died of food poisoning.

Thanks to the Science Center, and the copious amounts of money they seem to have spent, we now have a new, beautiful auditorium to meet in. Gone are the flame-belly turtles, the rocks that should glow, but won't, and my personal favorite, that owl who chose to eat his raw rat halves during the meetings. All gone, but of course, not forgotten.

## Go East, Young Men

Last month, we decided to make 4 Duxbury students SSAS members to show our support for their trip to the Soviet Union, where they will participate in an exchange program. They expressed their thanks to our society, and are looking forward to giving a presentation at a future business meeting. One of the young men, who remains unidentified, says he just can't wait to "party with some of those Russian babes."

We wish all of them the best of luck (particularly the Russian babes).

## SSAS Elections

At our business meeting in June, we will be having our yearly election of new officers. All offices are up for grabs, as well as 2 board of director positions. If you would like to run for any office, call Gabe at 934-5596.

Tom Stadelmann, our incumbent president, has informed me that he has no intention of running this time out, so things are liable to get pretty interesting.

### F.C. Meichsner Co.

**Any excuse  
for a sale!**

Meade 1.25 inch Plössls

\$75 to \$85

Meade 2045D

\$700.00

Thousand Oaks

60mm Type II Solar Filters

\$55

**F.C. Meichsner Co.**

182 Lincoln St. Boston, MA 02111 1-800-3-2-1-View!

### Used Brandon Equipment Package

Includes-

VernonScope 94mm

Complete Equatorial Mount with  
Motor Drive

2" 1/20 wave Diagonal

2" Barlow

2" to 1.25" Adapter

2" 45° Image Corrector

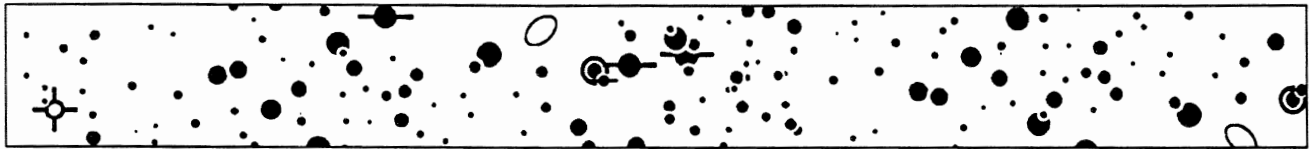
2" 48mm Orthoscopic Eyepiece

5 Solid Brass Brandon Eyepiece Set in  
Wooden Case

(Special Edition Set)

Total for complete package-

\$2500.00



## ***World News***

### ***NASA Admits Communications Breakdown in Study of Planned Space Station***

After being reminded of problems that led to the Challenger disaster, NASA officials acknowledged a communications breakdown had occurred over a study of the maintenance needs of the planned space station.

But the officials said the breakdown had occurred because of a poor choice of words and a misunderstanding and steps would be taken to prevent such problems in the future.

"We at NASA are seriously concerned and troubled by the course of events over the last week and a half," said William Lenoir, NASA's associate administrator for space flight.

"I'm glad we've surfaced our communication concern here. You can bet your boots that we will be working on that and that we will have this solved and we will deal the situation that set up the environment," he said.

### ***Chemist Claims To Have Harnessed Power of The Sun in Lab Flask***

Despite doubts raised by other researchers, a University of Utah chemist said he has continued to gather evidence backing his claim to have harnessed the power of the sun in a laboratory flask.

Stanley Pons said his team had set up more than 200 cold fusion devices using more power than was employed in the initial experiment. Putting more electricity into the devices produced more consistent results and a "very large" amount of excess heat, Pons said.

Other scientists may have been unable to reproduce his results because they were using lower levels of electricity, he said.

In addition, Pons maintained his team has also detected several signs that the energy is being produced by a nuclear reaction and that "it is inconceivable that they are caused by any chemical reaction."

### ***Space Probe Produces "Disturbing" Lack of Evidence***

A space probe exploring the evolution of the universe has produced a "disturbing" lack of evidence to explain the uneven distribution of galaxies through the cosmos, scientists said.

While preliminary data from the Cosmic Background Explorer, known as COBE, continues to support the "big bang" theory of the universe's creation, the information gathered so far has failed to explain its current "lumpy" formation.

"The smoothness is disturbing us a lot. At this point we're beginning to expect little warts and dimples to appear," said David Wilkinson, a professor of physics at Princeton University.

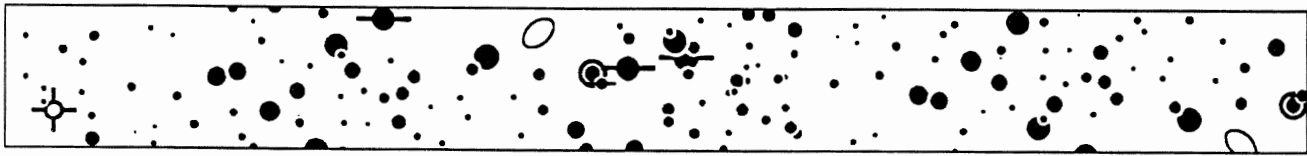
### ***Report Does Not Recommend Joint U.S.-Soviet Space Exploration Program***

The United States and the Soviet Union should coordinate the exploration of Mars but the two nations should continue to stage independent missions to investigate the planet, an expert panel said.

In a report commissioned by the National Aeronautics and Space Administration, the National Academy of Sciences' National Research Council recommended against one joint U.S.-Soviet program to explore Earth's nearest planetary neighbor.

While the United States and the Soviet Union cooperated for a joint Apollo-Soyuz orbital rendezvous and linkup in 1975, "The two countries have no prior experience with the degree of cooperation necessary to carry out a technical project of this complexity or magnitude," the report said.

Instead, the report recommended a "highly coordinated" program in which the United States and Soviet Union would discuss and agree upon scientific goals, set targets and plan overall strategies but "conduct their own self-contained and independently designed missions."



# World News

## ***Rockwell, NASA Ink Commercialization Accord for Extended Shuttle Missions***

Rockwell International Corp. (NYSE: ROK) and the National Aeronautics and Space Administration (NASA) have signed a Memorandum of Agreement (MOA) to commercialize a major element of NASA's extended duration orbiter (EDO) program, which is designed to extend Space Shuttle missions to up to 16 days.

Rockwell Space Transportation Systems Division (STSD) President Robert G. Minor called the agreement a major step in the commercial development of space. "The EDO will offer commercial space users extended time in space as a precursor to Space Station Freedom. This unique agreement demonstrates Rockwell's confidence in the Shuttle's ability to evolve to meet increasingly ambitious objectives. We are pleased to be participating with NASA on this exciting project."

Specific details of the arrangement will be negotiated as a supplemental agreement to an existing Rockwell/NASA Shuttle orbiter contract. Rockwell is developing a 16-day EDO mission capability, including the cryogenic pallet and modifications to the Shuttle orbiter

## ***NASA Studies Parachute Problem, Other Anomalies of Recent Space Shuttle Flight***

The shuttle Atlantis's crew cabin was shaken by higher-than-normal vibrations during launch Feb. 28 and human error caused communications problems that delayed the launch of a secret spy satellite for five orbits, sources said.

Two of the shuttle's maneuvering jets failed to operate, officials said. Atlantis suffered a hydraulic system leak in its engine compartment during ascent and trouble on the ground is believed to have caused a brief communications blackout during re-entry.

NASA engineers, meanwhile, are studying whether emergency parachutes worn by Atlantis's crew were improperly rigged for speedy use. None of the problems was considered dangerous to Atlantis's crew, but because of the military nature of the flight, such details were not revealed at the time of the flight.

## ***Soviet Mir Module Launching Delayed by Two Months Amid Computer Problems***

Computer problems have forced the Soviet Union to delay by two more months the already-postponed launching of the latest addition to the Mir space station, the Glavkosmos space agency said.

It is the third delay of the newest Mir module, or space station building block. Originally set for March 30, the launch was put off until April 9, then until April 19. Glavkosmos spokesman Nikolai Semenov told United Press International the launch is now set for June.

Docking problems have also plagued the Mir project, both in bringing cosmonauts to the space station and in attaching the modules, which are similar to the building blocks of a child's erector set.

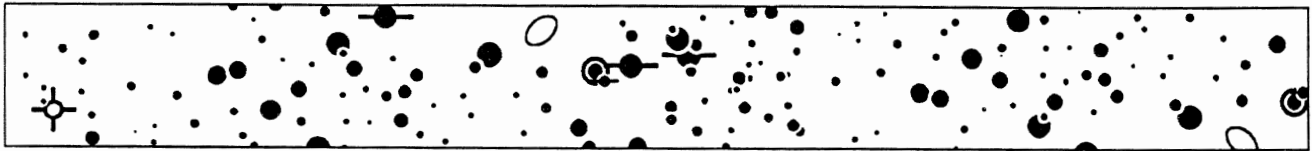
Mir has been almost constantly manned, except for a short time in its early history and for four months last year.

## ***Japanese Telecommunication Satellite Makers "Shocked" at Accord With U.S.***

Japanese telecommunication satellite makers reacted with shock and dismay to an accord on the opening of Japan's satellite market reached with Washington.

Under the accord, Japanese makers will not discriminate against foreign makers in commercial satellite purchases, opening wider the market to American competitors.

Toshiba Corp. executives said they had expected Japan to make some concessions but felt Tokyo's move to liberalise the market came "too early."



# **World News**

## ***Stray Cloth Caused \$250 Million Arianespace Rocket Explosion Last February***

A stray piece of cloth - perhaps left behind accidentally by a technician - apparently caused the \$250 million explosion of a rocket in February that destroyed two Japanese communications satellites, officials said.

Arianespace announced that an inquiry into the Feb. 22 accident found it was caused by a blocked water pipe in a rocket engine. In a statement, the company acknowledged the pipe was blocked by a piece of cloth.

The announcement came after the water valve and flexible tubing from the rocket's engine were sent from French Guiana where the launch occurred to the Saclay Jet Propulsion Test Center near Paris for testing, the statement said.

## ***Winged Rocket Successfully Launched From B-52; Launches Military Satellite***

A unique winged rocket dropped from a high-flying B-52 bomber successfully carried a small military satellite into space, the first payload ever put into orbit by an air-launched booster.

"All indications ... are that the launch was indeed a complete success," said David Thompson, chairman of Orbital Sciences Corp., the company that spearheaded the development of the unconventional Pegasus rocket.

With its maiden flight running 24 hours late because of bad weather, the white, 49-foot Pegasus rocket was dropped from the right wing of a NASA B-52 at 12:10 p.m. PDT as the eight-engine jet was cruising due south over the Pacific Ocean about 60 miles southwest of Monterey, Calif.

Five seconds later, the first stage of the falling, 41,000-pound solid-fuel rocket ignited with a gush of incandescent flame to kick off a 9-minute, 37-second flight, a critical milestone in a project to develop a versatile, low-cost booster for small military, commercial and scientific payloads.

## ***Scientists Hope Hubble Space Telescope Will Solve "Big Bang" Debate***

With vision 10 times better than the best observatory on Earth and 500,000 times better than the human eye, the Hubble Space Telescope is an engineering masterpiece that will allow astronomers to scan the universe and look back into time.

The finest mirror ever made -- along with a cadre of super-sensitive cameras, light meters and prisms -- will enable the Hubble Space Telescope to see back almost as far as the beginning of time, according to an international team of astronomers who will conduct observations for the U.S. space agency.

## ***IBM Technology Plays Integral Role on Hubble Space Telescope***

When the Hubble Space Telescope scans deep space to uncover the mysteries of the universe, IBM-developed equipment and software will control the scientific equipment and flow of data.

IBM (NYSE: IBM) had a major role in the development of the Science Instrument Command and Data Handling (SI C&DH) system as part of a \$41.8 million NASA contract. IBM also manufactured the NASA Standard Spacecraft Computer-1 (NSSC-1) and associated software and developed a set of simulators under that contract.

Control of the instruments aboard HST is crucial to mission success. The command system allows scientists to systematically scan the heavens and zero in on unusual phenomena.

SI C&DH not only controls the science instruments but also controls delivery of science instrument health/safety and image data to the Support Systems Module (SSM), developed by Lockheed Missile and Space Corp. The SSM then transmits the data to the HST ground control center at Goddard Space Flight Center, Greenbelt, Md.

# Time Dilation

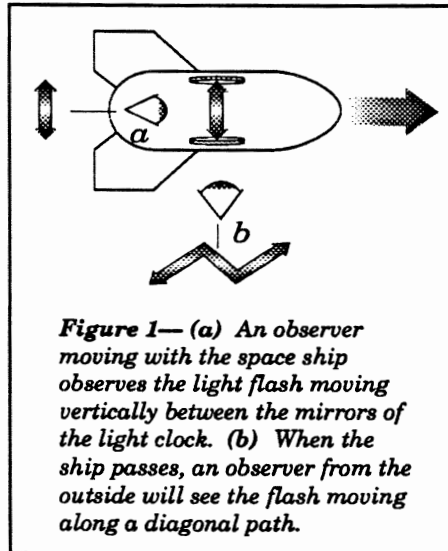
At our last meeting we saw a film about time. I don't know about anyone else, but I found it fascinating, so I put off the paper I was writing on gravity, and have written one on time, instead.

Albert Einstein's special relativity reverses some of our conceptions about the world we live in. We think that speed is relative; that it depends on the speeds of the source and the observer. Yet, the speed of light (186,000 miles/second or  $3 \times 10^{10}$  m/s) is absolute—independent of the speeds of the source or observer. Time, on the other hand, only appears absolute. It seems to pass at the same rate regardless of what is happening. Einstein did not accept this. He proposed that time depends on the motion between the observer and the event being observed.

We measure time with a clock. A clock can be any device that measures periodic intervals, such as the swings of a pendulum, the oscillations of a balance wheel, or the vibrations of a quartz crystal. For the moment, I'd like you to imagine a "light clock". Such a thing would be impractical, but it may help describe time dilation.

Imagine, if you can, an empty tube with a mirror at each end. A flash of light bounces back and forth between the parallel mirrors. The mirrors are perfect reflectors, so the flash bounces indefinitely. If the tube is 300,000 km in length (186,000 miles), each bounce will take exactly 1 second as measured by our light clock. If the tube is 3 km long, each bounce will take 0.00001 seconds.

Suppose we view the light clock as it whizzes past us in a space ship moving at very great speed (figure 1).



*Figure 1— (a) An observer moving with the space ship observes the light flash moving vertically between the mirrors of the light clock. (b) When the ship passes, an observer from the outside will see the flash moving along a diagonal path.*

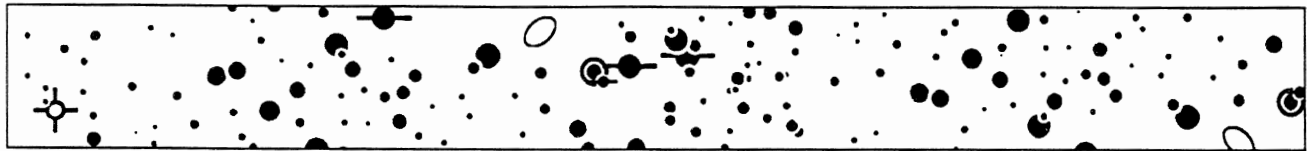
The second postulate of special relativity says that the speed of light is "C", no matter who observes it. Since the speed of light will not increase, we must measure more time between bounces! The light clock is a measure of time for the moving spaceship. We would measure more time for bounces in the light clock and for all the seconds and minutes experienced by the inhabitants of the spaceship. We would observe time in the space ship running more slowly than it does where we are.

Slowing time is not peculiar to the light clock. It is time itself in the moving frame of reference, as viewed from our frame of reference, that slows. The heartbeats of the spaceship occupants will have a slower rhythm. To us, all events on the moving ship appear slower.

Time itself becomes dilated. How do the occupants on the spaceship view their own time? Do they perceive themselves moving in slow motion? As it turns out, they notice none of these things. Time for them is the same as when they do not appear to us to be moving. Einstein's first postulate is that all laws of nature are the same in all uniformly moving frames of reference. There is no way they can tell uniform motion from rest. They have no clues that events on board appear dilated when viewed from other frames of reference.

How do occupants on the spaceship view "our" time? Do they see our time as speeded up? The answer is that they do not, because motion is relative, and from their frame of reference it appears as if we are the ones who are moving. They see our time running slow, just as we see their time running slow. If this appears to be a contradiction, you must understand that it is physically impossible for observers in different frames of reference to refer to realm of space-time. The measurement in one frame of reference need not agree with the measurement made in another reference frame. There is only one measurement they will always agree on: the speed of light.

Michael F. Meyers  
Physicist



# Schedule for May

| Sunday                                | Monday   | Tuesday | Wednesday                       | Thursday | Friday   | Saturday |
|---------------------------------------|--|---------|---------------------------------|----------|--|----------|
|                                       |  | 1 ☾     | 2 <b>Business Meeting</b><br>\$ | 3        | 4 <b>Lunar and Planetary</b><br>☾<br>(Rain Date 5)   | 5        |
| 6 <b>Solar</b><br>☉<br>(Rain Date 13) | At the business meeting this month, Frank Masciulli will tell us how he produces his magazine-quality astrophotos. Bring your questions! |         |                                 |          |  |          |
| 7                                     | 8  | 9 ○     | 10                              | 11       | 12   |          |
| 13 <b>Mother's Day</b>                | 14   | 15      | 16                              | 17 ☾     | 18 <b>Deep Sky</b><br>☉<br>(Rain Date 19)  | 19       |
| 20                                    | 21   | 22      | 23                              | 24 ●     | 25   | 26       |
| 27                                    | 28 <b>Memorial Day observed</b>  | 29      | 30                              | 31 ☾     | All scheduled meetings are open to the public, free of charge. Business meetings are always held on the scheduled date at 8:00 P.M. Solar viewing starts at 11:00 A.M. |          |

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