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Monthly Newsletter of the IEEE Susquehanna Section

April 2003

See us on the WEB at: **www.ewh.ieee.org/r2/susquehanna**

April Section Meeting

The Accelerating Universe

Date: Tuesday, April 8, 2003
Time: Dinner 6:30 PM
Speaker 7:30 PM

Dinner & Program:
The Eagles's Nest
(Upstairs room)
2519 Mt. Rose Avenue
York, PA 17402

Dinner Cost: $20 (Members/Guests/Retirees)
$10 (Students)
Menu Choice: Sliced Top Round, or
Sliced Turkey Breast

Speaker: H. John Wood, PhD
Optics Lead Engineer
Hubble Space Telescope Project
NASA Goddard Space Flight Center

Contact: (by email if possible)
Ed Simoncek
TEL: 717-243-0889 (Leave details on machine)
FAX: 717-243-5538
E-mail: <simoncek@pa.net>

By April 4 noon for Dinner and/or Program Reservations. Indicate menu choice of sliced Top Round Beef or Turkey Breast.

Note: Dinner no-shows will be charged if not canceled by Friday, April 4 noon. Also, we cannot guarantee late dinner reservations. Attendance limited to 75 because of dining room size.

Our Honored Guest Speaker

Dr. H. John Wood is an astronomer and serves as an optical engineer for the Optics branch at NASA's Goddard Space Flight Center. Since June 1990, he has been Optics Lead Engineer on the Hubble Space Telescope (HST) Project. He led the team that successfully determined the optical prescription of HST while on orbit. He then led NASA's effort to develop and test the corrective optics for HST. In addition to his work on Hubble, he currently serves as Science Liaison in the Instrument Synthesis & Analysis Laboratory for new instrument engineering design at Goddard.

A graduate of Swarthmore College, Dr. Wood earned the MA and PhD in Astronomy from Indiana University. He has been at Goddard for 20 years. In addition to the Hubble Project, he has been Lead Optical Engineer on other Goddard projects: the Mars Observer Laser Altimeter and the Diffuse Infrared Background Experiment aboard the Cosmic Background Explorer (COBE). Earlier he was assistant to the director at Cerro Tololo Interamerican Observatory (Chile) for two years. He held a Fulbright Research Fellowship for two years at the University Observatory in Vienna, Austria. He also served five years as a staff astronomer at the European Southern Observatory in Chile. His career began with six years on the astronomy faculty of the University of Virginia at Charlottesville.

Winner of the 1992 NASA exceptional service medal and the 1994 NASA exceptional achievement medal for his work on COBE and HST, he is the author of 50 research papers in astronomy and space optics. He was invited by the Optical Society of America to edit special editions of Applied Optics and Optics and Photonics News on the HST first servicing mission. He was co-chair of the HST Independent Optical Review Panel that was charged with the determination of the optical parameters for the HST while on orbit.

Dr. Wood served as the Co-Chair of the 2002 Annual Meeting of the Optical Society of America in September 2002 in Orlando.

We welcome Dr. Wood back to our Susquehanna Section meeting of the IEEE. Dr. Wood's presentation and slides are fascinating and he remains as the speaker we most want to come back and visit.

2003 Tentative Schedule of Events

Tuesday, May 13, *WITF Transmitting Site Tour*
Tuesday, September 9
Tuesday, October 14
Tuesday, November 11
Tuesday, December 9

The Accelerating Universe

Dr. Wood provided the following synopsis of his presentation for the Section meeting:

Einstein published the general theory of relativity in 1916. It describes the nature of gravity in large-scale systems such as planets, stars and galaxies. In the decades around 1910, the universe was thought to be static. As part of the development of general relativity, Einstein invented the "cosmological constant", a negative energy to balance gravity (a form of positive energy) and keep the universe from collapsing in on itself. In 1927, Hubble and V. M. Slipher discovered that the spiral nebulae were receding from each other with velocities proportional to their mutual distances. Einstein thought he no longer needed the cosmological constant and called it "…the greatest blunder of my life". The universe was expanding so fast it might never slow down. Other theories were developed which predicted that the universe might have enough mass to slow down, stop and start contracting down to a "big crunch".

Quantum theory is successful in describing the atomic – scale behavior of matter. And the cosmological constant reappeared in an effort to find a grand unified theory. The first effort to combine special relativity with quantum theory was by Dirac in the 1930's. Later Feynman, Schwinger and Tomonaga shared the 1965 Nobel Prize for the development of quantum electrodynamics (QED). QED is very successful in describing the laboratory behavior of light. But QED fails to correctly predict the behavior of the large-scale universe. Quantum theory tells us that the vacuum is filled with "virtual particles" which appear and disappear so quickly that they cannot be measured. These unseen particles do produce measurable effects such as forces between metal plates set very closely together. But the theory also predicts so many types of the virtual particles that their total energy is infinite.

In recent years, a giant breakthrough has been made in the field of Cosmology. A new means for measuring the distance to faint galaxies has been discovered. This has led to the hypothesis that the universe is accelerating.

Using the light from exploding stars called supernovae of type Ia, astronomers can measure distance by comparing their known intrinsic brightness to their apparent brightness. In the huge thermonuclear explosion of a type Ia supernova, the dying star is a white dwarf in orbit with a larger companion star. The companion star is shedding mass onto the white dwarf. Because the white dwarf has a limiting mass, it explodes when this limiting mass is exceeded. The explosion takes about three weeks to reach maximum brightness and then declines over a period of months. Because of the nature of the white dwarf with its limit of 1.4 solar masses discovered by Subramanyan Chandrasekhar, the explosion always reaches a defined intrinsic brightness or luminosity. Although they vary slightly in brilliance, the brighter Ia supernovae last a little longer than the fainter ones so astronomers can estimate their intrinsic luminosities to within 12 percent. Then, by measuring the apparent brightness, the difference becomes a measure of the distance. At maximum light, these supernovae are as bright as all the stars in their parent galaxies combined. This means that Ia supernovae can be seen very far away – out in space and back in time to when the first galaxies were formed. Comparison with distances derived from Doppler shifts in their spectra, supernovae in very distant galaxies show that the universe was expanding more slowly back then than it does today.

To explain these observations, the simplest hypothesis is that the mean density of the universe is decreasing rapidly with time while the cosmological constant is there, unchanging, throughout space. A plot of the mean density of the universe as a function of time since the Big Bang shows that the force of gravity was exceeded years ago by the cosmological constant (also known as Dark Energy). By coincidence, since the solar system was formed, the mean density has fallen so low that today, the repulsion of the cosmological constant has overcome the attraction of gravity allowing the expansion of the universe to accelerate.

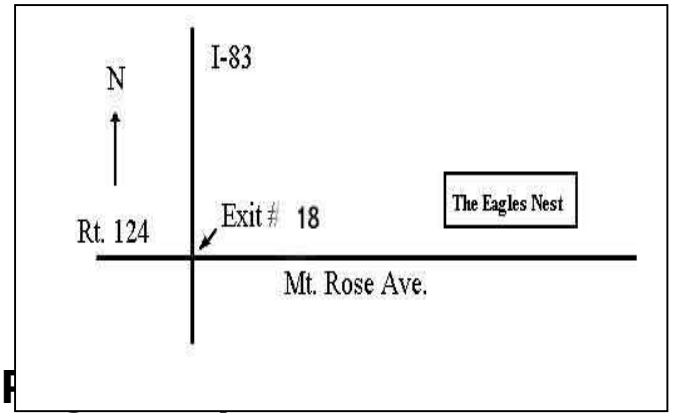
The talk will describe and illustrate the known and hypothesized contents of the universe and the past and future of the universe.

Welcome ESP

Welcome to members of the Engineers Society of Pennsylvania, who were invited to join us in a joint meeting to hear Dr. Wood.

Directions to Section Meeting

Proceed on Interstate Route 83 to York, PA. Take the PA-124, exit #18, towards Mt. Rose Avenue. This was old exit 7. Take the PA-124 East ramp. Turn left onto PA-124 E, Mt. Rose Avenue. Follow PA-124E for about 1/3 mile. The Eagle's Nest restaurant is on the left as you come up the hill.



Senior Members Wanted

The Susquehanna Section has not had a Senior Member upgrade in some time. Currently our Section has 74 senior and life senior members. Out of about 600 members or life members, at least 210 ought to be eligible for senior membership.

The major benefit to you is the professional recognition of your peers for technical and professional excellence. This is noted by receipt of an attractive Senior Member plaque to proudly display. There will also be announcement of your elevation in the Section newsletter and inclusion in the nationwide IEEE database. You will be eligible to hold executive IEEE volunteer positions and can serve as reference for other Sr. Member applicants. On a practical note, the Section also receives a slightly greater rebate for Senior Members.

The requirements are not that difficult. Basically the candidate shall be an engineer, scientist, educator, technical executive or originator in IEEE-designated fields. The candidate shall have been in professional practice for at least ten years and shall have shown significant performance over a period of at least five of those years. Your educational experience is credited toward the time requirements, e.g., 3 years for a BS degree. There are many ways to show significant performance, and publication of papers, books or inventions are not required, although they certainly can be used. References are required, including three from Senior Members. There are usually several senior members present at Section meetings who would be willing to present themselves as references. We could also review a list of all senior members for you if necessary. Bringing the necessary form and resume to a Section Meeting would be helpful.

For more information, including the necessary form, go to <**www.ieee.org**>. Click on Membership, then Membership Development and then Senior Member Program.

Ethernet

WASHINGTON (7 March 2003) Federal, state and local government policymakers should ensure that Ethernet networks over fiber infrastructures be fully considered and given a fair marketplace opportunity to prove their value in accelerating advanced broadband deployment, according to an IEEE-USA position adopted by the organization's board of directors last month in Dallas.

IEEE-USA is concerned that scalable gigabit broadband networks, which can be changed in size or configuration to suit changing conditions, are not receiving serious consideration at policy levels in the United States, nor are they being rapidly deployed. This lack of scalability leaves us behind other countries, which recognize that rapidly deploying broadband communications networks offers the potential to enhance a nation's productivity, homeland security and international competitiveness.

In practical terms, IEEE-USA's recommendations mean that the convergence of video, voice and data services could occur because gigabit Ethernet infrastructures offer over 1000 times as much bandwidth as current digital subscriber line (DSL) and cable broadband networks. A transfer of data taking 15.5 minutes on DSL (8.5 mbps) takes just eight seconds with Ethernet over fiber networks. Speed like that will allow businesses to operate far more efficiently, according to IEEE-USA.

For the entire position statement, go to
www.ieeeusa.org/FORUM/POSITIONS/broadband.html

Visa Issues

WASHINGTON (14 February 2003) - Congress should allow the yearly H-1B visa cap to return to 65,000 and use visa fees for scholarships and retraining of displaced U.S. engineers, according to IEEE-USA in a position adopted by the organization's board of directors in Dallas on 12 February.

With the current yearly visa cap of 195,000 set to expire Sept. 30, the number will revert to 65,000 with no further congressional action. Despite the 120,000 high-tech professionals (electronics engineers and computer scientists) estimated by the Department of Labor as being unemployed in the fourth quarter of 2002, the Immigration and Naturalization Service is reporting that it processed 294,100 H-1B petitions in fiscal year 2002 in new, renewed and exempt categories. Because an H-1B petition can authorize admission by more than one person, the actual number of high-tech workers admitted may be substantially higher.

Private employers intending to hire H-1B workers must pay the government a $1,000 application fee, most of which is used to support technician-level training projects sponsored by the Department of Labor and scholarship programs administered by the National Science Foundation. The latter is for low-income students primarily at junior colleges.

"Congress should see to it that more of the H-1B fee revenue is used to address the specialized instructional needs of unemployed engineers, scientists and other high-tech professionals," IEEE-USA President-Elect John Steadman said. "In the long term, it should focus support on programs that help financially needy students complete degrees in computer science, engineering and mathematics."

H-1B visas permit the entry of highly skilled professionals into the US on a nonimmigrant basis. This was done by the American Competitiveness in the 21st Century Act of 2000.

For more information on IEEE-USA's H-1B position, go to www.ieeeusa.org/forum/issues/H1bvisa/index.html

News from the Committees, Apr '03

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March Meeting Recap

The scheduled speaker for March, from Transcore, had to cancel at the last minute because of subject clearance problems. Unfortunately this occurred after the Newsletter had been published, and we are sorry for any confusion. The program was intended to cover the E-ZPass System.

Thanks Don Appleby

A Susquehanna Section Thanks to Don Appleby, Radio Project Engineer from the Governor's Office of Administration. Don stepped up and became our speaker at the March Section meeting. Don's presentation brought us up-to-date on the Commonwealth's Microwave and 800 Mhz Radio System and its implementation. This is a very unique system, with over 25,000 potential users, and is one of the largest of its kind in the world. It covers all state agencies over 50 counties and connects to over 1100 cars. The system includes a private 6 ghz microwave network plus fiber links, with 174 towers and 22 more under construction. Supplementing the radio towers are very compact pole-mounted Microcells. The system architecture is comprised of seven regions interconnected with rerouting capability. The software defined digital radios are designed with a lot of flexibility and can be upgraded remotely. The system also easily accommodates the use of portable radios as well as the mobile sets on 800 mhz. If you missed this meeting, you missed hearing how all this works in the state of Pennsylvania.

You can, however, learn more by accessing their web site at: www.radio.state.pa.us.

Civil War Ball

A public **Civil War Era Ball** is returning to the Capital Union Building at Penn State Harrisburg from 7 to 11 p.m. **Saturday, March 29**. More than 100 people, many attired in period costumes, attended the inaugural ball last year on campus.

As part of the event, costumed floor managers from the Victorian Dance Ensemble will assist the dance master in conducting the ball. Period attire or dressy outfits are optional. There will also be appetizers and refreshments. Music at the event will be provided by the "Arcona Reel Band" through support from the Student Activity Fee, the Student Government Association, and the Penn State Harrisburg School of Science, Engineering, and Technology. The student branch of the Institute of Electrical and Electronics Engineers is organizing the ball. Tickets priced at $5 for the Penn State community and $10 for others are now on sale. For information, contact AB Shafaye at 717-948-6349, e-mail mes121@psu.edu, or visit the Web site at www.hbg.psu.edu/clubs/ieee/.

Useful Information Column

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Q/A-C Column
Do you have any questions or comments? Call, email or FAX it to our Co-Chairs at the above addresses.

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Address Changes and Updates
There are several ways to correct member information with IEEE. They update their directory from the information you provide, and pass the changes to us monthly. Keeping your address information up to date will ensure accurate mailings.

- There is a WEB based interactive "change of address" form at: http//services1.ieee.org/membersvc/coa/intro.htm
- You can send an email to: address-changes@ieee.org
- Call IEEE Member Services at 1-800-678-IEEE
- Mail changes to
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  P.O. Box 1331
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- FAX changes to 1-732-981-9667

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