Inter-Society Color Council *News*

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IN THIS ISSUE 365

PRESIDENT'S COLUMN

My plan for the column this month was to discuss Williamsburg conference, and I still will, but first I must take a moment to welcome our newest Member-body...CORM or the Council on Optical Radiation Measurements. CORM was established to provide a forum for the exchange of information and requirements between the then NBS [now NIST] and the users of its services in the measurements community. With an overlapping interest base and common goals, we are pleased that CORM has become a member-body. Welcome.

In the last newsletter, I asked a trivia question: How many Williamsburg Conferences has the ISCC spondored? If I had asked about annual meetings the question would be easy. We were formed in 1931 and had our first annual meeting the next year. And the nice thing about annual meetings is they have been happening once a year every year since then. We do not even have to do the math; the ISCC has numbered the annual meetings. In September 1997, our 66th Annual Meeting will be held in Baltimore in cooperation with the Color and Appearance Group of the Society of Plastic Engineers (SPE). Don't miss it. Annual meetings are the one opportunity for the color community to get together as a whole.

But back to Williamsburg Conferences. To find the number of these conferences is more complicated. A hint: they are newer. A problem: they are held at irregular intervals. They were initiated so that a small group of people could get together and discuss one topic of color in depth, and with lots of interchange. The ISCC held a conference when some one or other group thought it was important to have such a discussion. For several years now, I have wondered when the Williamsburg Conferences got started, how many we have had, and what topics have been covered. So I tried to find out what I could about past conferences. I'll share what I have found, and I hope other ISCC members will share with me what they know.

The first Williamsburg Conference was held in 1966. I am indebted to the organizers because they labeled it the First Williamsburg Conference. That kindness saved me reviewing 35 more years of history. The topic was "Instrumental Approaches to Colorant Formulation", a very timely and important topic then and now.

The twentieth schedualed Williamsburg Conference is

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February 22-24, 1998. Its topic is "Color and Design: 21st Century Technology and Creativity." The first announcements about that conference were in the last Newsletter. We are all very excited about this conference that Wade Thompson is organizing. We hope everyone with an interest in this topic will come and exchange ideas with their friends and colleagues. You will be hearing more and more about this conference in the upcoming issues of the Newsletter.

However, what about the conferences in between? I will share with you the list I have compiled. I was fascinated by the diversity of topics. I have included the dates of the conferences and organizers. Where I have omitted information I would love to have the input to add. I would appreciated it if attendees or organizers for any of these conferences, would share with me additional information (including additions or corrections to my list).

WILLIAMSBURG CONFERENCES

Year	Topic	Chair
1995	1st Panchromatic Conference	Michael Brill & Steve Shaffer
1994	The Colorimetry of Fluorescent Materials	Richard Harold & Fred Billmeyer
1992	Comparison of Colored Images Presented in Different Media that are Intended to Simulate Each Other or Another Image	Milton Pearson
1991	Colorfastness to Light	Jacqui Welker
1989	Color Discrimination Psychophysics	Roy Berns & Alan Robertson
1987	Appearance	David H. Alman
1986	Colors of History: Identification, Re-creation, Preservation	Robert Feller & Danny Rich
1985	Color Then and Now	Mark Gottsegen & Rolf Kuehni
1984	Color and Imaging	Richard Ingalls
1983	Color and Illumination	Charles W. Gerome & William A. Thornton
1981	Creativity, the Common Denominator -Artist and Scientist Working Together	Ed Cairns, Bonnie Bender, Alan Robertson
1980	Helson Memorial Symposium on Chromatic Adaptation	James Bartleson
1979	Judd Memorial Conference on Color Metrics	Rolf Kuehni
1978	Objectives of Pictorial Color Reproduction	Cal McCamy & Ed Breneman
1976	Instrumental Colorant Formulation	1976
1972	Fluorescence and the Colorimetry of Fluorescent Materials	
1971	Optimum Reproduction of Color	Rhodes & Yule
1969	Visual Reproduction of Color	R. Evans
Future Conferences:		
1998	Color and Design: 21st Century Technology and Creativity	Wade Thompson
1999	2nd Panchromatic Conference - Color in Its Surround	Cynthia Brewer
2000	ISCC Color Course	Roland Connally

Ellen C. Carter
President, ISCC

ISCC WELCOMES A NEW MEMBER-BODY

I am happy to announce that CORM has joined the ISCC as a Member-Body. I am quite certain, there are a large number of members who do not know what the acronym CORM stands for. Thanks to Dr. Art Springsteen, Secretary of CORM, I have received some information about CORM which I will pass along to you.

CORM is the Council for Optical Radiation Measurement, advisory group to the National Institute of Standards and Technology and the Optical Radiation Community..It was organized on February 1972 at a conference of 27 industrial and 32 government representatives. This meeting was held at the National Bureau of Standards under the title "Second Conference on the Definition of Pressing Problems and Projected Needs in Radiometry and Photometry." The first such conference was held October 28, 1971. The formation of CORM resulted from recognition at this conference that the definition of measurement problems must be followed with an action program, and for this purpose a permanent organization was necessary.

CORM began its operation as an activity of the US National Technical Committee 1.2, Photometry, of the International Commission on Illumination (CIE). Soon, however, CORM became independent of USTC-1.2 and operated under the chairmanship of Edward S. Steeb (General Electric Co.), with early assistance of Bruce Steiner (National Bureau of Standards), Robert Wateson (EG&G), Michael Zinchuk (Polaroid Corp.) and Frank Grum (Eastman Kodak Co.)

The major objective of CORM during the years 1972-1978 was to reach a concensus on pressing problems and national needs in optical radiation measurement, and to advise the National Bureau of Standards of these

needs through periodic reports, two of which were issued in the period mentioned.

In 1978 CORM decided that its objectives should be broadened to include the dissemination of information on national needs in optical radiation measurements, and particularly on physical standards useful in meeting those needs, to other organizations and parties than the NBS. It was apparent that a more formally organized council would be needed to discharge the added responsibilities resulting from this broadened scope.

CORM has continued to issue to the NBS (and later to NIST) on the Pressing Problems and Projected National Needs in Optical Radiation Measurements. The third CORM Report to the NBS was issued in August 1979, the Fourth CORM Report in August 1982, the Fifth CORM Report in August 1991, and the Sixth CORM Report in November 1995.

The Council has grown to over 500 members, with almost 15% of the membership being international. In addition to the CORM annual technical meeting, the Council has also co-sponsored with the Ultraviolet Study Group (UVSG) of the United Kingdom, two conferences on Spectroscopic measurements; the Fifth Oxford Conference held at Oxford England in 1986 and the Second Oxford Conference on Spectroscopy, held in Ridge, New Hampshire (USA) in 1994.

The following are the aims and purposes of the CORM:

A. To establish concensus among interested parties on national, industrial and academic requirements for physical standards, calibration services, and interlaboratory collaboration programs in the fields of optical radiation measurements, including the measurements of the transmitting and reflecting properties of specimens, the measurement of the output of radiant sources, and the characterization of detectors for measurement of these properties,

B. To establish national concensus on the priorities to be attached to meeting these requirements.

C. To maintain liaison with the National Institute of Standards and Technology and to advise the Institute of requirement and priorities.

D To assure that information on existing or proposed standards, calibration services, collaboration programs, and its own activities is widely eminated to interested parties.

E. To answer inquiries about such standards activities or forward such inquiries to appropriate agencies.

F. To cooperate with other organizations, both public and private, to accomplish these objectives for the direct and indirect benefit of the public at large.

CORM Technical Committees

CORM Technical Committees are set up to have a group of knowledgeable individuals study a particular problem or a series of problems in the field of optical radiation measurement. There are currently two major technical committees, each with a set of sub-committees that study particular problems.

Calibration and Radiometry (CR)

The CR Committee is chaired by Dr. Dianna Jones (VP of CORM). CR sub-committees concern themselves with detectors, detector arrays, sources, and measurement of light (photometry). There are currently three active radiometry committees; two committees are inactive; CR-1 (standard sources) having completed its mission and issued a report and CR-2 (array radiometry) for lack of a chairman.

The active sub-committees are CR-3, CR-4 and CR-5.

CR-3 (photometric calibration and standards) is headed by Dr. Yoshihiro Ohno of NIST. The mission of CR-3 is "to identify and quantify problems, to address needs, and to disseminate information on standards and procedures in photometry including broadband and spectral measurements, colorimetry of light sources, and evaluation of photometers."

CR-4 is headed by Greg McKee of Labsphere and is concerned with flux integrating devices, especially integrating spheres, their design, and measaurement techniques using these devices.

CR-5 is headed by Ed Kelly of NIST and concerns itself with the measurement and specification of flat panel displays.

Optical Properties of Materials (OPM)

The OP Committee is chaired by Dr. Art Springsteen, Secretary of CORM. OPM subcommittees deal with artifact standards and methodology dealing with spectrophotometric measurements, including artifact standards, geometry of measurement, and instrument and laboratory intercomparison. There are three active subcommittees:

OP-1 and **OP-2** are combined under the leadership of Dr. Danny Rich (Datacolor International). OP-1 is concerned with intercomparison of method, which may include the sponsorship of round-robin measurements between laboratories, both national and industrial. OP-2 is concerned with geometry of measurement and definition and specification of geometry. This committee is working in conjunction with CIE Technical Committee 2-14 and 2-39, and ASTM E-12 committees on Color and Appearance.

OP-3 is currently co-chaired by William Weber (Macbeth) and Ann Campbell Laidlaw (SheLyn,Inc.). The committee covers artifact standards for spectroscopy, both transmittance and reflectance.

OP-4 is headed by Norbert Johnson (3M Company). OP-4 concerns itself with the measurement and specification of retro-reflective devices, including instrumentation for measurement and standards.

CORM Publications

One of the charters of CORM is to disseminate information to the public at large. The following is a listing of CORM publications.

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Newsletters/Journals

Optical Radiation News: A semi-annual newsletter published by CORM since 1984. Optical Radiation News reports of upcoming meetings, news from NIST and other national laboratories relevant to CORM, news from related organizations such as CIE, ISCC, and others. ORN is included in the CORM membership fees.

CORM Reports:

"Program for Action", CORM First Report (May 1973)

"Pressing Problems and Projected National Needs in Optical Radiation Measurements", CORM Second Report (January, 1975)

"Projected National Needs in Optical Radiation Measurements", CORM Third Report (June 1979)

"Pressing Problems and Projected National Needs in Optical Radiation Measurements", CORM Fourth Report (August, 1982)

"CORM Priorities in Radiometry: An update on the Fourth report on Pressing Problems and Projected National Needs in Optical Radiation Measurements" (November 1985)

"Pressing Problems and Projected National Needs in Optical Radiation Measurements", CORM Fifth Report (Sept., 1989)

The CORM Questionairre on Spectral and Photometric Standards, Final Report (May 1993)

"Pressing Problems and Projected National Needs in Optical Radiation Measurements", CORM Sixth Report (December 1995)

Books/Proceedings

Advances in Standards and Methodology in Spectrophotometry, C. Burgess and K. D. Mielenz, Editors, Elsevier Publishing, Analytical Spectroscopy Library, Volume 2 (1987) *(Proceeding of First Oxford Conference on Spectroscopy)*

Spectrophotometry, Luminesence, and Colour; Science and Compliance, C. Burgess and D. G. Jones, Editors, Elsevier Publishing, Analytical Spectroscopy Library, Volume 6 (1995) *(Proceeding of Second Oxford Conference on Spectroscopy)*

For inquiries about CORM and Reports please contact :

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CORM 97 / 25TH ANNIVERSARY CONFERENCE

On Optical Remote Sensing, Reflectance, Transmittance and Infrared Metrology

The 1997 annual meeting and conference on the Council for Optical Radiation Measurements (CORM97) marks the 25th anniversary of CORM and will be held at the National Institute of Standards and Technology (NIST) on Tuesday, April 29 through Thursday May 1, 1997. The conference will consist of technical sessions on optical remote sensing, reflectance, and transmittance metrology, and advances in infrared metrology.

A block of rooms has been reserved at the Gaithersburg Marriot Washingtonian Center at a special conference rate. This hotel offers executive accomodations and is located adjacent to a complex of shops, theaters, and other diversions. The Center is immediately off I-270 and is near NIST. To ensure that you receive the special conference rate, be sure to mention CORM when making your reservation. The cutoff date is April 7, 1997. For reservations call the hotel directly at 301-590-0044 or 1-800-228-9290.

The Gaithersburg Marriot Washingtonian Center will also be the site of the CORM banquet on the evening of Tuesday, April 29th. As part of the banquet, the traditional Franc Grum Memorial Lecture will be given by William E. Schneider of Optronic Laboratories on the life, times and work of Franc Grum and his role in developing CORM.

Authors are encouraged to contribute papers to any of the three technical sessions. They are requested to contact the appropriate co-chairperson listed below by 1 February 1997.

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Retroreflectance Measurement Workshop

A workshop on Retroreflectance Measurement sponsored by CORM OP-4 subcommittee and NIST will be held at NIST, Gaithersburg on Thursday May 1, 1997 in conjuction with the CORM 97 annual meeting. Topics will include Retroreflectance Measurement Basics, NIST Programs, National and International Standards Development, Laboratory and Field Measurements, and Uncertainty Expectations. For more information contact:

Bob Saunders
Tel: 301-975-2355
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COLOR RESEARCH AND APPLICATION

IN THIS ISSUE
February 1997

Readers will notice a new look to the journal this month. Changes in the author, title, abstract, and key word sections were introduced to provide a uniform standard in journals published by Wiley. The format changes facilitate the creation of a Color Research and Application web page, which includes the table of contents and abstracts of the articles in each issue. In addition, a computerized database will allow users to search for relevant articles by author, title, and key words. As the database grows, we hope the readers will find it useful.

We start this issue with an article from the field of linguistics. In "Basic Mandarin Color Terms," Ching-Fu Lü reports on the investigation of Mandarin color terms and the mapping of those terms using Munsell color space as the grid. In his studies he systematically surveyed all administrative regions of Taiwan, using 5 participants with different educational backgrounds and occupations from each district to find common color terms. The 1,815 participants were asked to write down all the color terms they could recall using written Mandarin, or the Chinese characters for color terms used in everyday life. This article reports on the Mandarin study, however detailed information was collected on eight additional languages that some of the participants spoke to observe the possible influence of other language. For example among the 96 Taiwanese aborigines surveyed, an average of 36 Mandarin color terms were elicited, but when responding in their native aboriginal language, Paiwan tribal members could only name six basic color terms and Rukai tribal members five. In the mapping study he used 46 participants and divided the approach into high saturation and lower saturation colors. The figures show the regions for the 11 basic Mandarin color terms.

In the next article, Hugh S. Fairman, Michael H. Brill and Henry Hemmendinger review "How the CIE 1931 Color-Matching Functions Were Derived From Wright-Guild Data." In it the authors describe the five resolutions that Guild presented to the Colorimetry Committee of the CIE on September 18, 1931, and examine the principles that led to the transformation coefficients included in resolution 5. The authors, using the vantage of 65 years later, go on to look at whether or not these principles would be adopted if the system was being formulated today with current knowledge and resources.

For years the colors for traffic signal lights and road safety signs have been prescribed to promote common practice, minimize confusion, and maximize visibility. The selection of the colors is based on knowledge about normal and defective color perception. The addition of sun glasses may affect the colors perceived greatly. In the past couple of years a technical committee of the Comi Euroen de Normalisation (CEN/TC 8-pt Personal Eye Protection) pepared European standards for sunglare protection filters. These standards define a Q factor, the relative visual attenuation quotient for specific signal colors, to quantify the distortion of that would likely occur when someone wearing sunglasses looks at signal lights. The presumption is that filters with the same Q factor would distort the color appearance the same amount, and those filters with higher factors would perform better than those with lower Q factors. David A. Palmer, John Mellerio, and Amanda Cutler examine these assumptions and report on the results of their experiments in "Traffic Signal Light Detection Through Sunglare Filters of Different Q Factors."

The next article is in the field of computer color matching. Much of the computer color formulation and matching algorithms have been based on the Kubelka-Munk theory. They have been used in the coatings, plastics and textile industries. In the textile industry, dyeing processes are so complex that the formulation of mathematical models for the prediction of their behaviors has proven quite challanging. In "Prediction of Absorbance from Reflectance for an Absorbing-Scattering Fabric," M . El Sherif, O. A. Bayoumi and T. Z. N. Sokkar propose a relationship between the Beer-Lambert law of absorbance and the Kubelka-Munk function. Using this relationship, the spectral absorbance can be predicted from the reflectance of a substrate dyed with it, through an iterative procedure. Samples of polyester fibers dyed with different colorants are used as examples.

In color planning and design, small colored samples or chips are used for selection, specification, and communication of the color. The choice of the color is an important decision not only for products in industry - cars, clothing and appliances, but also for structures in architecture, communication in advertising. Everyone has color preferences. Color sells. But does the selection and evaluation of chip colors directly correlate to the preference of color on an object surface? Charles Taft, in "Color Meanings and Context: Comparisons of Semantic Ratings of colors On Samples and Objects," reports on the results of a study comparing semantic ratings of color chips with those of the same colors applied to a variety of familiar objects.

For many industries, spectrophotometers are the workhorses that are used every day to assess the color quality of products. However, who do you think is assessing the performance of spectrophotometers? Much has been published concerning the accuracy of spectrophotometric and colorimetric measurements, and the care and control of color measuring instruments. Many of the programs described have involved tedious and detailed techniques for assuring the performance of instrumentation needed to get precise measurements. However, the reality is that there must be a serious commitment of both time and expertise to realize such a program. The Industrial Applications section this month is about

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NOMINATIONS SOUGHT FOR NICKERSON SERVICE AWARD

The Nickerson Service Award is presented for outstanding, long-term contributions towards the advancement of the ISCC and its aims and purposes. The contributions may be in the form of organizational, clerical, technical or other services that benefit the Council and its members. The candidates must be members of the Council and must have been active in the affairs of the Council.

If you would like to nominate someone for the Nickerson Service Award, please contact Bob Marcus, 774 Harmony Road,Middletown, NJ 07748, (908) 495-1118, or send by e-mail: eqkj48a@prodigy.com, for more details. Please remember that confidentiality of the nomination is of the utmost importance.

assessing the performance of spectrophotometers. In "An Abridged Technique to Diagnose Spectrophotometric errors," Roy S. Berns and Lisa Reniff sugget an abridged technique that will validate the accuracy and reproducibility of a color-measurement instrument. Using an abridged technique can aid in developing the expertise needed for the more sophisticated assessment programs and can provide a bridge to routine evaluation of instrumental performance.

In the communications and Comments section, we have a short article in which Peter D. Burns examines the "Accuracy of Approximations for CIELAB Chroma and Hue Difference Computation." One method to evaluate CIELAB chroma and hue angle difference is to calculate the rotation of the sample from the standard about the L* axis using a rotation matrix. These rotated differences approximate the chroma and hue angle difference. Burns examines the amounts of error that can occur when the matrix rotation method is used to approximate the true transformation in CIELAB.

Ellen C. Carter
Editor
Color Research and Application

50 YEARS AGO IN ISCC *NEWS #68* JAN-FEB 1947

HEARINGS ON COLOR TELEVISION

During the week of December 9 hearings began before the Federal Trade Commission on a petition of the Columbia Broadcasting Company that the FCC immediately set standards for commercial broadcasts in color television. The direct testimony of CBS and thirteen representatives of other broadcasting and set-manufacturing companies was completed during this week. The following week the commissioners went to New York to witness additional broadcasts, having already witnesses demonstrations by CBS and other companies who had requested it. Because of the technical nature of the material, cross-examination was deferred until there could be time for study of the direct testimony.

Technical men were star witnesses. Dr. Peter C. Goldmark, whose outstanding achievements in this field brought him the Television Broadcasting Association's Award of Merit in Engineering in 1944, was chief spokesman for CBS, proposing use of the sequential method of broadcasting by successive use of red, green and blue filters. Technical data regarding the sequential method now being used in experimental broadcast by CBS were presented in 74 pages of direct testimony, with five pages of additional remarks to call attention to the greater importance of high contrast compared to high maximum brightness which was often urged during the hearings. The CBS television pictures may be shown in a room with about twenty foot candles illumination or less. (NOTE: Excluding direct sunlight, this is probably more than most rooms have except near the window in daylight, and much more than night-time illumination in any home living room we know about. -D.N.) Dr. Goldmark called attention to the fact that it is more important to have a good contrast ratio in which the black reflects only about 1/30th as much as the white than it is to have high maximum brightness which does not allow the contrast ratio to be kept. Ordinarily we view pictures and objects that are not brighter than the surrounding fields but the contrast ratio is maintained. Because it is built in, black looks black, white looks white. When the screen in a color receiver is

turned off it appears black under room illumination, not white, as it does in black and white television receiver, or in a movie screen.

The case for simultaneous all-electronic color television was presented by Dr. R. D. Kell on behalf of RCA and NBC in 45 pages of direct testimony. The system which they propose, and in which much of the rest of the industry is interested, has been developed to fit into the present black-and-white system so that one could work with others and avoid obsolescence of black-and-white receiver sets. Three pictures, a red, a green, and a blue, are produced simultaneously on three different tubes in the receiver and are combined optically. The system is developed far enough for demonstration, but while RCA outlined details in their testimony that gave a picture of the concept of research and development necessary to provide solutions to the remaining problems, they are not ready to go, as is CBS. They estimate that the work and testing necessary, and industry's consideration for color television, will require a minimum of four to five years. Therefore, while CBS petitions for immediate adoption of standards for color television, RCA, speaking for NBC, and several of the other broadcasters, do not wish to have standards adopted until after further reserach and testing.

Selected by
Harry K. Hammond III
Hammond Consulting Services

ISCC 1997 ANNUAL MEETING

September 14-17
Interest Group I
Basic and Applied Color Research
CALL FOR PAPERS

ISCC Interest Group I, Basic and Applied Color Research, serves to bring together researchers in the fields of color science, color measurement, color technology, vision, design, education and psychology, to discuss topics of mutual interest. For the 1997 Annual Meeting to be held in Baltimore, MD, September 14-17, 1997, the topic of discussion is "The Colors of Colored Things". The session will include two invited lectures, followed by several contributed papers (approximately 20-30 minutes in length).

The two invited lectures will deal with metamerism and its quantification. Dr. James A. Worthey, National Institute of Standards and Technology, will discuss the relationship of metamerism to lighting; Mr. Hugh S. Fairman, a color consultant, will discuss the relation of metamerism to material properties and reflectances.

Interest Group I is now soliciting contributed papers on any aspects of basic and applied research in the field of color order systems. Please submit by **June 1, 1997** a title and an abstract of no more than 200 words to either of the Co-Chairmen below:

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EDUCATION COMMITTEE

TRAVEL FELLOWSHIPS FOR ISCC STUDENT MEMBERS

The Education Committee is pleased to announce that the ISCC has agreed to provide a limited amount of support to subsidize student attendence at the annual meeting. Awards will be made only in those years when it is deemed that there are qualified candidates. The budget allows $1,200 to be shared by qualified applicants, with a maximum amount of $600 per student.

Student members of the ISCC who are interested in this new program should submit a letter requesting support and enclosing the abstract of their presentation. The application should be made at the time of abstract submission. The annual meeting for 1997 will be held Sept. 14-17. Please send your requests to:

Vivianne C. Smith
ISCC Education Committee
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939 East 57th Street
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BYK-GARDNER USA RELOCATED

Their new address is:

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THE FOURTH IS&T/SID-COLOR IMAGING CONFERENCE SCOTTSDALE, AZ NOVEMBER 19 - 22, 1996

Last November, color scientists and engineers from around the world gathered in Scottsdale,AZ to exchange ideas and information on color imaging. This year's focus was on color science, systems, and applications. About 250 attendees, presenters and staff participated in this four day event at the Radisson Resort Scottsdale, under the warmth of the Arizona sunshine.

The format for this week was one day of tutorials ,followed by three days of papers. Tutorials were presented in many diverse topics: fundamentals of colorimetry; fundamentals of digital color imaging systems; color appearance models; color in hardcopy; color in electronic devices; color management systems; effective use of color; complex color images; digital halftoning for color; and photographic scanning, digital cameras and reproduction goals.

The papers program included sessions on color management; scanning devices; applications; gamut mapping and color appearance; printing devices; image processing; display devices; standards; and a poster session.

Each day was began with a keynote address which in all cases provided thought-provoking material to get the session started. Wednesday, Edward Giorgianni of Eastman Kodak gave the first keynote address, presenting his thoughts on a universal color management paradigm. He discussed thr difficult question of what is an original, and how is it to be reproduced. For example, when scanning a photograph, is the "original" for the resulting digital representation of the photograph, or the actual scene that was photographed? After the user makes this and other choices, how is this information captured unambiguously? Using ICC tools, Giorgianni proposed a method whereby all needed information about an input image is preserved and communicated to all display and output devices.

The Color Management session continued with A. Ufuk Agar presenting an interesting method to select the best grid structure for multi-dimensional interpolation. The "minimax method" places grid points where the data are concentrated, rather than a uniform structure, resulting in much improved color models. Yoshifumi Arai followed with a neural network application to perform color correction. The network takes CMY input and produces spectral reflectance out. Color prediction was much improved over current methods, such as principal component analysis. Next, Robert Chung discussed his use of ICC profiles and other methods for performing color management. He concluded that color reproduction accuracy depends heavily on the choice of profiling tools and other software processing and rendering style. The session closed with David P. Oulton's presentation of a precise color imaging system. This calibrated system incorporates image display, capture, and reproduction elements, and stores images in an object hierarcy. Image objects retain properties beyond color, such as surface detail and texture.

Wednesday afternoon opened with five talks on scanning devices. Peter D. Burns presented a method for multi-spectral image capture. He used a seven-channel digital camera to image object reflectance, and applied principal component analysis reconstructed spectral reflectance. U. Lenz then explained a method for calibration and characterization of a large digital camera. The immediate application for this work is the evaluation of an art paintings catalog. Johji Takima proposed a quality factor for evaluating color detector sensitivity. His method determines sensor quality by examining how the sensor subspace differs from that of the human visual system. In a similar vein, Gaurav Sharma described how to evaluate color scanners. This method performs well by accounting for both measurement noise and the fact that detector sensitivities are not typically linear transformations of those of human cones. The particular scanning application of color negatives was explored by Chric Tuijn. Much of the difficulty of this task stems from the darkness of typical negatives, differences in frames on the same roll of film, and complications arising when a positive image is made. We ended the afternoon talks with five fascinating presentations on applications. James M Reilly discussed some implications of photographic image fading in his invited talk. There are interesting trade offs between film price, marketability and fading properties demanded by consumers. Franziska S. Frey followed this by showing work to reconstruct faded color photographs and motion picture film. Using a model to compensate for fading, a scanned photograph can be reproduced to appear as they did when new. Lindsay W. MacDonald explained the challenging project undertaken to digitally capture all the stained glass in a 500 year old English Church. One use for these images will be to digitally restore them by removing artifacts due to repair work done since the original creation of the stained glass. Henri Maître presented an application of fine art imaging where spectral reflectance was captured at the pixel level. This was done by using many filters and performing principal component analysis; the thrust of this work is how to best select the filters. Last up for this session was Scott Foshee of the U. S. National Security Programs Team. He explained some interesting (and difficult) requirements of military imaging applications. The challenges here are color related, such as transmitting a color image to a monochrome printer in the field, and

more logistical in nature, such as implementing good color imaging systems that will be used by those with little or no color experience.

Wednesday evening we were treated to a lively reception. The outdoor area was well decorated with a western theme, which provided a great setting for the western style buffet. A large mesquite fire burned in a nearby firepit. Topping it off was live western music including some dancing. As with everything else, the Radisson staff did a superb job with this event, and I think it was thoroughly enjoyed by all.

Thursday morning, Robert Hunt gave the keynote address for the gamut mapping and color appearance session. Dr. Hunt, as usual gave a very stimulating talk. The subject here was the importance of black and white. Three arguments were presented: color balance; tone reproduction; and image sharpness. While this should not be a surprise to experienced color scientists, one demonstration was particularly memorable. Dr. Hunt arranged for two images of a fruit scene such that different color channels could be blurred; in one the chrominance, and in the other the luminance. From the distance I viewed this, the difference was startling. Chrominance blurring was almost undetectable, while luminance blurring was completely unacceptable. Understanding these effects allows us to more effectively store and display color images.

Next, Brian Funt discussed an application where a neural network was taught to estimate illuminant chromaticity from the image only. By training it with many images and illuminants, the network was able to better predict illuminant color than some existing models. Invited speaker Philip K. Robertson then presented techniques to help users perform gamut mapping. To enable less experienced users to perform complex color tasks, "metavisualizations" are shown, which help the user traverse a decision tree leading them to good gamut mapping. This should result in better results as compared to completely automated algorithms. Another gamut mapping method was presented by Shigeti Nakauchi where CIE L*a*b* color difference between images was minimized. Rather than simple point-by-point ΔE^*, images were spatially blurred to simulate the human contrast sensitivity function. Closing the gamut mapping session, Wilkin Chau presented a third method where image spectral reflectance was represented by principal components for each pixel in the image. This mapping method performed better than the simpler m ethods, such as projective transforms.

The first talk in the afternoon was by Ján Morovic, who discussed the difficult task of printer characterization without full control of the colorats. Several

(Continued→)

NEWS ABOUT MEMBERS

MR. CHRISTOPHER WILLARD

Who would climb 102 floors to the top of the Empire State Building to get inspiration to paint?

Mr. Christopher Willard, a painter and a professor of color theory at Hunter College is having a LIGHT SHOW, an exhibition of new paintings of Mr. Willard inspired by the colored lights of Empire State Building. The exhibition is at Fifth Avenue Gallery, Empire State Building from January 8, 1997 to March 12, 1997. It is open to public snd is free. For a free color postcard, send a self addressed stamped envelope to Christopher Willard, 407 West 54th Street, 3E, New York, NY 10019.

Lydia A. Ruth
Director of Public Relations
Empire State Building
(212) 736-3100

VIRTUAL COLOR:

LIGHT, HUE AND FORM INTEGRATED

From February 19 to May 2, 19977, the galleries of the **New York School of Interior Design** will be the site of *VIRTUAL COLOR*, an extraordinary exhibition that explores color in three dimensions. It is the brain child of architectural designer **Shashi Caan** who has gathered together artists, designers and architects to confront every facet of the subject.

Visually, the exhibition presents the viewer with a full spectrum of the color experience ranging from the perpetual to the reality of the built environment. Participants include Shashi Caan of Gensler, Charles Gwathmey and Robert Siegel of Gwathmey Siegel & Assoc. Architects; Donald Kaufman/Taffy Dahl; Ricardo Legardo Legorreta; Theodore Prudon of Swanke, Hayden, Connell Architects; Joseph Roberts; Lois Swirnoff; and Matthew Tanteri.

Beginning with the presentation of the role of color in historic architecture by Theodore Prudon and then using the more theoretical 3D exploratios of of the painter Lois Swirnoff, color is established as an essential design tool. This is further demonstrated in a display of the work of Mexican architect, Ricardo Legorreta, and American architects, Charles Gwathmey and Robert Siegel, who show contrasting examples of color reality.

Joseph McMahon of Gensler is the exhibition designer and Shashi Caan is the curator of *VIRTUAL COLOR*. Essays by each of the participants will be presented in a catalog to be published by the **New York School of Interior Design**, and this will help to further illuminate a subject that is still evolving.

The exhibition will be on view Monday through Friday, 10 a.m. to 5 p.m. and Saturday from noon to 5 p.m.

New York School of Interior Design is located at 170 E. 70th Street.

Shashi Caan

regression-and interpolation-based models were tried, the best of which performed as well as other published models. Shen-ge Wand then presented a color calibration technique for halftone printers which is independent of the halftone algorithm used. He accounts for the fact that pixels are not perfect squares, and nearby pixels of different separations will have overlap. Qing Yu, the next speaker examined the application of several blue noise masks for halftone printers. Depending on the specific printers, color error can be concentrated in chrominance or luminance, so the choice of blue noise mask is an implementation issue. Optical dot gain was the subject of the next talk, given by Stefan Gustavson. Color gamut was examined and actually shown to expand in the highlights when optical dot gain is added to the model. Closing this session, Patrick Emmel discussed a model for inkjet printers on transparent media. By accounting for internal reflection and nonuniform ink coverage, reasonable color errors were predicted for several halftone schemes.

The next event on Thursday was the poster session. About 25 presenters lead attendees through many interesting topics for about two hours. The session was well attended, and everyone was asked to vote for the best poster. This year, Susan Farnard, of Eastman Kodak brought home the coveted "Cactus Award" for the work on the effect of image content on color difference perceptibility.

Friday, the image processing session was started with the keynote address by Don Greenberg of Cornell University. His presentation focused on the relationship between computer graphics and color imaging. The goal is to produce images that are based both on lighting models, such as ray tracing and perceptual color models, such as CIEL*a*b*. When fully achieved, this results in an image that is indistinguishable from the real world. The session continued with an invited talk by Jack Holm, who presented his strategy for pictorial digital image processing. The goal is to improve the quality of digital photographs, which can be reached with available tools and following the comprehensive strategy outlined here. Graham D. Finlayson then discussed a color correction method where a linear systems approach is applied to color sensor calibration. A key assumption was "maximum ignorance with positivity," which here means that all spectra are equally likely, but spectra with any negative values are discarded. Next Michael Hild proposed methods to eliminate highlights from images. Segments of specular highlights are removed without knowledge of illumination intensity or direction, resulting in an image that can be more faithfully reproduced. This session ended with Lindsay W. MacDonald's discussion of the ethical issues in digital imaging. We were shown several examples ranging from simple retouching to wholesale rearrangement of images. The ability for such deception was shown to have far-reaching implications for fields such as advertising and political campaining.

The afternoon began with four talks on display devices. First up was Karen M. Braun, who presented work involving cross-media image matching. Several color appearance models were tested for both CRT-to-CRT and CRT-to hardcopy comparisons. Nobuaki Usui followed with an improved method for accuracy softcopy display by applying ray tracing techniques. The model predicted primary inks and overlays well. Next, Heui-Keun Choh discussed some effects of ambient illumination on the appearance of CRT colors. Observers performing achromatic color matching confirmed that their state of adaptation was shifted towards the ambient lighting. This session closed with Roy S. Berns' invited talk summarizing a recent CIE report on computer-controlled CRT colorimetry. The report concluded with a comprehensive recipe for accurate CRT color display.

The last session of the conference was on standards. Three talks were presented . The first of which, an invited talk by J. Shanda, summarized most of the recent color-related CIE work. Details were discussed on color matching, color difference and color appearance. Next Christopher R. Hauf presented FlashPix™, a proposed standard image file format. The format was designed to simplify the use of images, rather than only as a method of image storage. The last talk of the conference was given by Ricardo Motta on a proposed standard color space: sRGB. This space was desined particularly for use on the Internet, and incorporates the use of ICC tools. That concluded my first visit to the Color Imaging Conference. I truly enjoyed the opportunity to interact with so many experts from around the world. I am already looking forward to replacing some of next year's Rochester clouds with some warm Arizona sunshine.

Request for the conference proceedings can be made online at http://www.imaging.org, or by mail to:

Jo Paul
Customer Service
Society for Imaging Science & Technology
7003 Kilworth Lane
Springfield, VA 22151

David R. Wyble
RIT Munsell Color Science Lab.
Rochester, NY

FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY (FSCT)

Student Papers invited for 1997 A.L.Hendry Awards Competition

Student authors are encouraged to submit entries in the 1997 Southern Society for Coatings Technology Alfred L. Hendry Award Competition.

This year's award again features cash prizes to both the student author (or authors) and the Author's sponsoring

OBITUARY

ISCC loses a diligent worker and a friend.

David C. Sickles, 76, died of a stroke in his sleep, Saturday night, January 25, 1997 at his Washington home. Mr. Sickles started printing at the Washington Navy Yard and later on acquired the Mimeoform Service, Inc. He worked there with Mr. Norris Seldon for the next 27 years until his death. Mr. Seldon plans to continue operating the shop with the help of his son, Kevin.

The ISCC *News* was printed at Mimeoform, Inc. for many years.

Gultekin Celikiz
Editor

lab. The student receives a $1,000 cash award and expenses covering attendance at the FSCT International Coatings Expo and Technology Conference in Atlanta, GA, Nov. 3-5, 1997, to receive the honor and a suitably inscribed certificate for the best paper submitted for the competition. The competition is administered by the FSCT Educational Coordinating Committee and several committee members will judge the entries. In addition, the laboratory of the sponsoring school will also receive a grant of $500.

Submitted papers must decsribe the results of original research on a subject related to coatings technology, or present a significantly insightful, comprehensive review of a field of coatings technology. Work done on coatings related topics as part of an undergraduate research project or as a senior thesis is appropriate for submission.

Those wishing to enter the competition must send a letter of intent, along with the title of the proposed paper and a brief abstract, by March 17, 1997 to: Hendry Awards Committee, c/o FSCT, 492 Norristown Rd., Blue Bell, PA 19422-2350. The deadline for receipt of manuscripts is July 3, 1997.

The A.L.Hendry Award is sponsored by the Souther Society for Coatings Technology and commemorates the industry contributions of the late Alfred L. Hendry, president of A.L.Hendry Co. in Tampa, FL.

1997 Roon Awards Competition Underway, Entries Invited; Awards Total up to $4,000

FSCT Roon Awards Committee Chairman Clifford K. Schoff Industries, Inc., Allison Park, PA, has announced a Call for Papers for the 1997 competition. Prospective authors have the opportunity to earn up to $4,000 in cash prizes for outstanding papers.

The annual awards are sponsored by the Coatings Industry Education Foundation (CIEF) and were established to honor the late Leo Roon, founder of Nuodex Products Co., with support funds coming from the Roon Foundation. The awards will be presented at the FSCT International Coatings Expo and Technology Conference in Atlanta, GA, Nov. 3-5, 1997.

To submit a paper for the competition, the following rules must be observed: (1) The paper must describe original work not previously published or presented; (2) The information must be directly related to the protective coatings industry; and (3) It must be of such a caliber that it reflects a step forward in real scientific contribution to the coatings industry; and (4) It must be accompanied by a clearance for publication. The paper must also be prepared by someone associated with the organic coatings industry, including raw material suppliers and educators.

All of those interested in entering the competition must send a letter of intent, along with the title of the proposed paper and a brief abstract by March 3, 1997 to: Roon Awards Competition, c/o FSCT, Attention: Michael G. Bell, Director of Educational Service, 492 Norristown Rd., Blue Bell, PA 19422, or you can FAX the information to 610-940-0292.

Entries that arrive after the March 3 deadline will be considered for the 1998 competition.

SOCIETY FOR INFORMATION DISPLAY

FINAL CALL FOR PAPERS

1997 INTERNATIONAL DISPLAY RESEARCH CONFERENCE and WORKSHOPS

The 17th Annual International Display Research Conference (IDRC 97) will be held at the Sheraton Centre Hotel in Toronto, Canada on September 15-19, 1997. IDRC rotates triennially between the United States,Asia, and Europe. Recent IDRCs were held in Monterey, CA (IDRC 94), Hamamatsu, Japan (Asia Display 95), and Birmingham England (Eurodisplay 96).

This Conference emphasizes research and fundamental development activities in display technology and related human interfaces. Display researchers and other interested individuals are encouraged to attend for an intensive exchange of ideas through formal and informal discussions. These will be facilitated by topical evening discussions, by minimization of parallel presentations, and by author interview sessions where demonstrations are encouraged.

(Continued→)

Workshops will be included to focus on active-matrix displays and technology, passing LCDs and technology, field-emitter displays, and organic electroluminescent devices. In keeping with the conference emphasis and tradition, there will be no commercial exhibition of equipment.

Keynote Speaker

James M. Hurd, President & CEO, Planar Systems, Inc.

Translating Display Research into Display Business Opportunities

Papers that are relevant to the advancement of the state of the art of electronic displays are solicited for the main Conference (Sept. 16-18). Contributed papers for the Workshops will be presented in joint sessions with the main conference. Accepted papers will be of interest to contributors to the field of display research, will describe new results or concepts, and will be previously unpublished. Areas of interest include but are not limited to:

Display Materials, Display Devices, Display Processing, Display Addresing and Circuits, Display Systems and Human Interfaces.

New phenomena and concepts are distinguished features of this Conference. IDRC is an ideal forum for presenting new concepts in display technology and discussing their potential impact..

THE DEADLINE FOR PROPOSED PAPER SUMMARIES IS APRIL 1, 1997.

Workshop participants may also register for the remainder of the IDRC's contributed papers (on Sept. 16-18) at a reduced rate.

For further information, contact Ralph Nadell at 212-620-3341.

COLOR AND COLOR CONTROL -IN PAINT, COATINGS AND PLASTICS-

April 2-3, 1997
University Center for Continuing Education
Milwaukee, Wisconsin

Learn the practical aspects of color technology in coating and allied fields. The basic concepts of color science from the light source to the colored object and finally the observer will be discussed. Suggestions will be offered on how to set up a realistic tolerance for an application and managing errors. Also discussed are various instrument configurations and how certain types of instruments may be better suited for a specific application.

The mission simply put, is to bring you information, advice and reliable opinions from industry leaders that will heighten your appreciation of color and problem solving capability.

An informal working atmosphere with emphasis on color participation and problem solving will make it easy for you to obtain answers to specific questions.

This working and hands-on seminars is designed for process, design, manufacturing, and materials engineers as well as chemists, quality control and technical sales personnel dealing with color in coating and allied technologies.

The speakers for the program are: Dr. J. Baghdachi, BASF, Mr. Jim Cave, BASF and Ms. Gabriele Kigle-Boeckler, BYK-Gardner.

Call 414-227-3105 or 414-227-3152 for more information.

This program will be held at: University Center for Continuing Education, 161 W. Wisconsin Avenue, STE 6000, WI 53203.

Course Outline
Day One

Overview of Appearance Qualities of Paint Coatings

Dr. J. Baghdachi, BASF Corporation

Fundamentals of Color Technology

Mr. J. Cave, BASF Corporation

- Color Perception and Appreciation - What is color?
- Characterization of light source
- Characterization of the visual system
- Spectral properties of objects
- Chromaticity scale
- Color difference space
- CIE Colorimetry Tristimulus specifications

The Source and Control of Color in Coatings

Dr. J. Baghdachi, BASF Corporation

- Objective vs. subjective tolerance
- CIELab - Color Space
- What can really DE indicate?
- Relationship between tolerance and color standard
- "CMC" Color difference When-Where-Why?
- Visual evaluation and instrumental evaluation

Day Two

Analysis of Appearance

Dr. J. Badhdachi, BASF Corporation

Mr. J. Cave

- Use and Understanding of current instruments - Do They Measure what you See?
- Bi directional and sphere type instruments
- Multi geometry instruments
- How to minimize common application errors
- How to select the proper color measuring equipment?

Common Defects, and Their Characterization

- Blushing
- Cratering
- Gloss (Poor of Loss of)
- Lack of Travel
- Rend Through (Sand Marks)
- Uneven Application etc.

Instrumental Measurement of Appearance

Ms. Kigle-Boeckler, BYK-Gardner

- Precision and capabilities
- Visual evaluation and instrumental measurement of:
  - Gloss
  - Haze
  - DOI
  - Orange Peel

HFES - 41ST ANNUAL MEETING: SEPT. 22-26, 1997

Albuquerque, NM

The Human Factors and Ergonomics Society Annual Meeting provides an opportunity for the exchange of information and ideas among people working in the field of human factors/ergonomics and related areas. Interested persons are invited to present thair work at the 41st Annual Meeting, to be held in Albuqurque, NM, Sept.22-26, 1997. Workshops will be held on Monday and technical sessions begin Tuesday morning after the Plenary Session.

The meeting's theme is "Ancient Wisdom—Future Technology," which reflects the nature of New Mexico with its remnants of ancient cultures, the cutting-edge R&D of its government and military labs, and information technology industry. The Technical Program and Host Committee encourage you to apply the theme to the proposal, though this is not a requirement for acceptance.

You may submit a proposal for presentation in any one of the formats described in the brochure . To obtain a detailed submission kit, contact HFES at:

P.O. Box 1369,
Santa Monica,. CA 90406 - 1369 USA
Tel: 310-394-1811
Fax: 310-394-2410
Web Site: http://hfes.org.

NOTE: For all accepted proposals, one of the autheor must attend the meeting to present the work. Presenters are required to pay the meeting registration fee. Registration information will be mailed to all presenters in July.

Hosted by ZIA Chapter

WHAT COLORS WILL CONSUMERS BE BUYING IN 1998 ?

Alexandria, VA-Where is color heading for 1998? Color Marketing Group (CMG) Members have identified three major directions in which color is moving. According to **Susan Iverson,CMG*,** Fingerhut Companies, Inc., Minnetonka, MN, co-chairman of CMG's Consumer Color Directions™ Committee, "The first direction is reminiscent of '70s colors, but with '90s updates, such as new combinations of colors or new materials."

According to **Michelle Lamb, CMG,** Marketing Directions, Inc., Minneapolis, MN, Iverson's co-chair a second direction focuses on a new interest in whiter and brighter hues that are softened for a more livable personality. "The hues may be softened by using texture, by washing down a color or by using a color to accent. These hues will be most apparent in 1998 in home furnishings products."

"Currently," adds Iverson, "the third direction reflects an interest in brighter, more saturated colors that may sometimes find themselves veiled, as though looking at the color through a diffused filter."

The 1998 Consumer Color Directions palette includes the 12 colors listed below, which are forecast to appear in the market in 1998.

Limone: Citron in a livable version. Limone is a response to the influence of green on yellow and is inspired by Europe's strong move into the acid greens.

Salmon mousse: Softened, lightened and veiled, this is a new sheer direction for orange.

Creole Spice: Representing a vast range of terra cotta and spice tones that are forecast for the transportation industry, this color is a mineral copper reflecting an additional influence of orange.

Ragin' Cajun: An earthy red with the influence of both orange and brown.

Apache: A fusion of red and orange.

Antique Bear: A true golden brown.

Ice Berg Blue A cool, light blue, this color will be seen in a matte finish and in a metallic that adds a reflective touch to the color.

da Blues: A blue with only a hint of purple and touch of gray.

Green Bayou: This color highlights the influence of blue on green.

Mint Cicle: After exploring the yellow side of deeper greens, this green cycles back to lighter,bluer personality.

Fortune Teller: To be used as a neutral, this deepened, metallic.hue looks into the, future of and silver.

Macabre: Plum overtones carry this back into the neutrals.

These Forecast Colors are part of CMG's 1998 Consumer Color Directions palette, which was developed during CMG's May 1996 International Conference held in New Orleans, LA. Over 650 CMG members from around the world attended. In formulating the 1998 palette, CMG members draw on their own color experience, but at the same time, look at trends they see in a consumer behavior and in economic and political climates. Some of the themes and influences that CMG members at the Conference saw affecting the direction of color are:

- Special effects, such as metallic, pearlescent and veiled.
- A new interest in femininity.
- A desire for more optimistic color as we approach the millennium.
- More adventurous use of color.

* The "CMG" appellation after members' names indicates that they have earned "Chairholder" status in Color Marketing Group, recognizing their achievement and leadership in the profession of Color Design.

For more information please call Jennifer Freedman at 703-329-8500.

DETROIT COLOUR COUNCIL

The Council's fall meeting was held Nov. 13, 1996 at the Marriott in Troy, MI. Ms. Gabriel Kigle-Boeckler, BYK-Gardner USA, and a very interesting talk on "Measurement of Gloss and Reflection Properties of surfaces." Her presentation flowed very well in showing that the visual impression of gloss is like color, a multidimensional parameter. In order to characterize gloss, it is necessary to measure additional gloss parameters, haze and orange peel.

Bill Longley, Ford Design Manager-Color and Trim Department, is retiring from Ford at the end of the year. Aside from having over 35 years working with color, Bill has been the driving force behind the success of the Detroit Colour Council. His stint as Program Chairman has produced some very interesting and informative talks, especially our Symposiums. While he is leaving Ford, Bill will stay on with the DCC as an advisor. He will also be given a Lifetime Membership in recognition of his valued service.

J. R. Keiser

AATCC COLOR MEASUREMENT COMMITTEE ACTIVITIES

RA36-AATCC Research Committee on Color Measurement met Tuesday, November 19, 1996 at the Radisson Governors Inn, Research Triangle Park, NC. The meeting opened with a talk by Bill Thornton and Hugh Fairman on the spectral power distributions of CWF and tri-band sources, and the implications for industrial color matching in textile and related industries. Committee business also included a recent letter ballot on a new test method for *Determination of Relative Color Strength of Dyes in Solution*, continuing interest in reviving the Glenn Color Rule, and tabulating inter-laboratory precision for measurement of color difference. In addition, the committee will host a workshop to describe standard illumination and viewing conditions for purposes of communication within the textile and apparel industries.

RA-36 met Thursday, February 13,1997 10:15-11:45 am at Sheraton Airport Plaza Hotal in Charlotte, NC. Speaker, Bill Hurd of Philips Lighting Company gave a talk on *The Color of Lighting.*

CONGRATULATIONS!

Congratulations to **Junzhong Liang** for winning the "Best Presentation by a Young Investigator" for his paper, "Adaptive Optics for Compensating for the Wave Aberration of the Eye" at the 1996 Annual Meeting of the Optical Society of America. Dr. Liang is a postdoctoral fellow at the Center for Visual Science. His presentation was co-authored by David Williams and Donald Miller.

Thanks to all of the Young Investigators who applied, for helping to make the Rochester meeting one of the best OSA meetings in recent memory.

The award committee consisted of Andrew B. Watson (Chair), William H. Swanson, and Christopher W. Tyler.

Ellen C. Carter
President, ISCC

INTERNATIONAL CONFERENCE ON VISION, RECOGNITION, ACTION; NEURAL MODELS OF MIND AND MACHINE

May 28 - 31, 1997

The Conference is sponsored by the Center for Adaptive Systems and the Department of Cognitive and Neural Systems, Boston University with financial support from DARPA and ONR.

The conference will include a day of tutorials (May 28) followed by three days of 21 invited and contributed lectures and posters by experts on the biology and technology of how the brain and other intelligent systems see, understand, and act upon a changing world. The meeting program and updates can be found at http://cns-web.bu.edu/cns-meeting/. Hotel and restaurant information can be found there.

Wednesday, May 28, 1997: Tutorials

Stephen Grossberg, "Vision, Brain, and Technology" (3 hrs in two 1 1/2 hr lectures).

Gail Carpenter, "Self-Organizing Neural Networks for Learning, Recognition and Prediction: ART Architectures and Applications" (2 hrs).

Eric Schwartz, "Algoritms and Hardware for the Application of Space-Variant Active Vision to High Performance Machine Vision" (2 hrs)

Thursday, May 29—Saturday, May 31, 1997:

Confirmed Invited Lecturers

Andreas Andreou, Stuart Anstis, Terrance Boult, Rodney Brooks, Gail Carpenter, Patrick Cavanagh, Robert Desimone, Patricia Goldman-Rakic,

Stephen Grossberg, Michael Jordan, John Kalaska, Takeo Kanade, EnnioMingolla, Lance Optican, Alex Pentland, Tomaso Poggio, Eric Schwartz, Robert Shapley, George Sperling, Larry Squire, and Allen Waxman.

The conference registration fee includes the meeting program, reception, six coffee breaks, and the meeting proceedings. Two coffee breaks and a book of tutorial viewgraph copies will be covered by the tutorial registration fee. Fees are: $55 Conference plus Tutorial (Regular), $40 Conference plus Tutorial (Student), $35 Conference Only (Regular), $25 Conference Only (Student), $30 Tutorial Only (Regular), $25 Tutorial Only (Student).

GRADUATE FELLOWSHIPS IN COLOR SCIENCE AND COLOR IMAGING

Rochester Institute of Technology, through its graduate degree programs in color and imaging science, is seeking highly-qualified applicants to fill the following scholarships: Macbeth Engel Fellowship, Grum Memorial Scholarship, and Munsell Science Laboratory Scholarship. In additon, funding is available for teaching and research assistantships. Support can include full-time tuition and twelve-month stipend. Partial scholarships in the form of tuition remission are also available. Past scholarship recipients have had bachelor degrees in mathematics, computer science, psychology, chemistry, printing, and electrical engineering.

The Color Science MS degree program is an interdisiplinary program consisting of required courses in color vision, psychophysics, colorimetry, optical radiation measurements, color appearance, and color modeling, elective courses that build on the student's background and interests, and either a research thesis or graduate project. Graduates are in high demand and have accepted industrial positions in electronic imaging, color instrumentation, colorant formulation, and basic and applied research.

The Imaging Science doctoral degree program encompasses a wide range of activities in imaging science including color science and image perception. This program involves approximately 2- years of course work beyond the BS degree and completion of a doctoral dissertation. Graduates of this program are also in extremely high demand and have accepted research positions in academia, government, and industry.

For further information visit the web page on http://www.cis.rit.edu and be sure to check out the Munsell Color Science Laboratory link.

To obtain application forms and degree requirements, contact:

Dr. Roy S. Berns, Color Science M.S. Coordinator,
Munsell Color Science Laboratory
Chester F. Carlson Center for Imaging Science
Rochester Institute of Technology
54 Lomb Memorial Drive
Rochester, NY 14623-5604
tel:716-475-2230
Fax: 716-475-5988
email: rsbpph@rit.edu

Dr. Roy S. Berns

TAKE NOTE !

PLEASE LET THE ISCC OFFICE BE AWARE OF ANY CHANGES IN YOUR TELEPHONE and FAX NUMBERS and YOUR E-MAIL ADDRESS.
The office is in the process of preparing a new Membership Directory!

Cynthia Sturke

GENTLE REMINDER!

All appropriate information submitted to this *NEWS* publication is the full and complete responsibility of the sender.

This publication and the ISCC assumes no responsibility for information changes and inaccuracies.

Thanks,
The Editor

CALENDAR

Please send information on Member Body and other organization meetings involving color and appearance functions with dates, places, and information source to:

Harry K. Hammond, III,
Hammond Consulting Services
9801 E. Bexhill Rd
Kensington, MD 20815
Tel/Fax: 301- 942-4446

Or

John Peterson, 8509 Imperial Drive, Laurel, MD 20708
Tel: 301-725-7764

1997

INTERNATIONAL CONFERENCE
VISUAL SCALES
Photometric and Colorimetric Aspects
March 24 - 26
National Physical Laboratory
Teddington, Middlesex, UK
TW11OLW.
Information: Dr. Julie Taylor
tel: 011-44-81-943-6539
fax: 011-44-81-943-6283
email: jafw@newton.npl.co.uk

(Continued→)

FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY, Feb. 5-7, 24th Annual International Waterborne, High-Solids, and Powder Coatings Symposium, Sponsored by the Souther Society and the University of Southern Mississippi, New Orleans, LA Info: FSCT Tel: 610-940-0777

COLOR MARKETING GROUP (CMG) SPRING INTERNATIONAL CONFERENCE, Apr.27-29, Innisbrook Hilton Resort, Tarpon Springs, FL Information: CMG Headquarters 5904 Richmond Hwy, Suite 408, Alexandria, VA 22303, tel:703-329-8500, fax: 703-329-0155 email: colorcmg@erols.com

TAGA ANNUAL CONFERENCE, May 4 - 7,Technical Association of the Graphic Arts Québec City, Le Chateau Frontenac, P.Q., Canada, Information: Karen Lawrence; tel: 716-475-7470

FSCT Federation of Societies for Coatings Technology, May 17-18Spring Board Meeting, Birmingham Hyatt Regency, Birmingham, England, info: FSCT tel: 610-940-0777

SID '97, Society for Information Display May 12-16, Boston, MA.,Information: Lauren Kinsey, SID, 1526 Brookhollow Dr., Suite 82, Santa Ana, CA 92705, tel.:714-545-1526, fax: 714-545-1547, email:socforinfodisplay@mcimail.com

DETROIT COLOUR COUNCIL ANNUAL SYMPOSIUM June 10, 1997, Title:"Color Control and Instrumentation", Dearborn Inn, Dearborn, MI, Information: Jim Keiser, tel:810-583-8345

IS&T 50th ANNUAL CONFERENCE, May 18-23, Hyatt Regency Cambridge Hotel, Cambridge, MA Inf: IS&T Conference Mgr., 7003 Kilworth Lane, Springfield, VA 22151, tel:703-642-9090, fax:703-642-9094, email: info@imagin.org, internet: http:/www.imaging.org

COLOUR 97 , May 26-30, 8th AIC Quadrennial Meeting Colour 97 Executive Committee Meeting May 25, Kyoto International Conference Hall, Kyoto, Japan, Inf:Paula Alessi, Eastman Kodak Co.tel: 716-477-7673, fax: 716-722-1116, email:pjalessi@kodak.com

ISCC ANNUAL MEETING, Sept. 14-17, Inter-Society Color Council and Appearance Division of Society of Plastics Engineers, Marriot Inner Harbor Hotel, Baltimore MD, Inf: Gary Beebe, tel: 215-785-8497

HFES 41st ANNUAL MEETING, Sept: 22-26, Human Factors and Ergonomic Society, Albuquerque, NM, Info:HFES, PO Box 1369, Santa Monica CA 90406-1369, tel:310-394-1811, fax:310-394-2410, email:72133.147@compuserve.com, internet:http://hfes.org

AATCC INTERNATIONALCONFERENCE AND EXHIBITION Sept.28-Oct 1, American Association of Textile Chemists and Colorists Marriot Marquis, Atlanta, GA, inf: AATCC, tel; 919-549-8141

OSA ANNUAL MEETING, Oct. 11- 19, Optical Society of America, Long BeachConvention Center,LongBeach,CA Inf: OSA, tel: 202-223-0920; fax: 202 416-6100

IS&T 13TH INTERNATIONAL CONGRESS, Nov. 2-7Society for Imaging Science and Technology ,Advances in Non-Impact Printing Technologies, Sheraton Seattle Hotel, Seattle, WA. Info: IS&T Conference Manager, 7003 Kilworth Lane, Springfield, VA 22151,tel: 703-642-9090 fax: 703-642-9094, email: info@imaging.org

INTERNATIONAL COATINGS EXPO (ICE),Federation of Societies for Coatings Technology, Nov. 3 - 5, Georgia World Convention Center, Atlanta, GA Info: FSCT tel: 610-940-6777, fax: 610-940-0292

COLORMARKETING GROUP (CMG) FALL INTERNATIONAL CONFERENCE, Nov. 9 - 11, St. Francis Westin Hotel, San Francisco, CA , info: CMG , 5904 Richmond Highway, Suite 408, Alexandria, VA 22303,tel:703-329-8500 email: colorcmg@erols.com

IS&T/SID FIFTH COLOR IMAGING CONFERENCE Society for Imaging Science and Technology / Society for Information Display ,Nov. 16 - 19, Transforms and Transportability of Color, Radisson Resort, Scottsdale, AZ, info: IS&T Conference Manager, 7003 Kilworth Lane, Springfield, VA 22151, tel: 703-642-9090, fax: 703-642-9094, email: info@imaging.org internet: http://www.imaging.org

1998

COLOR MARKETING GROUP (CMG) SPRING INTERNATIONAL CONFERENCE, The Broadmoor, Colorado Springs, CO info:CMG, 5904 Rischmond Hwy Suite 408, Alexandria, VA tel: 703-329-8500 fax: 703-329-0155, email: colorcmg@erols.com

ISCC WILLIAMSBURG CONFERENCE (Feb.22-24), Color and Design: 21st Century Technology and Creativity, Inter-Society Color Council, info: Wade Thompson

TAGA 98 - 50TH ANNIVERSARY CELEBRATION ! Apr.26 - 29, 1998, Technical Association of the Graphic Arts, Marriot Lincolnshire Resort, Chicago IL info: Karen Lawrence, tel: 716-475-7470

SID 98, Society for Information Display, May 17 - 22, Anaheim, CA, info: Lauren Kinsey, SID, 1526 Brookhollow Drive, Suite 82, Santa Ana, CA 92705 tel: 714-545-1526; fax: 714-545-1547 email: socforinfodisplay@mcimail.com

ASTM COMMITTEE E-12 ON APPEARANCE, June 16-18 St. Louis, MO , info: Bode Bradley, tel: 610-832-9740 fax: 610-832-1547

AATCC INTERNATIONAL CONFERENCE AND EXHIBITION Sept. 22-25, American Association of Textile Chemists and Colorists Marriott, Philadelphia, PA Info: AATCC tel: 919-549-8141

ISCC ANNUAL MEETING (Oct. 2-4) Inter-Society Color Council and OSA ANNUAL MEETING (Oct. 3 - 8), Optical Society of America Baltimore Convention Center, Baltimore, MD Info: OSA, tel: 202-223-0920, fax:202-416-6100

COLOR MARKETING GROUP(CMG) FALL INTERNATIONAL CONFERENCE, Oct.4 -6, Le Centre Sheraton Hotel Montreal, Montreal, Quebec, Canada, Info. CMG 5904 Richmond Hwy.,Suite 408, Alexandria, VA 22303 tel: 703-329-8500, fax; 703-329-0155 email: colorcmg@erols.com

1999

ISCC ANNUAL MEETING (MAY 5-7) Inter-Society Color Council and TAGA ANNUAL CONFERENCE, May 2 -5, Technical Association of the Graphic Arts , Technical conference, Philadelphia, Pa. Info: Karen Lawrence,tel: 716-475- 7470

SID '99 (May) California
Information: Lauren Kinsey SID,1526 Brookhollow Drive, Suite 82, Santa Ana, CA 92705
Tel: 714-545-1526, Fax: 714-545-1547
email: socforinfodisplay@mcimail.com

AATCC, INTERNATIONAL CONFERENCE AND EXHIBITION, October 12-15, American Association of Textile Chemists and Colorists, Convention Center, Charlotte, NC, info: AATCC, tel: 919-549-8141

2000

SID 2000 (May) Torronto, Ontario Canada, Information: Lauren Kinsey SID , 1526 Brookhollow Drive,Suite 82 Santa Ana, CA 92705, Tel: 714-545-1526, Fax: 714-545-1547 email: socforinfodisplay@mcimail.com

AATCC CONFERENCE AND EXHIBITION (Oct. 1-4) American Association of Textile Chemists and Colorists Marriott World Center,Orlando, FL, Information: AATCC Tel: 919-549-8141

2001

AATCC CONFERENCE AND EXHIBITION (Oct. 7-10) American Association of Textile Chemists and Colorists Sheraton Hotel, Boston, MA, Information: AATCC Tel: 919-549-8141

HELP WANTED

National Research Council Canada

Conseil national de recherches Canada

NRC is a dynamic, nationwide R&D organization committed to helping Canada realize its potential as an innovative and competitive nation. Combining our strength - outstanding people, core science expertise and information, research programs focused on key technologies and technology diffusion - with those of industrial and academic partners, we foster Canada's emerging national system of innovation.

Research Officer
Institute for National Measurement Standards
Ottawa, Ontario

Your Challenge

Within the Photometry and Radiometry Group, the successful candidate will initiate and perform research and development of new and improved colorimetric techniques and standards and transfer this technological knowledge to Canadian industry. A priority is for the candidate to develop procedures and transfer devices for colour and liminance calibration of displays traceable to NRC photometric standards. The successful candidate will also be required to provide associated calibration and consultation services and to collaborate with other members of the Group in the development of new photometric procedures that require an understanding of how visual evaluations of colour and brightness relate to their physical measurement. Possible areas of research include: the fundamentals of colour matching, colour discrimination and thresholds, adaptation, and colour appearance models, and the perception of flickering lights. Basic research in selected areas of colour sciece is carried out to better understand the relationship between photometric scales and human factors affecting visual evaluations. These results are applied to problems of commercial importance, such as the needs for improved colour quality control in the manufacture og coloured goods (displays, textiles, paints, paper), and for standardized procedures for accurate numerical specification of colour appearance.

Your Credentials

The successful candidate must possess a PhD in Physics or in a related field and have demonstrated experience working with complex optical apparatus and computer programming. An enhanced reliability check will be required. The salary range for this position varies according to qualifications and experience.

To explore this oppotunity, send your resume by March 21, 1997 to: Marlene Schmidle, Human Resources Assistant, National Research Council, Canada, M-36, Room 1112, Ottowa, Ontario, K1A OR 6. Please quote competition number NM-96-22.

NRC is an equal opportunity employer. We thank all those who apply. However, only those selected for further consideration will be contacted.

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This Section is intended to help ISCC members that are in need of, and are looking for employment. Here is an opportunity to use the resources at hand. There is no charge for this servce. However the restrictions are as follows:

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2. No more than 50 words may be used to describe yourself.
   (Not including name address and/or telephone number).
3. If you are using a P.O. Box, you must supply a complete address.
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5. Neither the ISCC *News* nor the editors are responsible for any errors.
6. You must advise us in writing when you have obtained employment.

We hope this new section will be of value to you, the ISCC member. If you have any suggestions/ criticisms, please send them to the editor. Let's make this work!

SEEKING EMPLOYEMENT IN R&D POSITION IN COLOR

PhD (expected, 1997) Color Vision, MS Biophysics, BS Biomedical Engineering. Highly motivated, adaptable and dependable individual seeking R&D position. Interdisiplinary background and research experience in color color vision, biomedical instrumentation, colorimetry, photometry and reflectometry. Working knowledge of computer graphics, image analysis/ processing, mathematical modelling. Computer and statistics skills include Pascal, C C++, Matlab, Assembly, S, SAS, Steplt.

Jun Xu
The University of Chicago, Visual Science Center
939 E. 57th Street, Chicago IL 60637
Tel: 773-702-1987, Fax: 773-702-4442
email: junxu@midway.uchicago.edu

SEEKING EMPLOYMENT IN COLOR REPRODUCTION INDUSTRY OR HUMAN FACTORS.

PhD in visual psychophysics. Detailed knowledge of color vision, colorimetry, human psychophysics, color testing and calibration procedures, and statistics. Broad knowledge of pattern recognition and image processing. Familiarity with signal processing and systems analysis. Knowledge of optics, electronics, and mathematical modeling.

SHUANG WU
Schepens Eye Research Institute
20 Staniford Street
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FAX: 617/ 523-3463
e-mail: shuangwu@vision.eri.harvard.edu

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Please note: the deadline for submission of material is the 1st of each even numbered month. Material received after the 1st may not be printed until the following issue.
All submissions must be in English.

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Human Factors & Ergonomics Society (HFES)
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