XXVII Day Of Scientific Lectures
And
23rd Annual Meeting
Of The
National Society of Black Physicists
March 15-18, 2000

Physics: The Science That Shapes The Future

Dedicated
to
Professor Donald Anderson Edwards
(1905-1999)

Department of Physics
NC A&T State University
1601 East Market St. Greensboro, NC 27411

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PREFACE

Welcome to the National Society of Black Physicists XXVII Day of Scientific Lectures and Twenty-Third Annual Meeting. The National Society of Black Physicists (NSBP) is an outgrowth of the regular attendance at a "Day of Scientific Lectures" which had its beginnings at Fisk University in December 1972. The gathering provides a mechanism for African American physicists to meet at least once a year to discuss physics, exchange insights on the overall state of the discipline, and to develop a network for student support and encouragement.

This year’s meeting is historic in that it has not been held before on the campus of NC Agricultural and Technical State University or in the State of North Carolina. Past meetings have been held at the following HBCUs: Fisk University, Howard University, Morehouse College, Morgan State University, Knoxville College, Alabama A&M State University, Hampton University, Lincoln University, Southern University, Florida A&M University, Hampton University, Jackson State university, and Clark Atlanta University.

Meetings have also been held on non-HBCU campuses, at institutions with a significant African American presence. Schools in this group include the University of the District of Columbia and the City College of New York; both have large minority populations. Stanford University has hosted a meeting also. Although the overall minority presence is small by comparison, Stanford has a significant African American physics graduate student population. The recent history has seen the Society reach out to other institutions, which do not have large minority populations but which have demonstrated a sincere desire to increase their minority population. Schools in this group include the University of Kentucky and Rutgers -The State University of New Jersey. AT&T Bell Laboratories hosted and/or cosponsored several meetings. These conferences held both at various company plants and in several college settings are always successful, because the large African American professional staff at AT&T Bell laboratories provides substantive professional, intellectual, and inspirational experiences. An early meeting was held at Fermi National Laboratory and a recent meeting was held at the Lawrence Berkeley national Laboratory.

The Society’s meeting this year will be held jointly with the National Conference of Black Physics Students Conference (NCBPS). Like NSBP, NCBPS has not been previously held in North Carolina. The meetings have parallel and overlapping agendas held at NC A&T and at the Embassy Suites Hotel that include: technical and motivational talks, groups discussions, lectures, awards and recognition banquets , etc. as detailed in the specific program agendas.

NSBP has dedicated its program this year to the late Dr. Donald Edwards, the founding chairman of the Physics Department at NC A&T. One session of the technical talks will be devoted to presentations in Dr. Edwards’ field of x-ray crystallography. Dr. Ronald E. McNair, who perished aboard the Space Shuttle Challenger, studied under Dr. Edwards while pursuing his undergraduate degree in physics here at A&T. I am certain that both men would be humbly proud to know that their beloved A&T is hosting the NSBP/NCBPS - 2000 Conference.

We trust that you will all enjoy this historic four-day event!

Elvira Williams, Ph.D.
Conference Coordinator
Professor Donald Edwards (1905-1999)

Donald Anderson Edwards, renowned physics educator and researcher, passed away on 19 December 1999 in Greensboro, North Carolina. He will be remembered by friends and scientific colleagues as a giant of the twentieth century. His research accomplishments, educational leadership, and personal character have spawned a whole generation of outstanding scientists who have become true leaders in their fields and household names throughout the United States and the world.

Edwards was born in Lowndes County, Alabama in the town of Calhoun on 5 January 1905. His father, Edward Early Edwards, was a minister and his mother, Mary Maud (Fleming) Edwards, was a schoolteacher. Donald was the third of four sons born to the couple. After receiving his Bachelor’s degree in mathematics in 1926 from Talladega College in Talladega, Alabama, he went on to earn the Master’s degree in the physical sciences in 1931 from the University of Chicago and his Ph.D. in physics in 1952 from the University of Pittsburgh.

Throughout his career, Edwards’ research interests were mainly in the field of X-ray crystallography, for which he performed research at Oak Ridge National Laboratory; the University of Pittsburgh; Lincoln University – Jefferson City, Missouri; and North Carolina Agricultural and Technical State University. One of his earliest accomplishments was the determination of the complete crystal structure of potassium nitrate [Z. Kristallog. 80, 154 (1931)]. At North Carolina A&T, his research was sponsored by the National Science Foundation, where he studied cadmium-magnesium alloys using X-ray diffraction methods. As a physics teacher and administrator, Edwards served for many years as Professor and Chair of the Department of Physics at Lincoln University – Missouri. It was during that period that he met and married his wife of sixty-five years, Alice Ruth (King) Edwards, who at the time was a high school teacher of English and French. In 1953, Edwards moved to Greensboro, North Carolina, where he became Professor and founding Chair of the Department of Physics at North Carolina A&T. He chaired the newly established department until 1971, and during that period inspired many young students to pursue careers in physics. Three of his most famous students were Joseph McNeill (B.S., engineering physics, 1963), Dwight Davis (B.S., physics, 1970), and Ronald McNair (B.S., physics, 1971). McNeill won worldwide acclaim when, as a freshman on February 1, 1960, he was one of the Greensboro Four which staged the first protest of the 1960s’ national student sit-in movement to desegregate commercial establishments. According to Dr. Martin Luther King, Jr., that event was “the turning point of the civil rights movement.” Their target was the downtown Woolworth Five and Dime’s lunch counter. The store has since been turned into a national museum.

Davis, Professor of Medicine and Associate Dean at the Pennsylvania State University College of Medicine, achieved worldwide fame as the chief cardiologist with the Penn State Heart Transplant Team, when it became one of the first to use an artificial heart to keep a patient alive for days until a transplant could be performed. Davis credits much of his success to Edwards and states, “Dr. Edwards, from the day that I first met him, served as a tremendous inspiration to me.”

Astronaut Ronald McNair is a national hero who perished in the January 28, 1986 explosion of the Space Shuttle Challenger. During many public occasions, McNair has thanked Edwards for providing him with the academic foundation with which to complete his Ph.D. in laser physics from MIT and supporting him through the process that selected him as a NASA mission specialist astronaut.

Edwards received numerous awards during his career. In 1972, Edwards’ life and career were celebrated at a Day of Scientific Lectures and Luncheon in his honor by a group of physicists that was the precursor of the National Society of Black Physicists. In 1984, he received the George B. Pegram Medal for Excellence in the Teaching of Physics from the Southeastern Section of the American Physical Society. The medal recognizes his outstanding contributions for more than forty years to physics research and education. In his letter nominating Edwards for this award, Astronaut McNair wrote, “Dr. Edwards was Chairman of the Physics Department while I was an undergraduate student at A&T, and I remember him as the epitome of a complete and capable physicist whom all of his students strived to emulate.”

Edwards’ alma mater, Talladega College, presented him with its Golden Diploma Award in 1990. To accomplish all that he did, in spite of the racial barriers of his time, is truly phenomenal. He surely will be missed by all. Edwards is survived by his wife, Ruth; daughter, Marion Edwards Johnson; and grandson, Donald King Johnson.

Sekazi K. Mtingwa, Interim Chair
Department of Physics
North Carolina A & T State University
Greensboro, NC 27411
Dear Colleagues,

On behalf of the students, faculty, and staff of the Department of Physics at North Carolina Agricultural and Technical State University, I extend our warmest welcome to you. It gives us great pleasure to host this year’s Joint Annual Conference of the National Society of Black Physicists (NSBP) and the National Conference of Black Physics Students (NCBPS). It has been seven years since we made our initial commitment to bring this conference to Greensboro, and we are thrilled that the day finally has arrived that that dream has turned into reality.

For many years, we at A&T have been proud of our scientific and technological education and research endeavors. In particular, our physics program has grown rapidly. Since 1991, the physics faculty has more than doubled in size, currently at ten tenured and tenure-track faculty, and has established a Master of Science degree program. Areas of research include condensed matter physics, low and medium energy nuclear physics, atomic and molecular chemical physics, laser physics, accelerator physics, and physics education. Moreover, we have been successful in forging important collaborations with a number of universities and national laboratories, including the Michigan - Howard - AT&T Collaborative Access Team at Argonne National Laboratory’s Advanced Photon Source, Thomas Jefferson National Accelerator Facility, Triangle Universities Nuclear Laboratory, Los Alamos National Laboratory, Clark Atlanta University, Hampton University, University of North Carolina - Chapel Hill, University of Wisconsin – Madison, University of Connecticut, North Carolina State University, and Duke University. The remarkable growth in the physics program has been a good match to the expansion of programs in other areas of the university.

Witness the recently established doctoral programs in electrical, mechanical, and industrial engineering. Further, couple these with the growth of our School of Technology, which provides hands-on applications of engineering concepts as derived from scientific discoveries. Such degree programs include manufacturing systems, electronics, technology, and graphic communications. Our physics faculty has been involved in a number of collaborations with these other areas of the university. Thus, A&T offers the full panorama from basic science to final industrial, high tech implementation.

While we strengthen ourselves academically, we also realize the importance of our responsibility to the general physics community, and especially to the younger generations. For that reason, in 1992 A&T established the national home office of NSBP within its Department of Physics so that it could have its foot firmly planted in the middle of the many important activities of NSBP. We pledge to continue our leadership position with respect to NSBP and to expand our activities by assisting in the great cause of NCBPS.

We in the Department of Physics would like to join the great city of Greensboro, Chancellor James Renick, Vice-Chancellor for Academic Affairs Carolyn Meyers, and Dean Ethel Taylor of the College of Arts and Sciences in welcoming you to Greensboro. Please let us know if we can do anything to make your stay and participation in this year’s conference activities a more pleasurable and memorable experience.

Best wishes,

Sekazi Mtingwa, Interim Chair
Department of Physics
North Carolina A&T State University
Greensboro, NC
He served as aide to President Jimmy Carter until mid-1979. Subsequent duties included Executive Officer of USS MISSISSIPPI (CGN 40); Commanding Officer of USS COONTZ (DDG 40); and Commanding Officer of the nuclear powered guided missile cruiser USS BAINBRIDGE (CGN 25). From 1986 through 1988, he was Commander, Naval Base Seattle, where he was responsible for all naval activities in Washington, Oregon, and Alaska. In mid-1988, Admiral Reason shifted to command of Cruiser-Destroyer Group One. Concurrently, he led Battle Group Romeo through operations in the Pacific and Indian Ocean regions and the Persian Gulf. Admiral Reason reported as Commander, Naval Surface Force, U.S. Atlantic Fleet, following selection to three-star rank. He served in that capacity until assigned as Deputy Chief of Naval Operations (Plans, Policy and Operations) in August 1994. Upon promotion to four-star rank, he assumed duties as Commander in Chief, U.S. Atlantic Fleet in December 1996. Admiral Reason’s awards include the Distinguished Service Medal, Legion of Merit, Navy Commendation Medal, the Venezuelan LaMedalla Naval Almirante Luis Brion Medal, and the Republic of Vietnam Honor Medal. He also wears the Navy Unit Commendation, Navy Meritorious Unit Commendation, Navy “E”, National Defense Service Medal, Armed Forces Expeditionary Medal, Vietnam Service Medal, Sea Service Deployment Ribbon, Republic of Vietnam Meritorious Unit Citation, and the Republic of Vietnam Campaign Medal.

Admiral Paul Reason was born and reared in Washington, D.C. His naval service began after graduating from the U.S. Naval Academy with the Class of 1965. Prior to being trained in nuclear propulsion engineering, he served as Operations Officer in the destroyer escort USS J. D. BLACKWOOD (DE 219). Upon completion of training, he was assigned duties in the nuclear powered guided missile cruiser USS TRUXTUN (CGN 35) and participated in the ship’s first deployment to Southeast Asia in 1968. In 1970, he earned a Master’s degree in the management of computer systems. Joining the nuclear powered aircraft carrier USS ENTERPRISE (CVN 65) in 1971, he deployed twice to the Southeast Asia and Indian Ocean areas. After service as Combat Systems Officer, again in USS TRUXTUN, Admiral Reason became an assignment officer at the Bureau of Naval Personnel. In late 1976, he was assigned as Naval Aide to the President of the United States.
Anthony M. Johnson was most recently a Distinguished Member of the technical staff in the Photonic Circuits Research Department at AT&T Bell Laboratories, in Holmdel, New Jersey. After 14 extremely rewarding years at Bell Labs, on January 1, 1995, he joined the New Jersey Institute of Technology (NJIT) in Newark, NJ, where he is Chairperson and Distinguished Professor of Physics. He is also Chairperson of the Federated Physics Department, joint between NJIT and Rutgers University (Newark Campus). He is a Fellow (1996), a General Councilor (94-97), member of the Executive Board (96-97), member of the Committee on Fellowship (97-99), member of the Executive Committee of the Laser Science Topical Group (93-95), Chairperson of the Committee on Minorities in Physics (92-93) and recipient of the 1996 Edward A. Bouchet Award of the American Physical Society (APS).

He is a member of the National Research Council’s Committee on Atomic, Molecular, and Optical Sciences [CAMOS] (96-99) and the DOE Basic Energy Sciences Advisory Committee [BESAC] (99-01). His general area of research is in ultrafast optical and optoelectronic phenomena (nearly 60 refereed publications, 2 book chapters, and 4 US patents). His current research interests include the ultrafast photophysics and nonlinear optical properties of bulk, nanoclustered, and quantum well semiconductor structures, ultrashort pulse propagation in fibers and high-speed lightwave systems. On November 1, 1995 he assumed the current position of Editor-in-Chief of Optics Letters (95-01), shortly after serving 6 years as the Ultrafast Optical Phenomena Topical Editor of Optics Letters. He served as the 1990 Program Co-Chair, 1992 Conference Co-Chair and 1996 Steering Committee Chair of the Conference on Lasers and Electro-Optics (CLEO '90, '92, '96). Dr. Johnson is a Fellow (1991), member of the Board of Directors (93-96) and Board of Editors (95-01) of the Optical Society of America (OSA); a Charter Fellow (1992) and Chair of the Nominations and Screening Committee (92-99) of the National Society of Black Physicists; a Senior Member (1989), member of the Board of Governors (93-95), and Chair, 1996 William Streifer Scientific Achievement Award Committee of the IEEE Lasers and Electro-Optics Society (LEOS); a Fellow (1996) of the American Association for the Advancement of Science (AAAS); and a member of the American Association of Physics Teachers (AAPT).

For more information check his website at http://physics.njit.edu/~johnson/.

Keynote speaker: Professor Anthony M. Johnson.
William D. Magwood, IV is the Director of the Office of Nuclear Energy, Science and Technology in the U.S. Department of Energy (DOE). He was assigned to this position by Secretary of Energy, Bill Richardson, on November 8, 1998. As the Director of Nuclear Energy, Science and Technology, Mr. Magwood is the senior manager for all of the Office's programs. Prior to assuming his current position, Mr. Magwood served as the Associate Director for Technology and Program Planning in the Office of Nuclear Energy, Science and Technology for four years.

In that capacity he was responsible for nuclear energy R&D program development, the direction of Nuclear Energy's university nuclear engineering and science education programs, the formulation of the Nuclear Energy budget, and planning of key program initiatives. He also served as the Executive Secretary of the interagency Highly Enriched Uranium Oversight Committee.

From 1984-1994, Mr. Magwood held technology management positions with two energy-related organizations. He managed utility research and nuclear policy programs at the Edison Electric Institute, Washington, DC; and he was a scientist at Westinghouse Electric Corporation, Pittsburgh, PA, where he analyzed radiological and hazardous waste disposal, treatment, and handling systems. Mr. Magwood holds a B.S. degree in Physics and a B.A. degree in English from Carnegie-Mellon University in Pittsburgh, Pennsylvania, and a M.F.A. degree from the University of Pittsburgh.
THURSDAY MORNING: NC A&T Webb Auditorium

8:30am-9:00am: Alternatives for Increasing the Number of Black Women in the Science and Engineering Enterprises.
Arlene P. Maclin, Technical Consultant, Howard University, College of Arts and Sciences, Washington, DC 20059

Over the past twenty-five years, there has not been a concerted effort to encourage minority women into the fields of science and engineering. In 1975, when the American Association for the Advancement of Science convened a workshop for minority women in science and engineering, the findings were reported in the Double-Bind. Twenty five years after the Double-Bind was published, which exposed the dilemma of minority women in SEM fields, the problems of isolation, small numbers and sexism in most major institutions-both public and private still persist. There are few minority women in senior level positions at major and even small colleges and universities, a few minority women in senior-level federal government positions and a few in major corporations. Many minority women scientists and engineers become entrepreneurs by necessity because of the lack of role models and mentors in their fields. This talk will offer some alternatives for increasing the number of black women scientists who are interested in participating in the science and engineering enterprises.

9:00am-9:30 am: Neutral Hydrogen in Stephan’s Quintet.
Barbara A. Williams, University of Delaware, Newark DE 19176

Using the VLA, we have made new spectral-line observations of the neutral hydrogen in the direction of the compact group Stephan's Quintet. The high-velocity cloud components between 5600 and 6800 km/s and the disk of the foreground galaxy, NGC 7320, at 800 km/s, were successfully imaged with the C- and/or D-arrays. Given the high sensitivity and angular resolution of the data, we have generated maps of the distribution and velocity field of five spatially distinct HI substructures within the compact group. The observed line widths of the more extended components are all very small, less than 300 km/s. Interestingly, the angular extent of the substructures correlates inversely with their observed line widths, i.e., the compact components have broader line widths while the more extended features have the narrower line profiles. No emission brighter than 0.4 mJy/beam was detected at the positions of any high-redshift galaxies in the quintet including NGC 7320C. Analysis of the velocity fields suggests that the HI gas between 5600 and 6100 km/s does not behave as a single dynamical feature or HI disk gravitationally bound to any other member of the quintet.

9:30am-10:00am: "Willie Hobbs Moore: A Life in Science and Service"
Ronald E. Mickens, Department of Physics, Clark Atlanta University Atlanta, GA 30314

The name, Willie Hobbs Moore, is not well known in the community of African American scientists. She was the first African American female to obtain the doctorate in physics. This degree was earned at the University of Michigan in 1972 where her research centered on the theoretical prediction of the infrared spectra of certain organic molecules. My presentation will focus on several issues: (1) family background; (2) academic studies at the University of Michigan; (3) career after receiving her Ph.D.; and (4) her contributions to various social and community activities. I will also give a brief discussion as to why the history of (our) science is important and what we can do to both preserve this knowledge and make it widely known.

10:00 am -10:15 am BREAK

10:15am-10:30am: Properties Of Derivatized Thiacarbocyanine Dyes
Carl E. Bonner, Jr., James H. Haliburton, and Sam S. Sun
Center for Materials Research, Norfolk State University, Norfolk VA, 23504

The nonlinear optical absorption of a range of dialkylthiacarbocyanine dyes has been measured using intensity dependent transmission measurements of the absorption crosssection at 532 nm. The ground and effective excited state absorption crosssection for each of the dyes has been determined. It was observed that with increasing bridge conjugation length between the thiacarbocyanine end groups, the absorption cross section of ground state decreases slightly while the absorption crosssection of the excited state increases leading to an overall increase in the absorption cross-section ratio by an orders of magnitude from 0.3 to 5.29. The absorption cross-section ratio tracks linearly with the difference between the energy of the pump laser
A report on some of the properties of diamond-like carbon (DLC) thin films grown via the Plasma Enhanced Chemical Vapor Deposition technique using hydrogen and methane as reactant gases is made. The films were made by flowing these gases, in appropriate proportions, through an evacuated deposition chamber designed as a cylindrical parallel plate capacitor. The electric field in the deposition chamber was produced by a radio frequency (r.f.) power supply. The silicon (100) substrates were unetched and unheated. The films were characterized by Raman spectra.

Recent advances in microfabrication techniques, in conjunction with the precise growth of layers of single crystalline materials by epitaxial growth techniques, allow the creation of new electro-optic microstructures. We have selectively etched compositionally modulated III-V heterostructures to produce quantum wells (QW’s) that are confined on both sides by air or vacuum. The material is patterned so as to have the QW’s suspended horizontally between vertical support posts. The structure is ideal for probing the local properties of solids, e.g. the interaction of quantum confined states with surface or interface states. The inherent high contrast ratio between the indices of refraction of the barrier and the suspended material (3.59:1 for GaAs and air) allows the construction of efficient mirrors for lasers. This is of particular interest in that it allows the fabrication of a Fabry-Perot optical resonator cavity with a linear dimension on the order of the spontaneous emission wavelength of the active medium. The satisfaction of this latter criterion limits the emission to a single mode and would substantially lower the emission threshold.

This work examines the effects of molecular beam epitaxy (MBE) parameters and sample design for quantum well (QW) based structures. Using asymmetric double barrier resonant tunneling structures (ADBR) as a testbed for electron-phonon interactions, sample sets were grown using a Riber 32 R&D system for III-V deposition. Room temperature and 77K current-voltage measurements were made in conjunction with photoluminescence spectra to investigate the relationship between longitudinal-optical (LO) phonons and electrons. From a separate but related study, the effects of MBE control upon tensile strained QWs are also described. The latter investigates the use of both in-situ and ex-situ characterization techniques with respect to their provision of feedback regarding strained well design.

Keynote: "Hot Topics in Science & Technology and Perspectives From a Black Physicist"
Anthony Johnson, New Jersey Institute of Technology

THURSDAY AFTERNOON: NC A&T Webb Auditorium

The photon has played an important role throughout the history of quantum physics. Starting with Planck's early work on blackbody radiation and Einstein's explanation of the photoelectric effect. Since those early days, the photon has been the projectile of choice in a myriad of scattering experiments, with Compton scattering...
being one of the first. Nowadays, photons from the far infrared to the far gamma region of the electromagnetic spectrum are used routinely to uncover nature’s secrets. We will review the present state of affairs and briefly describe a novel application of Compton backscattered photons for heavy flavor production in particle physics.

2:00pm-2:30pm: The Standard Model and Beyond: Fundamental Particles, Forces, and the Road to the Theory of Everything (TOE)
Mesgun Sebhatu, Winthrop University, Rock Hill, SC 29733

In the last half century, significant progress has been made in the identification and organization of fundamental particles, as well as the unification of their interactions. This remarkable result is represented by what is confidently called the Standard Model (SM). This talk presents a historical and descriptive account of SM and its possible extensions. According to SM, all matter in the universe is made up of a dozen fermions—six quarks and six leptons. The quarks and leptons interact by exchanging a dozen bosons—eight gluons and four electroweak bosons. The success of SM in explaining virtually all the elecroweak and hadronic experimental results is remarkable. SM provides a framework for the unification of almost all the fundamental forces. Its major deficiency is the exclusion of gravity. The ultimate goal of high energy physics is to unify all the fundamental forces—gravity, electroweak, and the strong nuclear—into one. This would result in the development of a complete theory of everything (TOE). Currently, we have candidates for TOEs that are based on superstring theory. The theoretical extensions of SM and their experimental tests are likely to engage high energy physicists of the 21st century. [This presentation is based on a PHYSNET/CUPLE module that was developed while the author was a King-Chavez-Parks Visiting Professor of Physics at MSU, during a 91-92 sabbatical year.]

2:30pm-2:45pm: Position and Variability of 2A-1704+241
W.A. Morgan Jr., Dickinson College, Carlisle, PA 17013

We present results of analyses of observations of the X-ray source 2A 1704+241 with the ROSAT Position Sensitive Proportional Counter (PSPC) and the High Resolution Imager (HRI). 2A 1704+241 was first associated with the M-giant star HD 154791, based upon observation with the HEAO 1 SMC and the Einstein IPC (Garcia et. al. 1983) and analysis of the spectrum of HD 154791 obtained with the International Ultraviolet Explorer. This identification was unusual, because there are a few bright X-ray binaries associated with an M-giant star. We observed 2A 1704+241 with the PSPC and HRI in order to determine more accurately the position of the X-ray source, and in order to study the previously-seen 900-second variability in the Einstein data. Based upon the previous identification and determination of the position of MS 1703.7+2417, an AGN in the field, and the position of the three previously unreported X-ray sources that we have associated with stars in the USNO-A2.0 catalog, we have improved the size of the error region for the position of 2A 1704+241. We find an error region for the PSPC of 1.5 X 10^{-8} arcmin’ and an error region for the HRI of 1.5 X 10^{-8} arcmin’, which are approximately 1.4% and 0.41% respectively, the size of the error region determined and reported by Gracia et. al. (1983). In addition, we determine that there is little evidence for the 900-sec modulation seen by the IPC in these new PSPC data, and that there is no phase coherence in what modulation is noticeable.

2:45pm-3:00pm: Transport in Dusty Plasmas
Edward Thomas, Jr., Physics Department 206 Allison Laboratory Auburn University, AL 36849-5311

The investigation of charged particulate matter (i.e., dust) in plasmas has recently become a topic of great interest. The presence of the charged dust can greatly modify the charge distribution, electron and ion densities, and collective modes in plasmas. This presentation describes experimental investigations of the transport of silica particles in argon de glow discharge plasmas. Specific emphasis is placed on the use of particle image velocimetry (PIV) to obtain direct measurements of the temporal and spatial evolution of dust particle transport.

3:00pm-3:15pm: Feasibility of Evaluating the Clouds and the Earth’s Radiant Energy System (CERES) Spacecraft Sensors Stabilities Using Lunar Radiance
Robert B. Lee III, Atmospheric Sciences, NASA Langley Research Center Hampton, VA 23681-2199

The Clouds and the Earth’s Radiant Energy System (CERES) thermistor bolometer are being used to measure the Earth’s radiation budget components from the Tropical Rainfall Measuring Mission (TRMM) and from the Earth Observing System (EOS) Terra Spacecraft platforms. The Earth radiation budget components are
(1) the incident, incoming sunlight; (2) the Earth atmosphere- and surface-reflected sunlight; (3) the Earth atmosphere- and surface-emitted infrared, longwave heat. These measurements can be used to define long-term climate changes and to validate General Climate Circulation Models (GCM’s). The CERES broadband shortwave sensors measure Earth-reflected sunlight while broadband total sensors measure both Earth-reflected sunlight and Earth-emitted infrared heat. In the narrow, 8 to 12 micrometers spectral band, the CERES water vapor window sensors measure heat emitted near the Earth's surface. To define the CERES sensor measurements in SI units, the sensors' responses were calibrated in ground vacuum laboratories using reference blackbodies and lamps. The stabilities of the responses were monitored between the ground and on-orbit using blackbody and tungsten lamp systems, built into the CERES instrumentation assembly. These systems indicated that the TRMM sensor responses were stable at the 0.3% level during the 1995-1997, pre-launch ground calibrations through the December 1997-June 1999 on-orbit calibrations. Currently, the moon is being characterized as an additional radiometric target to monitor the stabilities of the spacecraft sensor responses. On the Aqua Spacecraft, the CERES sensors are scheduled to measure absolutely the lunar radiances near phase angles of 7 and 22 degrees. The phase angle is the angle formed at the moon between directions to the Sun and the Earth. Near full moon, the lunar radiances are approximately five times brighter than the corresponding radiances found at the 22-degree phase angle. In this paper, April 14, 1998, and June 10, 1998, TRMM spacecraft/CERES sensor measurements of the near-full moon radiances are analyzed to evaluate the feasibility using CERES measurements to calibrate lunar radiances. Preliminary analyses indicated that near (seven angular degree phase angle) full moon observations might permit the characterizations of broadband lunar radiances in the 2% to 5% uncertainty range. This result suggests those CERES measurements of 22-degree phase angle, lunar radiances may not be useful, with projected uncertainties in the 10% to 25% range. The CERES spacecraft sensors are described. The CERES measured lunar radiance are presented and discussed.

3:15pm-3:30pm: Heat Capacity and Transport of RESb_2 Compounds
Brian Gamble, Guebre X. Tessema, Malcom Skove and Mike Nevitt
Clemson University Department of Physics and Astronomy, Clemson, SC 29634

We have investigated the thermodynamic and transport properties of RESb_2 (RE = Pr, La, Nd, Ag-La) compounds. The study was conducted from room temperature to 2.2 K. PrSb_2 exhibits phase transitions at 100K and 8K. We will present further TEP evidence that the 100 K transition is most likely due to condensation of charge carriers as suggested earlier from Cp, and Hall measurements. Based on a comparative study of Cp of PrSb_2 and LaSb_2, we will characterize the thermodynamic properties of the 8 K cusp in Cp in Pr. We will present similar systematic results on the La, Nd, and the La-Ag compounds. Preliminary results on the Nd compounds show a similar phase transition at 50 K. We will also present Cp, TEP and transport studies on LaSb_2 and La-AgSb_2. These studies provide preliminary evidence of a subtle phase transitions at much higher temperature (220K).

3:30pm-3:45pm: Modeling SPEAR3 LCW
Mavis Donkor, Bethune-Cookman College, Daytona Beach, FL 32114-3099

The Stanford Positron Electron Asymmetric Ring (SPEAR) is partly cooled by Low Conductivity Water (LCW). About 2,000 gallons per minute of water cools the SPEAR. Most of this water supplies magnets and vacuum system components, which are supported by 18 girders on the ring. An upgrade of the current SPEAR (SPEAR2), to SPEAR3 in 2002 will require modifications to the pipe network system. Pipe2000, a software for modeling pipe network systems was used to model a possible system for SPEAR3 according to the specifications. A simplified system was modeled with all devices on a girder modeled as a single load with no valves or bends.
FRIDAY MORNING : Embassy Suites Hotel Salon  E

10:15am-10:45am: Using Supercomputers to Design and Model Novel Materials and Molecules
Steven L. Richardson, Howard University, Washington, DC 20059

Recent advances in computational materials science and theoretical condensed matter physics, coupled with the power and speeds of modern supercomputers, have enabled scientists and engineers to design and study novel materials from a first-principles or ab initio viewpoint. Such calculations have become increasingly useful in their ability both to explain experimental properties of materials and to predict novel materials and molecules. As an example of the progress in this exciting field, we will discuss some of our recent work on the structural properties of the energetic material, solid cubane, and the formation of defects in zinc.

10:45am-11:00am: μSR study of the Anomalous f-electron Compound Ce$_2$Ni$_3$
Ceasar Jackson, NuHep, Thomas Jefferson Laboratory, Newport News, VA 23606

Muon Spin Relaxation techniques (μSR) (LF-μSR, TF-μSR, and ZF-μSR) were applied to a sample of Ce$_2$Ni$_3$ so that its magnetic properties could be examined. The compound crystallizes into the Th$_2$Ni$_3$ type hexagonal structure with three inequivalent crystallographic Ce sites (Ce$_1$, Ce$_2$, Ce$_3$) for atoms. It has been claimed that the Ce$_2$ atom is responsible for the magnetic order (MO), the Ce$_1$ atoms for the heavy-fermion (HF) behavior and the Ce$_3$ atomic sites for the intermediate valence (IV) contributions. From the experimental measurements taken by the author, while at the Tri-University Meson Facility (TRIUMF) on the campus of the University of British Columbia in Vancouver, BC and prior research on other Ce$_2$Ni$_3$ crystals, it can be ascertained that Ce$_2$Ni$_3$ has a large resistivity and antiferromagnetically orders at the Néel temperature $T_N = 1.8$K. It is a HF compound and near the transition from the magnetic to the nonmagnetic state, Non-Fermi-Liquid (NFL) behavior appears. The experimental results were used to create a spin 1/2 mean-field ordering line for various choices of $T_N$ and saturation rate. From this plot it is concluded that there is a second-order transition at $1.75 \pm 0.02$K. Moreover, significant moment dynamics persist below $T_N$ (much more than normally seen in an antiferromagnet with μSR). Furthermore, the moments slow down substantially when cooling from 1.9K to 1.8K just above $T_N$. The μSR results imply that there is a coexistence of magnetic and Kondo compensated behaviors, along with strong anisotropy in spin dynamical properties.

11:00am-11:15am: Cross-relaxation Dynamics of Tm$^{3+}$ Doped Strontium-Fluorapatites
Lester Richardson, Peter Mwangi, George B. Loutts, and Carl E. Bonner
Center for Materials Research, Norfolk State University, Norfolk, VA 23504

The cross-relaxation dynamics of Tm$^{3+}$ doped S-FAP has been examined using time resolved fluorescence spectroscopy. The concentration and temperature dependence for each of the crystals is shown to be the result of dipole-dipole coupling between neighboring Tm$^{3+}$ ions acting as energy donors and acceptors. The temperature dependence is shown to be the result of a dependence on phonons to bridge the energy difference between emission from the donor and the energy required for absorption by the acceptors. When the observed cross-relaxation rate is normalized for distance and host unit cell dimensions, the effect of the crystal field is observed to influence the rate of cross-relaxations, a mechanism whereby the crystal field spatially adjusts the orbital overlap between donor-acceptor pairs.

Derrick S. Boone, Wake Forest University, Winston-Salem, NC 27109-7659

Artificial Neural Networks (ANNs), computational systems based on the physiological characteristics of animal nervous systems, have been applied to a wide variety of problems in engineering, computer science and mathematics (Gurney 1997). One particularly useful application of ANNs is based on their ability to identify latent patterns in data. Consequently, we investigate the use of ANNs as an alternative means of performing cluster analysis, a widely used combinatorial optimization technique. Despite widespread research on cluster analysis and related techniques (Dickinson 1990), few researchers have investigated ANNs as an alternative means of performing such analyses (Balakrishnan, et al. 1994; Balakrishnan, et al. 1996; Hruschka and Natter 1999; Krishnamurthi, et al. 1990). Consequently, we extend the work of prior researchers by investigating and testing a clustering algorithm based on Hopfield (1982) networks, an ANN whose architecture differs from those previously examined.
11:30am-11:45am: Low-Mass Stellar and Sub-Stellar Classification Spectroscopy
John C. Wilson, Cornell University, Ithaca, NY 14853-2801 and Naval Research Laboratory

Our understanding of the continuum of field low-mass objects between M-dwarf stars and methane brown dwarfs is filling in rapidly with the aid of results from modern near-infrared (NIR) detector based all-sky surveys such as 2MASS and DENIS. We present results from the recently commissioned Cornell Massachusetts Slit Spectrograph (CorMASS), an instrument built specifically for spectroscopic classification of candidate field low- mass objects in $g$J$HK$ bands. CorMASS is used on the Palomar 60-inch telescope. The instrument’s low resolution ($R\sim300$) maximizes signal yet allows identification of telltale L-dwarf molecular features such as FeH and TiO shortward of 1.0 micron, as well as the methane brown dwarf absorption feature at 1.6 microns between atmospheric airglow lines.

12:00-2:00 pm: Lunch with National Conference of Black Physics Students

Keynote: Admiral J. Paul Reason

FRIDAY AFTERNOON: Embassy Suite Hotel Salon E

2:00pm-2:30 pm:The Effect of Gender and Ethnicity on Student Cognitive Expectations and Conceptual Change.
Apriel Holdari, University of Maryland, College Park, MD 20742

In a study of introductory physics students at Historically Black Colleges and Universities (HBCU’s) and All-Women College and Universities (WCU’s), we are comparing expectations and conceptual of these underrepresented students to previously published data. The Maryland Physics Expectations (MPEX) Survey is used to measure expectations and the Force and Motion Conceptual Evaluation (FMCE) is to measure conceptual change to the understanding of Newtonian mechanics. To expand the understanding of how gender and underrepresented minority status may affect undergraduate physics learning, we are analyzing MPEX and FMCE data by gender within these non-traditional settings. In this talk, I will present the results of this analysis in the context of previous research findings.

2:30pm-3:00pm: The Timbuktu Academy: The Science of Creating Intellectual Value-Added from Middle to Graduate School and Beyond
Diola Bagayoko, Southern University, Baton Rouge, LA 70813

We present the paradigm, programs, activities, and results of the Timbuktu Academy. The primacy of languages as vehicles of thought; the primacy of mathematics as a language for science, engineering, and technology (SET); the compound or integrated law of (human) performance (ILP, Education, Vol. 115, No.1, 1994); the unification of cognitivism and behaviorism, and related principles are dynamically summed to provide the paradigm that is rigorously followed in the design and implementation of all the programs and activities of the Timbuktu Academy. A central tool of the Timbuktu Academy is comprehensive and systemic mentoring which is the coupling between teaching and learning on the one hand and between research and education on the other hand. Properly sequenced exposure to and adequate practice at the appropriate scope and depth of a subject is the key, not gene, gender, or galaxy of origin—so says the ILP. Our “large” physics undergraduate enrollment, the successful pursuit of the Ph.D. degree by our alumni, the awards, prizes, and graduate fellowships earned by the scholars of the Academy, our publication track record, and the production of National Merit and National Achievement Finalists by our pre-college programs indicate that the Timbuktu Academy is upholding the long tradition of intellectual eminence set at the former University of Timbuktu, in Mali, West Africa. (Timbuktu is on the left bank of the majestic Niger River; Southern University and A&M College is on the left bank of the mighty Mississippi!). The handouts accompanying this presentation are intended to facilitate the replication of the Timbuktu Academy by any department, college, or university. Further, they are meant to empower any student to enhance immensely her/his proficiency in any intellectual endeavor! Acknowledgments: The development of the materials for this presentation, over the years, was funded in part by the Department of the Navy; Office of Naval Research (ONR, Grant Nos. N00014-93-1-1368
A common problem solving strategy for students is to use numbers in the problem description as a guide to find the "right" equation. As a result, students often attempt a mathematical solution before considering the problem conceptually. To combat this approach, it is vital to teach explicitly a problem solving strategy. Equally as important is giving students problems where novice problem solving strategies are woefully ineffective. One such problem is a multimedia-focused problem where students must gather information from an animation or video clip in order to solve the problem. Students must consider the problem conceptually, decide what method is required and what data to collect, and analyze the data. It is like an open-ended laboratory experiment where students are not given instructions, but merely a question. They must decide what data to collect and how to most efficiently collect it. I will demonstrate this type of question and discuss its use in teaching and learning physics.

3:30 PM-3:45PM BREAK

3:45-4:00pm: Magnetic Resonance Imaging to Study the Brain
Joseph C. McGowan, University of Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104

Magnetic resonance techniques have revolutionized medical imaging in only the past twenty years. Based upon a fundamental property of water protons known as spin, magnetic resonance provides a non-invasive methodology to explore soft tissue, and offers a number of advantages over x-ray based tomographic techniques. The fundamentals of magnetic resonance and magnetic resonance imaging will be discussed in this talk in order to motivate an interest in applications that are continually providing physicians new information for diagnosis and prognosis. Physicists contribute to the field of MRI by devising new acquisition strategies and by developing novel analysis techniques. Working side-by-side with physicians, clinicians, and engineers, physicists contribute as equal partners to teams that explore the natural course and classification of disease and prospective treatment effects. Some examples of recently published work conducted by the speaker and his undergraduate and post-doctoral students will be presented.

4:00pm-4:15pm: Gas Electron Multiplier Development Using LIGA
K.H. Jackson†, H.K. Kim‡, J. S. Lee†, I.J. Park†, S.H. Han‡, J. Kady†, V. Perez-Mendez†, W. Wenzel* and G. Cho†, †Physics and ‡Material Sciences, and Engineering Departments Lawrence Berkeley National Laboratory, Berkeley, CA 94720, †Department of Nuclear Engineering, Korea Advanced Institute of Science and Technology, Teajon 305-701, Korea, ‡Department of Physics, Myongji University, Yongin 449-728, Korea, Kyungpook National University, Teagu 702-701, Korea

Since the Micro-Strip Gas Chamber (MSGC) was first introduced in 1987 [1], a large amount of effort has been invested in this new field of gas avalanche microdetectors. Improvements in and variations from the original MSGC design have led to even better detector performance. Other innovative devices have recently been produced, such as CAT [2] and the Gas Electron Multiplier (GEM) [3], using the concept of electrodes separated by an insulator between them, resulting in intense electric field across a hole defined through the insulator. The GEM geometry has a unique advantage in that the multiplication region is separate from the readout electrodes, which, in the case of gas avalanche microdetectors (MSGC, MGC, MDOT, etc.) are usually very vulnerable to damage from sparking. However, the conventional GEM design, has a conically shaped hole in the insulating substrate (Kapton). In the case of this device, a gain variation with time is observed: there is about 10 % gain increase within one hour [4]. This gain shift is presumably due to the charging by avalanche ions (or electrons)
of the GEM Kapton insulator. For comparison, a laser drilled GEM on 125 µm-thick polyimide foil with nearly straight walls (8° wall inclination) have been made at the University of Louisville and tested by us, and this exhibited a very stable gain (~ 1%) [4]. We have been collaborating with our colleagues in Materials Sciences Division on a new approach for fabrication of micro-pixel arrays for GEM devices with high aspect ratio wall sides. The fabrication of these GEM devices is based on LIGA processing. The acronym LIGA originates from the German expressions for the major process steps: lithography (Lithographie), electroplating (Galvanof ormung) and molding (Abformung). The LIGA process as applied here uses X-rays of 2-15 keV energy to expose through a patterned mask and a thick PMMA "resist" layer (50 - 1,000 µm).

REFERENCES

This work was supported by the Director, Office of Energy Research, Office of Basic Energy Sciences, ERLTR Program, Materials Science Division, of the U.S. Department of Energy under Contract No. DE-AC03-76SF00098.

4:15pm-4:30pm: Retinal Imaging and Optical Transfer of the Eye
Jerri Tribble, Life Support and Personal Protection, Code 4.6.3.100a, 48110 Shaw Road, unit 5 Patuxent River, MD 20670-1906

To characterize better the damage mechanisms during laser injury of the eye, retinal image quality and resolution must be improved. The Laser Department of the Naval Health Research Center Detachment, Brooks AFB, currently uses a scanning laser ophthalmoscope (SLO) to monitor simultaneously both morphology and visual performance during and after laser exposure. By scanning a laser beam across the retina, the Rodenstok 101 SLO is able to resolve various tissue layers of the retina, e.g. the nerve fiber layer is easily distinguished from the photoreceptor layer, however individual photoreceptor cells cannot be resolved in the primate eye. Greater confocal filtering and adaptive optics (deformable mirror technology) may increase the SLO resolution and image quality. Toward that end the effect of confocal filtering on the wave front of a collimated beam entering the eye and being reflected back from the retina has been quantified.

4:30pm-4:45pm: Materials Science of Nuclear Reactors
CDR Todd Allen, ONR S&T 822, Argonne National Laboratory, Argonne, IL

Currently, twenty-percent of the electricity produced in the United States is generated by nuclear power reactors. The fuel and structural materials in each nuclear reactor are subject to degradation from many sources, including changes in strength and ductility caused by damage from high energy neutrons and fission products and from high temperature corrosion. One of the goals of material scientists is to understand these degradation mechanisms and design new materials that allow reactors to operate at improved efficiency and for longer lives. Following a description of the basic construction of different types of nuclear reactors, this presentation will explain basic radiation damage mechanisms and how this damage changes the properties of structural materials. Next, the materials science issues of nuclear fuel will be discussed. These include basic fuel construction and how fuel properties change as the fuel is burned. Finally, the materials science issues associated with the storage and transportation of spent nuclear fuel will be discussed.

5:00p-5:30 pm: State of the Society Address, Dr. James Stith, Salon A
SATURDAY MORNING: NC A&T McNair Auditorium

8:45am-10:45am Atomic, Molecular and Optical Physics Symposium Abstracts

8:45am-9:15am: Making Molecules at MicroKelvin*
William C. Stwalley, University of Connecticut, Storrs, CT 06269

The cooling and trapping of atoms and atomic ions is a rapidly advancing field of fundamental science (e.g. Bose-Einstein condensation). We are attempting to extend the field to neutral molecules as well. As a first step, we are employing single- and multicolor photoassociation to produce translationally ultracold \(^{39}\)K\(_2\) molecules from ultracold (~30\(\mu\)K) \(^{39}\)K atoms confined in a magneto-optical trap\(^{1,2}\). Photoassociation of ultracold atoms (as opposed to thermal atoms) includes sharp resonances with wavelength as long-range rovibrational levels are accessed from colliding atomic pairs with ~10 MHz of relative kinetic energy and only a few partial waves. Potential energy curves derived from these spectra test electronic structure and long-range perturbation theory calculations of interatomic potentials. The molecules formed are translationally ultracold and rotationally cold. Both photoassociation of ultracold atoms\(^1\) and formation of cold molecules\(^2\) have recently been reviewed by our group.

* In collaboration with Professors Phil Gould and Ed Eyler, Drs. He Wang, John Bahns, Jason Ensher, Paul Julienne, Eite Tiesinga and Carl Williams, and Jing Li, Xiaotian Wang and Anguel Nikolov. Supported in part by the National Science Foundation.

References:

9:15am-9:45am: Applications of Atomic, Molecular and Chemical Physics to Art Conservation
John C. Miller, Oak Ridge National Laboratory, Oak Ridge, TN 37831

Daguerreotypes were the first form of photographs and were popular between 1840 and 1860, after which they were superseded by more modern techniques. The daguerreotype image is composed of silver/mercury microcrystals of varying size and density on a silver-coated copper substrate. Nineteenth century daguerreotypes, over the intervening 140 years, have suffered degradation and oxidation, which has greatly reduced their historic and artistic value. Laser ablation techniques have been previously explored for use in the characterization, dating, and restoration of historic paintings, parchments, stained glasses, and statues. We report here the use of a number of modern surface science techniques (especially those using lasers, mass spectrometry, and microscopy) to characterize and analyze both normal and degraded daguerreotypes. Then, attempts to use laser ablation techniques for cleaning and restoring damaged nineteenth century samples will be described. The optimal wavelength, pulse length, pulse energy, and focusing conditions are critical for effective cleaning while preventing damage to the fragile image.

9:45am-10:15am: Weak Interaction Effects in Atomic and Molecular Physics: Subtle is the Lord
R.N. Compton, Department of Physics and Chemistry, The University of Tennessee, Knoxville, TN 37996

The parity-violating weak interaction is the only known chiral force in nature. The presence of weak neutral currents within the nucleus gives rise to an anapole moment for all atoms and as a result, all atoms are chiral. The small optical activity for a number of atoms has been measured and has provided a test of the Standard Model of low energy nuclear physics. Chirality at the atomic level requires that non-superimposable mirror-image molecules (enantiomers) will differ in total energy by the minute parity violating energy difference (PVED). In one experiment, we have prepared \(l\)- and \(d\)-forms of the highly optically active \(\text{Fe(Phen)}_3(\text{SbO-tartrate})\) molecule and have characterized the enantiomers by Raman, IR, CD, ORD, ESCA, and MCD spectroscopies. The crystals have been characterized with X-ray diffraction. Preliminary measurements of the Mossbauer spectra of the \(l\)- and \(d\)-forms of these molecular crystals show a small difference in the energy of the two enantiomers of 0.0071 +/- 0.0245 (3.4x10^{-10} eV, \(\Delta E/E \approx 10^{-15}\)). This energy is of the right order of
magnitude to be ascribed to the PVED if one scales the values predicted theoretically for smaller amino acids by the atomic number to the 5\textsuperscript{th} or 6\textsuperscript{th} power, however, these are closed shell molecules and the PVED is expected to be small. The parity-violating weak interaction also gives rise to left-helical (spin polarized) electrons in beta-decay. Since the discovery of parity violation in the middle sixties, many have pondered the potential effects of $\beta$-radiation on prebiotic homochirality in nature. We have begun a series of experiments to examine the possible effects of beta irradiation on asymmetric synthesis in chemistry. Sodium chloride has been known to produce chiral crystals from achiral aqueous solutions since the 1890s. On average racemates are formed under conditions of unstirred crystallizations. D. Kondipudi (Wake Forest U.) has found that stirring the solution gives asymmetric crystal synthesis, but over lots of crystallizations equal numbers of $l$ and $d$ crystals are formed. Subjecting the achiral salt solution to beta rays and positrons is seen to affect the enantiomeric excess (ee) of the crystals formed. The opposite sense of the ee (handedness) is seen for the two irradiations. A number of possible explanations for this ee will be discussed, including the effects of circularly polarized Bremsstrahlung produced by the slowing down of the $\beta$\textsuperscript{+} particles and the formation of chiral “hydrated-electron” nucleation sites. The potential implications of these studies to the origins of specific homochirality in biology (e.g., exclusive L-amino acids in protein and D-sugars in the backbone of DNA) will be stressed.

10:15am-10:45am: All-optical Alignment Nonpolar Molecules
A. Marjatta Lyyra, Department of Physics, Temple University, Philadelphia, PA 19122

Continuous wave triple resonance spectroscopy provides an effective tool for all-optical selective control and transfer of population in quantum states of atoms and molecules. Using this technique, and the associated Autler Townes effect, we have shown that the customary rovibrational state selectivity of triple resonance excitation can be extended to the magnetic sublevels. The prospects of all-optical alignment of nonpolar molecules will be discussed.

11:00am-11:30am: Synchrotron Radiation Studies at MHATT-CAT
Walter Lowe, Howard University, Washington, DC 20059
Dedicated in memory of Professor Donald A. Edwards (1905 -1999)

MHATT-CAT is a multi-institutional organization that performs research using synchrotron radiation at the Advanced Photon Source at Argonne National Laboratory outside Chicago Illinois. MHATT-CAT was founded in 1990 and has been operational since early 1998 with participating scientists from Howard University, University of Michigan, Oak Ridge National Laboratory, Lucent Technologies-Bell Laboratories, and other research institutions around the world. The design and construction of the project was done at Howard University’s Beltsville Research Laboratories. The shear size, cost and complexity of the project instrumentation made necessary the implementation of novel scientific concepts, as well as fast track administrative systems and procedures. The evolution of the project will be presented as an operational model for the accomplishment of large scientific projects at small institutions. Results from the first series of science experiments will also be presented.

11:30am-12:00pm: Direct Measurement of the Time Structure of Ultrashort X-Ray Pulses from a Storage Ring
Donnell Walton, Howard University, Washington, DC 20059

The storage ring at the Advanced Photon Source (APS) produces photon beams of unprecedented brightness. Since the stored positrons circulate in bunches, the emitted radiation is not continuous, but pulsed. In fact, the resultant x-ray pulses are on the order of 100 trillionths of a second in duration. The ability to detect such ultrafast x-ray pulses would enable the study of structural dynamics at the fastest known time scales. In this talk, I will describe our recent results in the nascent field of ultrafast x-ray studies. The talk will begin with an overview of the accelerator system that comprises the APS. I will conclude with a discussion of the technology-enhanced pedagogical innovations that have developed as an offshoot of this work.
SPONSORS

North Carolina Agricultural and Technical State University and all conferees of the joint meeting of the XXVII Day of Scientific Lectures & Twenty-Third Annual Meeting of the National Society of Black Physicists (NSBP) and the 14th Annual Meeting of the National Conference of Black Physics Students (NCBPS) express sincere gratitude to our sponsors. This event could not have taken place without your generosity. These meetings are crucial in that they provide a mechanism for African-American physicists to meet at least once each year to discuss physics, exchange insights on the overall state of the discipline and to develop a network for student support and encouragement. Further, the meeting provides a unique opportunity to introduce students to a homogeneously supportive professional society.

Again, thanks to all sponsors !!!

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