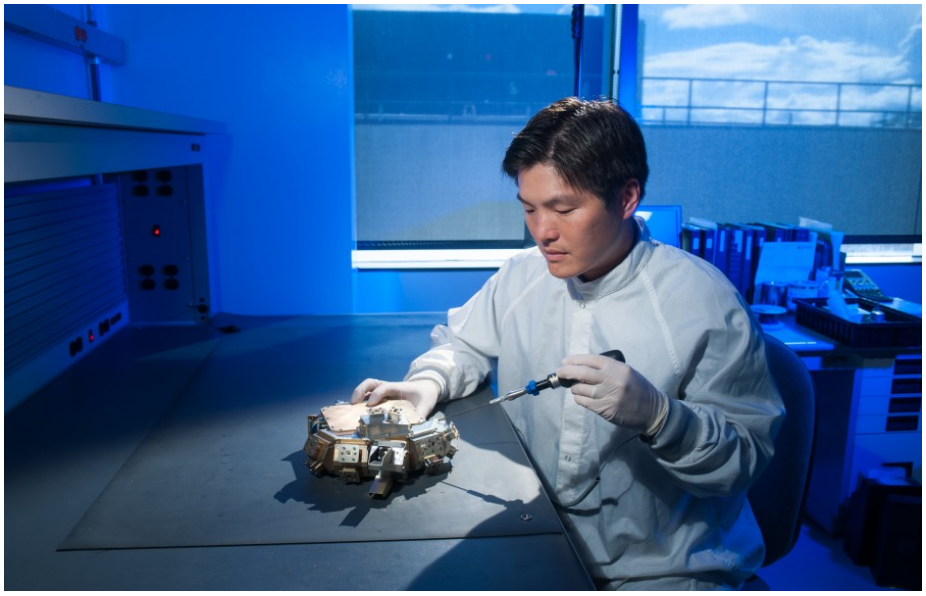
Orbiter
May 2016

Aerospace Scientists Contribute to Breakthrough Research

by Gabe Spera
May 12, 2016

Imagine a busy freeway with lanes of traffic moving in opposite directions. What would happen if the center divider were suddenly removed and the middle lanes were merged?

That's one way to envision the explosive energy release in the phenomenon known as magnetic reconnection, in which adjacent magnetic fields directed opposite to each other suddenly collide and annihilate one another, transferring energy to the surrounding plasma environment. Plasma, sometimes called the fourth state of matter, is a gas composed of charged particles, usually positive ions and (negative) electrons. Due to these charges, plasmas exhibit behavior that neutral gases do not, including intricate interactions with electric and magnetic fields.



Albert Lin, of the Space Instrumentation Department, works on one of the FEEPS instruments prior to launch. (Photo: Eric Hamburg)

Aerospace scientists recently contributed to a breakthrough discovery in the field, and the research is featured in Science magagine, one of the most prestigious journals serving the scientific community. The research program at Aerospace is led by Dr. J. Bernard Blake, Dr. Joseph Fennell, and Dr. James Clemmons of the Space Science Applications Laboratory, who are the Aerospace contributors to the Science article, along with Dr. Drew Turner, of the Space Sciences Department.

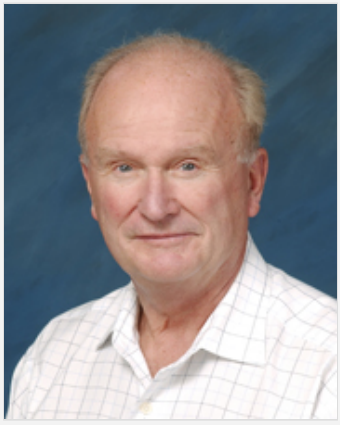
Dr. Drew Turner

The magnetic reconnection phenomenon is believed to be universal, occurring near stars, black holes, and other astronomical bodies. The effects of reconnection can be clearly seen in the form of coronal mass ejections on the sun and shimmering auroras on Earth — but the underlying mechanism, the microscopic physics at the heart of the reconnection process, has not been well understood.

In 2015, NASA launched the Magnetospheric Multiscale (MMS) mission to study reconnection in Earth's magnetosphere, which serves as a conveniently active and accessible natural laboratory for space-plasma physicists. The four identical MMS spacecraft are carrying a number of specialized sensors, including several instruments designed and built by the Space Science Applications Laboratory at Aerospace. These instruments, known as the Fly's Eye Electron Proton Spectrometers (FEEPS), have been characterizing the energetic charged particles that are produced from the breakup and reconnection of magnetic fields. These particles — mostly electrons and protons — can increase the intensity of radiation in the space environment, posing a hazard to spacecraft and astronauts alike.

As Turner explains, the MMS spacecraft each carry two FEEPS instruments, each of which contains 12 silicon "eyes" for detecting electrons and protons of varying energy levels. The spacecraft fly in a pyramidal formation that allows them to straddle the thin boundary of the magnetic bubble surrounding Earth (the magnetopause) and make simultaneous, coordinated measurements of local plasmas and fields.

The formation is exceptionally tight: at one point, the satellites maintained a separation of only six miles. This level of precision is critical for the mission, Turner says. "The MMS results are unprecedented due to the tight formation of the four identical



Dr. J. Bernard Blake

observatories and level of resolution available from the instruments. They allow us to observe physical mechanisms acting on smaller scales than ever previously observable — those on the electron kinetic scale, or tens of kilometers in space," he says.

Plasma researchers need to consider dynamic interactions on several scales, from the large, measured in Earth radii, to the smaller electron kinetic scale, defined by the circular range of motion for an electron in a constant magnetic field — roughly 10 kilometers in this plasma environment.

The MMS mission has initially been focusing on the sun-facing side of Earth's magnetosphere, which is predominantly shaped by the solar wind and related solar activity. In this region, magnetic fields from the sun can directly link with those surrounding Earth. A later phase of the mission will examine the night side, where reconnection also occurs within purely magnetospheric fields (i.e., those from Earth).

After months of reviewing data, the science team recently confirmed that the MMS satellites made several encounters with reconnection sites, where they observed the conversion of magnetic energy into particle kinetic energy. They also measured the intense current and electric field that causes the dissipation of magnetic energy and identified crescent-shaped electron distributions that carry the current as a result of demagnetization and acceleration. The FEEPS instruments in particular provided key observations of the change in magnetic topology by using electrons as tracers of the magnetic field.

Dr. James Clemmons

Turner says these encounters have yielded important new insights into the microphysics underlying the reconnection of the interplanetary and terrestrial magnetic fields. For example, the persistence of the characteristic crescent shape in the electron distributions suggests that the kinetic processes causing reconnection of magnetic field lines are dominated by electron dynamics, which produce the electric fields and currents that dissipate magnetic energy.

The MMS observations confirm what some models had suggested, but they also have provided new results that have not been captured in any models or simulations to date. "The mission is most definitely producing unexpected new insights, about not only reconnection, but other magnetospheric and solar-wind processes as well," Turner says. "The mission is giving us a much keener appreciation for the importance of processes at the electron scale and how those microscopic, local processes can then have effects on the entire system."

Dr. Joseph Fennell

The success of FEEPS is all the more satisfying, considering its lengthy development — the project was originally proposed in 2005, and the first instruments were delivered to NASA in 2012. During that time, a dedicated team of engineers and technicians from the Space Instrumentation Department and ETG designed, built, and tested the instruments. The team also took part in the initial commissioning, tuning, and operations by means of a ground station located within the Aerospace laboratories.

New 3D Printer Arrives at Aerospace

May 11, 2016

The Materials Science Department in the Space Materials Laboratory began installing a new metal additive manufacturing 3D printer on Tuesday, May 10, in the El Segundo A6 laboratory facility.

The $1 million Concept Laser M2 Cusing Machine can manufacture parts using numerous powders such as titanium, aluminum, nickel-based alloys, and steels. A single part could be made of multiple alloys, letting designers tailor its material characteristics in a way that's not possible with traditional casting. One segment of the part could be tailored for strength, while another is optimized for heat resistance. Additive manufacturing machines work directly from a computer model, so people can devise completely new shapes without regard for existing manufacturing limitations.

Traditional metal manufacturing techniques utilize subtractive manufacturing where a part is manufactured and material is removed or machined away to make the final part. The traditional processing methods are labor-intensive and lead to a high percentage of the material being scrapped.

By contrast, in additive manufacturing parts are built by adding micron-thick layer-upon-layer of material with the aid of 3D modeling software. Using this process, complex parts can be more easily produced with less material, labor, and overall production costs.

New 3D printer is unpacked on the A6 D-Pod loading dock. (Photo: Eric Hamburg)

However, the qualification, the materials science, and the directional properties of these materials are still under investigation and must be understood prior to full use. Aerospace is working to better understand this exciting new manufacturing process on the new metal laser melting system, which will be increasingly used by contractors to manufacture the next generation of space hardware.

Leadership Meets for Chantilly Technical Review

May 26, 2016

Aerospace top leadership met on May 17 and 18 for the Chantilly Technical Review. It was the first time the leadership group has met on the new campus for a technical review.

The topic of the meeting was future needs of the intelligence community and how work for the intelligence community can enhance work for other customers, and vice versa. Intelligence community work accounts for about 40% of Aerospace's customer base.

Briefings of technical capabilities included the role Aerospace can play in making sense of data exploitation, pattern recognition, and big data applications.

Attendees also got a chance to see the laboratories and integration facilities near the Chantilly campus, and saw firsthand the flexibility offered by software programmable receivers and a drone tracking system in the "garage." The garage is located near the Chantilly campus and provides a venue for quickly prototyping solutions.

Aerospace leaders met on May 17 and 18 for the Chantilly Technical Review. (Photo: Kelly Hart)

GPS Clocks Its Best Day Ever

by Gail Kellner
May 03, 2016

Dr. Dave Gorney cuts a 38-centimeter section of a six-meter banner to illustrate the improved accuracy of the GPS constellation. (Photo: Eric Hamburg)

Aerospace has been monitoring the accuracy of the Global Positioning System (GPS) constellation in realtime since 2002. Last month, on April 25, the GPS satellites recorded their most accurate day in the history of the constellation with what is called a user range error (URE) of just 38 centimeters.

Aerospace computes the error in measuring distance to every GPS satellite using data from a worldwide, NASA-owned, Jet Propulsion Laboratory-operated network of GPS tracking stations, according to John Langer, associate principal director, Strategic Planning Office. From this data, Aerospace computes the daily URE for the GPS constellation. The URE is related to the accuracy of GPS on Earth's surface.

Atomic clocks ensure that the data used to compute the range to a given satellite are accurate. Better atomic clocks on GPS satellites mean better accuracy for GPS users, and the Block II clocks are the best-performing clocks ever flown, according to Langer. Originally designed to operate with a URE of six meters, GPS today is performing at about 50 centimeters URE.

The most accurate day last month was illustrated by Dr. Dave Gorney, executive vice president, at a special GPS IIF recognition event on Tuesday, May 3. He began with a six-meter-long paper banner (about 20 feet) which represented the original URE for GPS. There were three sine waves on the strip, indicating the three frequencies provided by the Block IIF satellites.

Gorney then marked off a distance of just 38 centimeters – about 15 inches – and cut it with scissors, illustrating the importance of Aerospace's involvement with GPS performance.

"With the fine clocks of the Block IIF satellites, and the even better clocks that will fly on the new Block III satellites, we can look forward to more record-breaking days in the future," Langer said.

BBC Radio Interviews Dr. Austin

May 31, 2016

BBC Radio host Jenni Murray interviews Dr. Wanda Austin. (Photo: BBC Radio)

Dr. Wanda Austin, president and CEO of The Aerospace Corporation, was recently interviewed by BBC radio. Host Jenni Murray and Austin discussed a variety of topics, including "the last frontier" of space, technical challenges of putting satellites into orbit, space debris, and workplace diversity. Austin's section of the program begins at about 10 minutes and 35 seconds.

Innovation That Matters

by Gabe Spera
May 16, 2016

A cross-disciplinary team of Engineering and Technology Group (ETG) and National Systems Group (NSG) researchers received the annual Innovation Award on Thursday, May 12.

Group receives awards presented by Dr. Dave Gorney, right. Others, from left, Dave Stodden, Brian Hansen, Dr. Felix Hoots, Jeffrey Cummings, and Ryan McKennon-Kelly. (Photo: Elisa Haber)

Executive Vice President Dr. Dave Gorney presented the award. The inventors, Felix Hoots, Brian Hansen, Ryan McKennon-Kelly, David Stodden, and Jeffrey Cummings, were honored for developing a computer modeling and visualization technique that rapidly approximates the risk posed to spacecraft by orbital debris.

The technique, known as QuickDART, derives a first-order approximation to the more comprehensive risk computations obtained by the Debris Analysis Response Tool (DART). As with most space debris models, DART estimates collision risk via a computationally intensive screening against a list of orbiting spacecraft. Even on a large computing cluster, DART takes hours to run — but satellite operators need to know right away whether a new cloud of debris will jeopardize their spacecraft. QuickDART enables more rapid assessment of risk — just a few minutes on a desktop computer — without the need for extensive computational resources. Moreover, the visualization displays the debris cloud as a field, rather than a cluster of dots, which makes it easy to understand its extent, boundaries, density, and evolution.

Gorney praised the software for its “operationally relevant” and “decision-quality” products. It is an example, he said, of not simply giving the right answer, but putting it in a format that customers can use. Gorney also placed the development within a broader context, noting the many years of effort that went into creating QuickDART: “There wasn’t a single ‘aha moment,’” he said. “It draws upon a long heritage of similar work.”

Innovation Award trophies. (Photo: Elisa Haber)

The development of the algorithm was a joint effort of the orbit analysts and the software coders. The challenge was to create an algorithm that was not only valid, but computationally efficient enough to run on a single processor. The creation of such fast and efficient code was a remarkable feat in itself. The QuickDART visualization is now available in SOAP. It has given the Joint Space Operations Center (the branch of U.S. Strategic Command responsible for tracking orbital objects) a debris analysis capability that is years ahead of prior approaches.

Coincidentally, the QuickDART program was featured in a recent issue of Crosslink magazine focused on space debris. For further details, see “First Responders In Space: The Debris Analysis Response Team.”

Choy Appointed Aerospace Fellow

May 16, 2016

Tammy Choy

Tammy Choy has been appointed an Aerospace Fellow, Office of the Chief Information Officer, Enterprise Information Services (EIS).

In this position, Choy will provide technical leadership to EIS as the chief engineer in addition to advising corporate senior leadership in key areas of enterprise solutions, information technology (IT), operations and governance, and information security.

She will continue to provide technical expertise to a variety of corporate activities and committees, including Enterprise Risk Management, the Sub-Council on Information Policy, the Aerospace Business Committee, and appropriate budget committees. Choy will also serve in key roles on corporate emergency and crisis response teams including the Emergency Management Committee, Crisis Management Team, and Business Continuity Committee.

Choy began her career at Aerospace in 1985 as an intern in the Engineering and Technology Group (ETG). She was promoted to a member of the technical staff in the Electronics and Sensors Division of ETG and has held positions of increasing responsibility.

Her most recent previous position was principal engineer, EIS. She has had a long career solving some of Aerospace's most complex operational problems.

Choy earned a bachelor of science degree, with honors, in engineering and applied science from the California Institute of Technology and obtained the Federal Chief Information Officer Council's Certificate in Federal Executive Competencies from Carnegie Mellon University.

Steele Hosts East Coast Leadership Program Session

May 25, 2016

On Wednesday, May 25, Cathy Steele, senior vice president, National Systems Group, hosted the Aerospace East Coast Leadership Program (ECLP), which focuses on providing a growth and learning opportunity for technical staff members with more than 10 years experience to enhance individual leadership skills.

This session of the ECLP had three key speakers: Aerospace board of trustees members The Hon. Michael Donley and Anne Street, along with former Aerospace Vice President Gary Pulliam. Each speaker shared their leadership experiences and discussed the importance of leadership presence.

Cathy Steele, second from right, hosted a session of the Aerospace East Coast Leadership Program. (Photo: Kelly Hart)

Herndon Science Competition Draws 44 Schools From Both Coasts

by Gail Kellner
May 27, 2016

West Coast

All in the name of science: A team of students brought their own pool to demonstrate their work at the West Coast competition. (Photo: Elisa Haber)

Students gathered at The Aerospace Corporation in El Segundo on Wednesday, May 25, to compete in the 39th annual Herndon Science Competition and share their innovative science experiments and essays.

The competition honors Robert H. Herndon, who died in 1976, for his outstanding and significant contributions as an Aerospace scientist, engineer, and humanitarian.

Randy Kendall, vice president, Space Launch Operations, welcomed the students to Aerospace and told them that the types of experiments they would be presenting at the competition were the same types of subjects that Aerospace works on every day. “You are the future,” he said.

Nine middle schools and 11 high schools provided a diverse experiment list, including “Exploring LEDs Photovoltaics,” “Addressing the Water Problem: Using Grey Water as an Alternative Source,” “Portable Hydroelectric Generator,” “An Affordable Way to Fight Home Fires,” and “Invisible Computer Screen,” just to name a few.

Students enjoyed lunch and played “Who Wants to be an Enginaire?” offering them the opportunity to combine healthy competition, fun, and STEM knowledge.

Dr. Wanda Austin, president and CEO, presented the keynote address and congratulated the visiting students on being selected to participate in the competition. She also thanked them for devoting their energy, brain power, and creativity to developing outstanding scientific work.

“As aspiring scientists, each one of you has the power to design new technology, solve challenging problems, and answer questions about our world that will shape our future,” Austin said. “ All of you have the potential to do great things, and if you keep asking questions and learn from the answers, you will build a wealth of knowledge and understanding that will help you throughout your lives — at school, at work, and at home.”

Some future scientists get a chance to chat with Dr. Wanda Austin at the West Coast competition. (Photo: Eric Hamburg)

El Segundo Winners

High School Experiment

1. Clark Magnet High School, first place, fire detection and alert system.
2. Compton High School, second place, clean energy via a dye-sensitized solar cell.
3. DaVinci High School, third place, using ocean waves to generate power, wave energy converter.

Middle School Experiment

1. Manhattan Beach Middle School, first place, computer screen only visible to those wearing special glasses.

2. Dana Middle School, second place, a robot capable of marine search and rescue.
3. Hull Middle School, third place, application of geometric shapes in the construction of aeronautic vessels.

High School Essay

1. Pranit Mohnot, first place, West High School, “Discussing the Viability of Elon Musk’s Hyperloop.”
2. Steven Soto, second place, Lawndale High School, “A New Era of Renewable Energy.”
3. Omar Rashad, third place, West High School, “The Overlooked Severity of Concussions.”

Middle School Essay

1. Anoushka Gupta, first place, Bert Lynn Middle School, “The Future of Commercial Space Flight: Commercializing the Final Frontier.”
2. Zoe Storaalsi, second place, Bert Lynn Middle School, “What Will Become of Commercial Flight?”
3. Cindy Nguyen, third place, Robert E. Peary Middle School, “Relieving California in Different Ways.”

Students know that in addition to having solid research, it’s important to give a polished presentation. An East Coast student gets a little help with his attire. (Photo: Kelly Hart)

East Coast

Eleven middle schools and 13 high schools participated in the East Coast Herndon Science Competition.

Keynote speaker Shanna Travis, advisor to the deputy director, chief technology officer, U.S. Department of the Treasury, inspired the students through lessons and experiences while highlighting the benefits and necessity of STEM.

Travis congratulated the students on their outstanding science projects and encouraged them to keep their eyes open and continue to dream, “think and wonder, wonder and think!” because “STEM is everywhere because STEM IS everything,” she said.

Cathy Steele gets the inside scoop on a project from an East Coast student. (Photo: Kelly Hart)

Chantilly Winners

High School Experiment

1. Dhruv Patel, first place, Poolesville High School, “Optimization of Magnetic Drug Delivery Systems to Inner Ear Disorders.”
2. Joseph Chong, second place, Thomas Jefferson High School, “Fabrication of Flat and Microstructured Surfaces Patterned by Breath Figure Formation.”
3. Florencia Martinez, third place, Georgetown Visitation Preparatory School, “Biomedical Engineering.”

Middle School Experiment

1. John Miller, first place, Swanson Middle School, “Can the Process of Evaporation be Used to Transport Water, as a Supplement to Solar Distillation?”
2. Safiullah Rifai, second place, Argyle Middle School, “A Novel Stylometric Data Extraction Tool for Authorship Verification Using Tetragrams.”
3. Townson Cocke and Emmett Cocke, third place, George Washington Middle School, “The Effect of Tubercle Amplitude and Wavelength on Fin Drag.”

Middle School Essay (no high school essays were taken)

1. Zoree Jones, first place, Ronald Reagan Middle School, “A Critical Connection: Why the ‘Hard’ Sciences Need the ‘Soft’ Sciences.”
2. Aiden Douglas, second place, Roberto Clemente Middle School, “Can a Hydrogen-Powered Car Drive and Carry a Load?”

Technology Meets Entertainment for Cinco de Mayo

by Kimberly Locke
May 06, 2016

Technology met with entertainment as technical talks by California State University, Northridge (CSUN) faculty and students, a robotics demonstration, and a culturally themed dance performance united to mark Cinco de Mayo in El Segundo on May 5.

Cal State Northridge students Richard Gillberg, left, and Ameil Hartman demonstrate the El Toro robot on the Paulikas Mall. (Photo: Elisa Haber)

The events began with a mid-morning series of brief presentations titled Lightning Talks on the Road to New Technology, given by CSUN faculty and students in the Titan rooms of A1. Employees listened to technical briefings with some focused on robotics and others related to cutting-edge medical technologies. Employees in Albuquerque, Chantilly, and Huntsville joined in via videoteleconference.

Dr. Chuck Gustafson, senior vice president, Engineering and Technology Group (ETG), provided opening remarks, welcomed attendees, and thanked CSUN faculty and students for coming to Aerospace. Gustafson called the event a great opportunity for Aerospace and CSUN to collaborate and explore interests in various technical areas. “We do innovation on a daily basis for our customers,” he said. “We are always interested in seeing what the next big idea is.”

One of the presentations was about the school’s award-winning intelligent robot, El Toro, which was later demonstrated on the Paulikas Mall.

During lunchtime, CSUN faculty and students demonstrated El Toro as it maneuvered an obstacle course on the mall, adjacent to where dancers from the troupe Sabor de Mexico performed several numbers. The group’s appearance was sponsored by the Aerospace Latino Members Association in observance of Cinco de Mayo. Their colorful costumes brightened up the outdoor festivities and were in stark contrast to the cloudy skies overhead.

Dancers from Sabor de Mexico provided cultural entertainment at the May 5 festivities. (Photo: Eric Hamburg)

CSUN’s visit was sponsored by ETG and the Aerospace Diversity Action Committee in collaboration with the Aerospace Totally Adaptable Group and Aerospace Military Veterans.

Cinco de Mayo commemorates the upset victory of an under-supplied and vastly outnumbered Mexican army over the invading French forces of Napoleon III at the battle of Puebla on May 5, 1862. Slowed by the defeat, the French nonetheless went on win the war. However, the Mexican victory served as an inspiration for years of guerilla resistance to French rule in Mexico and helped keep the issue alive in the United States. California has continuously celebrated Cinco de Mayo since 1863.

Heritage Festival Features Cultural Music and Dance

by Wendy O'Dea
May 20, 2016

The Demon Drummers of East Los Angeles was one of many performing groups that set an upbeat tone for the annual Asian Pacific American Heritage Festival celebrated in Titan IVA and IVB on Thursday, May 19. The event was coordinated by the Aerospace Asian Pacific American Association (AAPAA) and featured dancing and drumming from a variety of Asian Pacific regions including Hawaii, Tahiti, Samoa, India and Japan, as well as a plentiful buffet of Chinese food.

AAPAA's theme for 2016 is "Walk Together, Embrace Differences, Build Legacies." Dr. Wayne Goodman reinforced the importance of this as it relates to Aerospace and diversity. "Only by working together, and accepting one another, can we truly achieve great things in our society," Goodman said. "At Aerospace, our job is to ask tough questions, innovate, and to always challenge the status quo. This cannot be done without accepting our differences in all their forms."

The UCLA-based Bruin Bhangra dancers performed at the Asian Pacific American Heritage Festival. (Photo: Eric Hamburg)

Maceo Hernandez leads the Demon Drummers, a taiko drumming group from East Los Angeles. (Photo: Eric Hamburg)

Celebrating these cultural differences were a variety of performers including The Wahine Ilikea Dancers, Glimpses of India dancers, and the award-winning Bruin Bhangra dancers from UCLA. A Zumba troupe that included some Aerospace employees also performed Asian-themed routines. The final performance was from the Demon Drummers, led by Maceo Hernandez, a renowned taiko drummer who was trained in Japan but raised in East L.A.

Greaves Speaks About Diversity and Leadership

by Wendy O'Dea
May 04, 2016

Lt. Gen. Samuel Greaves, commander of the Space and Missile Systems Center, addressed an Aerospace Corporate Colloquium on the topic of diversity and leadership. (Photo: Elisa Haber)

Lt. Gen. Samuel Greaves, commander of the Space and Missile Systems Center, was the featured speaker at a corporate colloquium on Tuesday, April 26, as part of the SMC Leadership Series. Dr. Wanda Austin introduced Greaves, who spoke to a packed room in El Segundo – and others at Aerospace locations around the country via VTC – about the importance of diversity in leadership as it relates to mission success. He also spoke about the role Aerospace has played in helping him be a more effective leader.

“As our Air Force Chief of Staff, General Welsh, has said on a number of occasions, leadership is a gift. It is given by those who follow to achieve a mission and you have to be worthy of it,” Greaves said, kicking off his speech.

Reinforcing the importance of diversity, Greaves encouraged people to step up, ask questions, and build teams with varying education, background, and experience. “Inclusiveness provides unique capabilities that help us avoid group think,” he said. “Diversity is essential and we must pursue it with vigor.” He also added that leaders must ensure that everyone understands that no job is too small.

Greaves touched on a number of topics, including the relationship SMC has with The Aerospace Corporation. “Aerospace excels at providing value-added information to help us with decision making, which is essential to effectively lead an organization,” he said. “You tell me what I need to hear, not just what I want to hear. You’ve been with us every step of the way, helping us make critical decisions over time. Not one significant technical decision I’ve made over the past two years has been made without consultation from Aerospace. Thanks for all you’ve done.”

After his comments, Greaves fielded questions, and Randy Kendall, chair of the Aerospace Diversity Action Committee (ADAC), spoke. Kendall specifically addressed General Greaves’ ability to lead by example, and his pursuit of a clear and unwavering vision. “He is laser focused on 100 percent mission success and that hasn’t changed since the first day I met him until today.”

The event was coordinated by the Aerospace Black Caucus and Aerospace Lambda Alliance and cosponsored by ADAC.

May 2016 Obituaries

by Elaine Young
May 02, 2016

Sincere sympathy is extended to the families of:

Tommie Baker, secretary, hired Feb. 11, 1963, retired May 1, 1988, died April 3, 2016.
Alan Blackford, member of technical staff, hired July 24, 1967, retired Jan. 1, 2003, died March 30, 2016.
Marcella Crocker member of administration staff, hired Nov. 4, 1965, retired March 1, 1987, died Feb. 10, 2016.
George Jensen, systems director, hired Aug. 30, 1965, retired March 1, 2003, died April 15, 2016.
Kenneth Kamber, member of technical staff, hired Dec. 13, 1965, retired Oct. 1, 1993, died April 1, 2016.
Roger Newman, member of technical staff, hired April 1, 1980, retired May 1, 1991, died April 14, 2016.
Donald Peterson, member of administration staff, hired Nov. 21, 1988, retired April 1, 2000, died April 5, 2016.
Harry Wilson, member of technical staff, hired March 8, 1979, retired March 1, 1986, died April 17, 2016.
Victor White, member of technical staff, hired May 28, 1962, retired Oct. 1, 1991, died March 25, 2016.

May 2016 Anniversaries

by Elaine Young
May 02, 2016

40

Operations and Support Group

Kathy Heffelfinger

35

Engineering and Technology Group

Paul Hanson

Enterprise Information Services

Molly Katherine Hughes

Operations and Support Group

Louise Maclean

Space Systems Group

Karolyn Young, Twain Summerset

30

Engineering and Technology Group

Catherine Kaneshiro, Nathan Presser

Space Systems Group

Michael Baxter

25

National Systems Group

Catherine Steele

Operations and Support Group

Jean Jiang-Lin, Victoria Hines

Space Systems Group

Guillermo Ayan

20

National Systems Group

James Lapean Jr

15

Engineering and Technology Group

Charles Uyeda, Ching-Yao Tang, Fernando Rodriguez,Frank Livingston, Susan Lui,

Viet Khoi Le

Enterprise Information Services

Don Middleton

National Systems Group

Christina Smith

Operations and Support Group

Elizabeth Simpson

Space Systems Group

Christopher Heidelberger

Systems Planning, Engineering, & Quality

Michael Boulavsky

10

Engineering and Technology Group

Andrew Chin, Felix Sasso, Hung Ngo, Jacob Breeden, Matthew Clark, Nicholas Lin,

Stephen Cathers

Enterprise Information Services

Arthur De Leon

National Systems Group

Christopher Miller, Michael Thimblin, Robert Kalinowsky, Stephen George,

Thomas Duerr

Space Systems Group

Jeffrey Troy, Jonathan Chao

Vaeros

Michael Wallisch, Sarah Lang

5

Engineering and Technology Group

Andrew Robins

National Systems Group

Amiel Fernandez

Space Systems Group

Paul Klimek

Systems Planning, Engineering, & Quality

John Di Pol, Richard Miller

Vaeros

Timothy Taylor