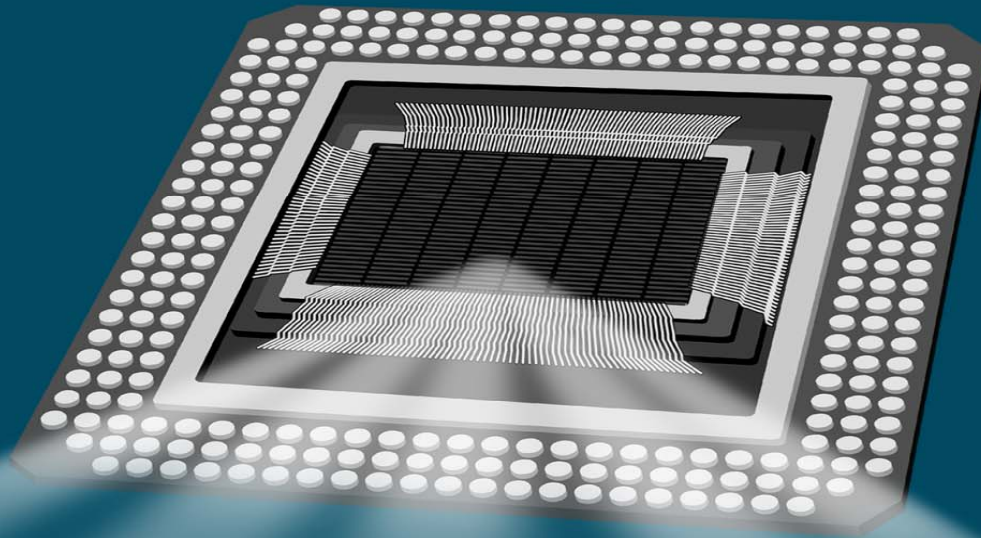
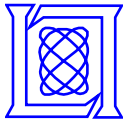




HPEC 2009

High Performance Embedded Computing



In memoriam:

JAMES C. ANDERSON

JUNE 25, 1953—MAY 3, 2009

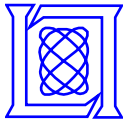


It was with shock and deep sadness that we learned of the premature death of Jim Anderson, who passed away suddenly on May 3, 2009. Jim spent his entire professional career at Lincoln Laboratory, a period spanning 32 years. Without a doubt, there will never again be a staff member in the Embedded Digital Systems Group or Lincoln Laboratory, for that matter, with Jim's special qualities—he embodied an inimitable mixture of warmth and humor, coupled with an encyclopedic knowledge of processor technology and a seemingly inexhaustible repertoire of anecdotes about luminaries throughout the computer industry.

In memoriam:

Jim's accomplishments while at Lincoln Laboratory were many and varied, from technical adviser, to program manager, to technologist, to workshop committee member. In the last role, he has been for many years an integral and valuable member of the High Performance Embedded Computing (HPEC) Workshop core committee. Jim's personableness and energy secured many fine speakers for us. His discussion panel, which was always a masterful blend of entertainment and informative technical commentary, has become a perennial highlight of the workshop.

Many of us who follow the trends and directions of the computer industry recognize that Jim has been a visionary in this area for a number of years. Jeremy Kepner shared with us the time Jim came to his office and declared that Moore's Law, the trend that was fueling the exponential improvements in the IC industry, was going to hit a wall in the next five years. Jim showed Jeremy the plot he had compiled, and said that clock speed would be leveling off and other ways to improve processors would have to be found. Only a handful of computer architects across the nation at that time would have taken Jim's prediction seriously; and yet, that is precisely where we are today—stuck at around 5 GHz, just as Jim predicted. One aspect of Jim's professional life that impresses itself most immediately upon even a casual observer is that Jim always seemed to love his work. His enthusiasm and talent charmingly combined the technological depth of an MIT PhD graduate with the sensibility and flair of a multitalented musician. Jim was a truly unique and talented man and will be profoundly missed.

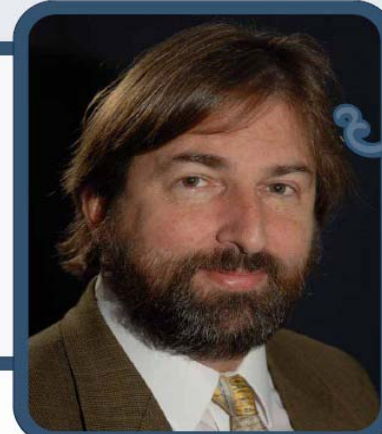


In memoriam

DENNIS M. HEALY

1957–2009

*HPEC Workshop Sponsor, DARPA MTO Program Manager,
& Professor of Mathematics, University of Maryland*



We were saddened to learn that Prof. Dennis Healy passed away on 3 September 2009. As a DARPA Program manager Prof. Healy was a long-time sponsor of HPEC, having sponsored the workshop since 2006.

Prof. Healy held two positions at DARPA. He headed the Applied and Computational Mathematics program in DARPA's Defense Sciences Office (DSO). Most recently he was a Program Manager for the Microsystems Technology Office (MTO), starting in 2003. Some of the recent programs he managed were Analog-to-Information (A-to-I), Multiple Optical Non-redundant Aperture Generalized Sensors (MONTAGE), Non-Linear Mathematics for Mixed Signal Microsystems (NLMMSM), Space Time Adaptive Processing (STAP-Boy), Intelligent RF Front-Ends (IRFFFE), Advanced Digital Receiver (ADR), Chemical Engineering at Molecular Scale(CHEMS), and Cognitively Augmented Design for Quantum Technology (CAD-qt).

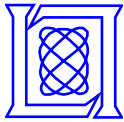
Prof. Healy also was Professor of Mathematics at University of Maryland, College Park. Previously, he was an associate professor in the Computer Science and Mathematics Departments at Dartmouth College and was Summer Faculty Fellow at the Naval Ocean Systems Center (now SPAWAR).

Prof. Healy authored over 90 publications on the subjects of mathematical physics, statistics, optical sciences, electrical engineering, biomedical engineering, magnetic resonance, signal and image processing, mathematics, applied mathematics, and theoretical computer science. He was a member of the editorial board for the *Journal of Fourier Analysis and Applications* and the IEEE press series on Biomedical Engineering.

His students, friends, and family remember Prof. Healy for his love of teaching, his passion for research, and his kind spirit. "Everything was interesting to him," said Katherine Healy, his wife of 24 years. "He did not understand how anyone could ever be bored, because he thought everything was so interesting, and that's how he approached life. There was no boundary between his life and his work."

His friendship as well as his contributions to and support for the HPEC community will be dearly missed.

MIT Lincoln Laboratory



HPEC 2009 Acknowledgments



Technical Committee

Dr. Stan Ahalt / Ohio Supercomputer Center
Dr. James C. Anderson / MIT Lincoln Laboratory
Mr. Masahiro Arakawa / MIT Lincoln Laboratory
Dr. Ray Artz / Lockheed Martin Corporation
Dr. David Bader / Georgia Institute of Technology
Mr. William Bent, Jr. / CSP, Inc.
Prof. Keren Bergman / Columbia University
Dr. Lawrence Bergman / Jet Propulsion Laboratory
Mr. Robert Bernecky / Naval Undersea Warfare Center
Ms. Nadya Bliss / MIT Lincoln Laboratory
Mr. Peter Boettcher / MIT Lincoln Laboratory
Dr. Jay Brockman / University of Notre Dame
Dr. Keith Bromley / SPAWAR Systems Center
Mr. David Cousins / BBN Technologies
Dr. Jay Culliney / The Aerospace Corporation
Dr. Jack Dongarra / University of Tennessee, ICL
Dr. Neall Doren / Sandia National Laboratories
Dr. Ian Dunn / Mercury Computer Systems
Dr. Alan Edelman / Massachusetts Institute of Technology
Dr. Maya Gokhale / Lawrence Livermore National Laboratory
Mr. Robert Gold / Office of the Under Secretary of Defense
Mr. John Grosh / Lawrence Livermore National Laboratory
Mr. Michael Harris / BAE Systems
Dr. William Harrod / DARPA / IPTO
Dr. Martin Herbordt / Boston University
Dr. Daniel Katz / University of Chicago
Mr. Bruce Kinney / Raytheon Company
Dr. James Lebak / The MathWorks
Dr. Miriam Leeser / Northeastern University
Dr. Richard Linderman / Air Force Research Laboratory
Mr. Michael Lucas / Northrop Grumman Corporation
Mr. Craig Lund / Independent Consultant
Mr. Michael McCollister / Northrop Grumman Corporation
Ms. Janice McMahon / University of Southern California, ISI
Dr. Sanjeev Mohindra / MIT Lincoln Laboratory
Dr. Brent Nelson / Brigham Young University
Mr. David Ngo / BAE Systems
Mr. Eric Pancoast / Lockheed Martin Corporation
Dr. Robert Pettit / The Aerospace Corporation
Mr. Frank Pietryka / Hewlett Packard
Dr. Viktor Prasanna / University of Southern California
Dr. Albert Reuther / MIT Lincoln Laboratory
Dr. John Reynders / Johnson & Johnson
Dr. Mark Richards / Georgia Institute of Technology
Dr. Martin Rinard / Massachusetts Institute of Technology
Dr. Sharon Sacco / MIT Lincoln Laboratory
Dr. Philip Sementilli / Raytheon Company
Dr. Anthony Skjellum / Verari Systems Software, Inc.
Dr. Hendrik Spaanenburg / Heterogeneous Computing, LLC
Mr. Brian Sroka / The MITRE Corporation
Dr. Jeffrey Vetter / Oak Ridge National Laboratory
Mr. Dan Wells / The Boeing Company

Sponsors

DARPA Information Processing Technology Office
DARPA Microsystems Technology Office
Air Force Research Laboratory
High Performance Computing Modernization Office
Air Force Rapid Capabilities Office

Advisory Committee

Mr. David Martinez / MIT Lincoln Laboratory
Dr. Richard Games / MITRE

Workshop Office Support

Ms. Joan Napoli
Ms. Sara Peterson
Ms. Terry Retherford
Ms. Lori Tsoulas
Ms. Joanne Zukowski

Technical Support

Mr. Troy McLean
Mr. Igor Marchenko

Audience

All of you attending!

Document Production

Mr. Michael Burke
Ms. Patricia Maguire
Ms. Linda Litchfield
Ms. Carly Tripp

Projectionists

Mr. Jon Barron
Mr. Tom Burbine
Mr. Dana Gaudette
Mr. Mike Imbeault

Security

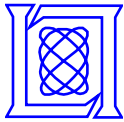
Ms. Renee Gylfphe
Ms. Roslyn Wesley
Mr. Thomas Zech
Reception Staff
Security Officers

Special Services

Mr. James Armao
Mr. Richard Gabriele
Mr. Hugo Volpe

Corporate Chefs

Mr. Jack Haight
Food Service Staff

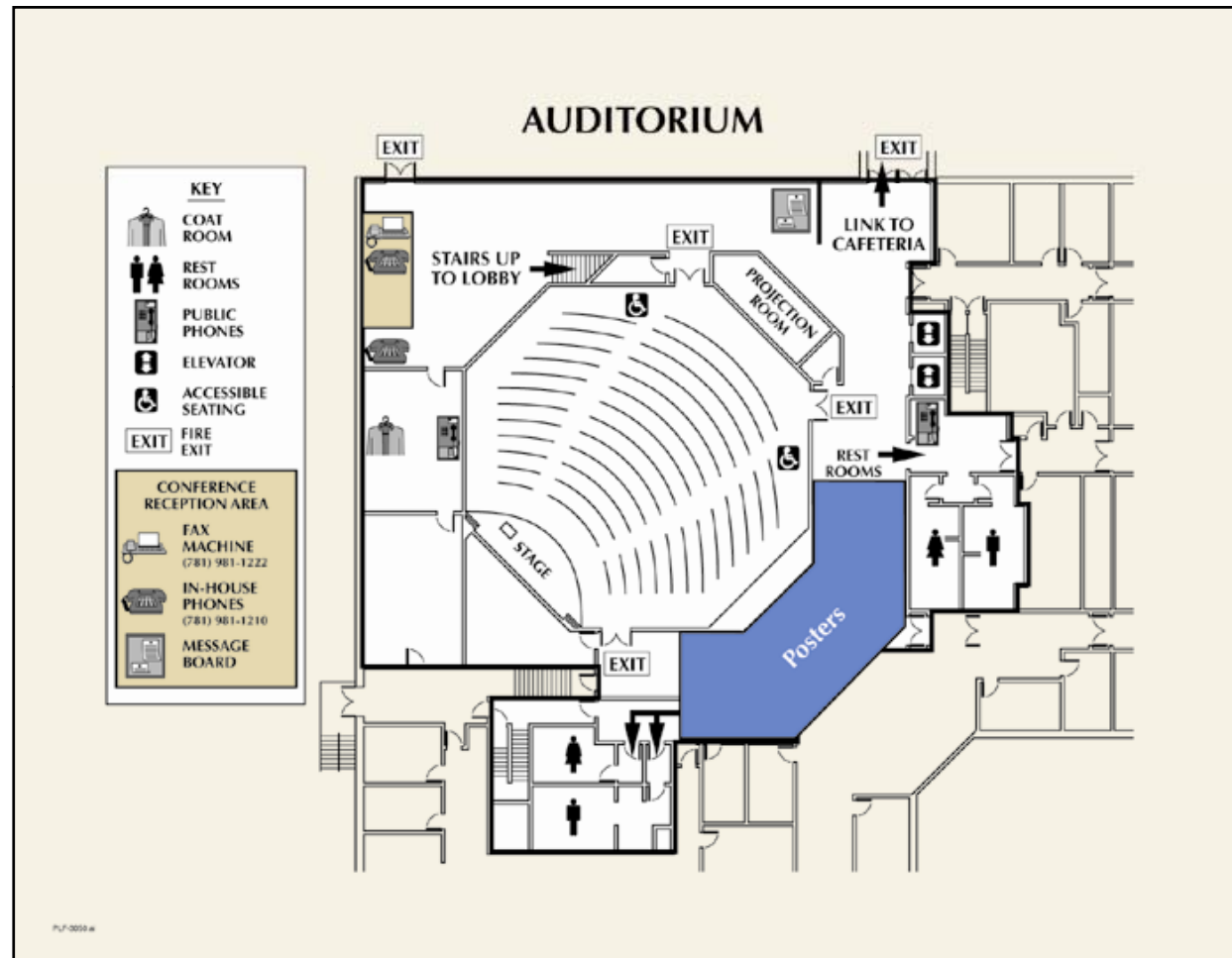


2009 HPEC Workshop

Administrative Information

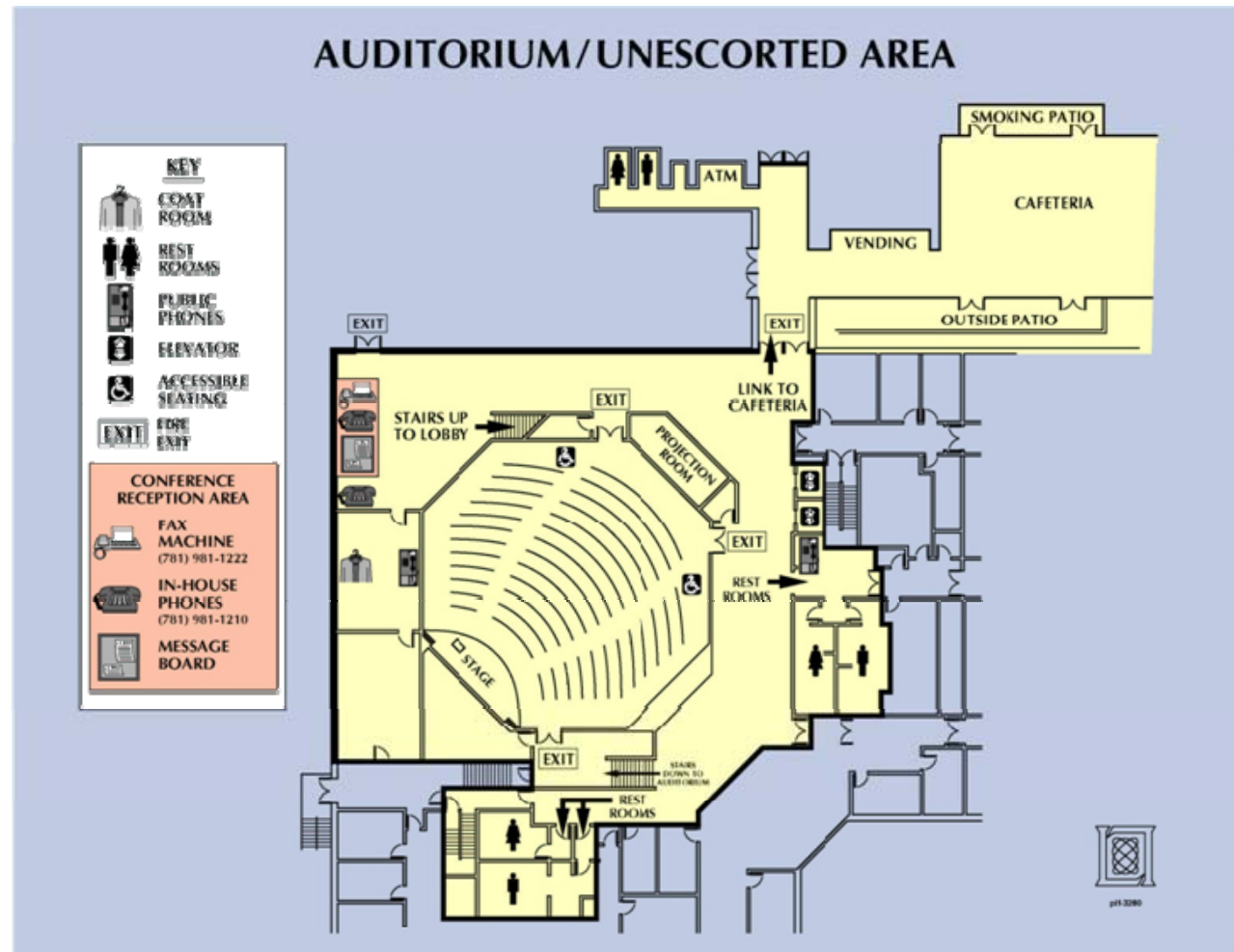


- **Unclassified Sessions**
- **Workshop is being videotaped**
- **No smoking inside the Laboratory**
- **Lunch and refreshments are provided**
- **Wireless devices that include embedded cameras or recording devices are restricted. Please see the Registration Desk for storage**
- **Badges**
 - **100% Picture ID check is required each day**
 - **Picked up at the Security Desk each morning and returned before you leave**
 - **May not be taken outside the facility**
- **Unclassified Proceedings will be available on the web and provided on CD**
- **Provide any necessary updates on the Contact Information form that is provided in your Attendee Package and leave it at the Registration Desk**
- **Please provide your completed Workshop questionnaire to the Registration Desk**

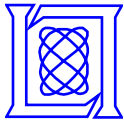




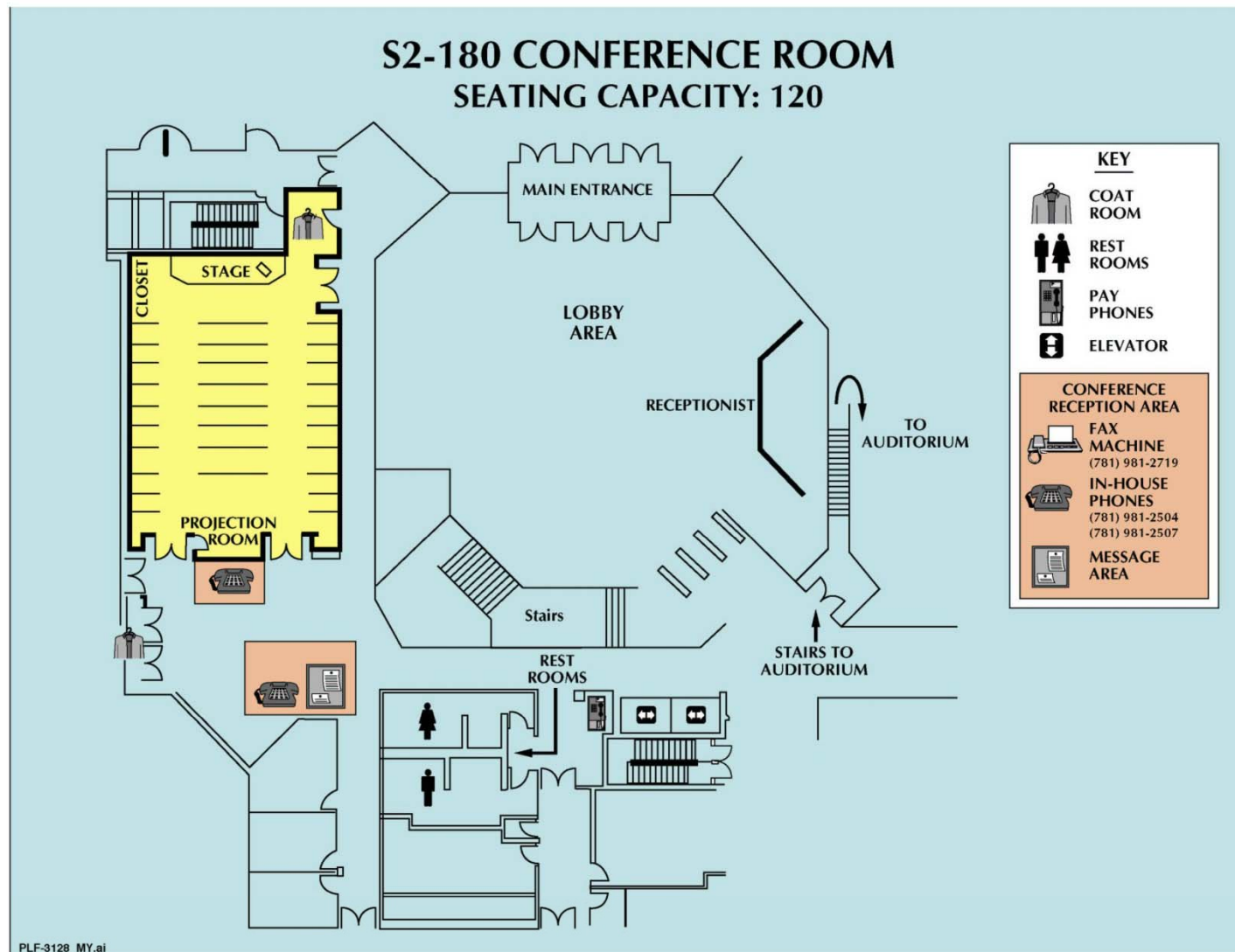
Unescorted Area

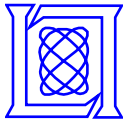


Lincoln Laboratory is a secure facility. Access to any other portion of the facility requires continuous escort by a white-badged employee.



Focus Sessions in S2-180





Agenda Highlights



Day 1

Tuesday

22 September

Mission Keynote Address – Dr. Robert H. Latiff / Major General, USAF (Ret.)

Session 1: HPC Landscape

Focus 1: Space Technology

Poster / Demo A: Advanced Algorithms and Hardware

Session 2: Multicore Architecture

Focus 2: Multicore Applications

Reception and Banquet (Burlington Marriott)

Banquet Presentation – Dr. Sigrid Close / Los Alamos National Laboratory

Title: From Dust to Asteroids: Impacts on Earth

Day 2

Wednesday

23 September

Technology Keynote Address – Dr. Richard Linderman / AFRL

Session 3: GPU

Focus 3: Multicore Programming

Poster / Demo B: FPGA Technologies and Applications

Session 4: Awards Session

Panel: Survivor: Computer Architecture



Banquet Speaker

Dr. Sigrid Close

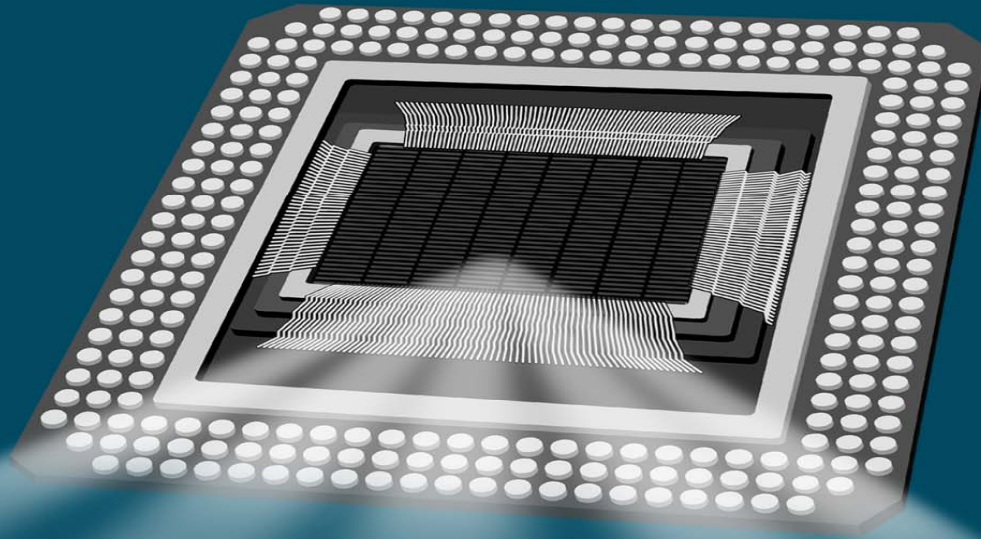
**Title: From Dust to Asteroids:
Impacts on Earth**

Place: Burlington Marriott

Date: Tuesday, 22 Sept 2009

**Time: 1745 – Reception
1830 – Speaker
1900 – Banquet**





HPEC 2009

High Performance Embedded Computing