IOP Conf. Series: Materials Science and Engineering **249** (2017) 011003 doi:10.1088/1757-899X/249/1/011003

**Peter Garnavich**

Professor, Department Chair
Astrophysics/Cosmology Physics
University of Notre Dame

Title:

# The Accelerating Universe and the Discovery of Dark Energy

*Summary*. One of the most dramatic scientific revolutions of the last fifty years is the discovery that the rate of expansion of the universe is accelerating. The source of acceleration is thought to be a mysterious "dark energy" that makes up 3/4 of the content of the universe, but more exotic causes are possible. This is a story that begins with Einstein and Hubble but shifts to two research teams racing to find the ultimate fate of the universe using exploding stars and new detector technology.

*Bio*. Peter Garnavich is a Professor and Chair of Physics at the University of Notre Dame. Previously he was a Research Fellow at the Harvard-Smithsonian Center for Astrophysics and received a M.Sc. from the Massachusetts Institute of Technology and a Ph.D. from the University of Washington. His research interests include cataclysmic variable stars, supernovae and cosmology. He is co-recipient of the 2007 Gruber Prize in Cosmology and the 2015 Breakthrough Prize in Fundamental Physics. Garnavich was a key member of the "High-Z" team that discovered the universal expansion rate is accelerating. The discovery of the accelerating universe was awarded the 2011 Nobel Prize in Physics.

**William Saric**
Distinguished Professor of Aerospace Engineering
George Eppright '26 Chair in Engineering

Texas A&M University
Aerospace Engineering

Title:

# Flight experiments on discrete roughness element technology for laminar flow control

William S. Saric has been Professor of Aerospace Engineering at Texas A&M University since January 2005. He received his PhD in Mechanics from the Illinois Institute of Technology in 1968 and has held appointments at Sandia Laboratories (Atomic and Fluid Physics, 1963-1966, 1968-1975), Virginia Polytechnic Institute and State University (Engineering Science and Mechanics, 1975-1984), Tohoku University, Japan (Aeronautics and Astronautics, 1991-1992), and Arizona State University (Mechanical and Aerospace Engineering, 1984-2005).

He is a registered Professional Engineer in Virginia and was an Aerospace Engineering Evaluator for ABET.

He is a Fellow of AIAA, APS, and ASME. He received the AIAA Fluid Dynamics Award in 2003, the G.I. Taylor Medal from SES in 1993, the Scientific Achievement Award from AGARD (NATO) in 1996, and the Alumni Research Award from V.P.I.&S.U in 1984. In 2006, he was elected to the National Academy of Engineering for “contributions to the fundamental understanding and control of shear-flow and boundary-layer transition”.

He has established two major wind tunnel research facilities and a flight research center at Texas A&M University and was the Director of the AFOSR/NASA National Center for Hypersonic Laminar-Turbulent Transition Research.

Most recently, he has conducted experimental, and flight research on stability, transition, and control of two-dimensional and three-dimensional boundary layers for subsonic aircraft, supersonic aircraft and reentry vehicle applications.

**Gennaro Cardone**

Professor, Dr.,
Chair of Aerospace Engineering Study Course

Università degli Studi di Napoli "Federico II", Italy
Department of Industrial Engineering –
Aerospace division

Title:

# Thermo-fluid-dynamic analysis of innovative synthetic jet devices

*Summary:* Synthetic jets are largely used, especially in the field of electronic cooling; indeed their heat transfer performances have been widely investigated and some of the work performed at University of Naples Federico II is herein described. Heat transfer coefficients have been enhanced through the design of innovative synthetic jet devices; in particular, twin synthetic jets, multi orifice nozzles, chevron exit nozzles are considered. Obviously, the heat transfer performances of both the classic and innovative devices are strictly related to their impinging flow field on the surface to be cooled. In this work the behavior of innovative impinging synthetic jets is experimentally investigated by using Particle Image Velocimetry (PIV) and IR thermography leading to both time average and phase average flow velocity and heat transfer measurements. Three-dimensional coherent vortex structures, time-averaged and phase-averaged means, as well as turbulent statistics of flow fields and wall heat transfer data are presented and discussed.

*Bio.* Born in Naples (Italy) on 1963. Graduated in Mechanical Engineering with summa cum laude (1988). PhD in Aerospace Engineering (1991). Assistant professor (1992). Associate professor (1998). Actual position: Full Professor of Fluid Mechanics (2010) and Chair of the Aerospace engineering study courses, at the University of Naples Federico II, Department of industrial engineering, aerospace division. Scientific interests: two-beam and reference beam interferometry; velocimetry techniques such as PIV, Stereo-PIV and Tomo-PIV and their developments; heat transfer measurements with the infrared thermography technique, particularly focused on heat flux sensors and thermal image restoration; steady and unsteady natural convection; boundary layer diagnostics; transition detection and flow field visualization from subsonic to hypersonic flow regimes; free and impinging synthetic jets; swirling jets; aerodynamic heating and its thermal visualization; thermal measurements in investment casting.