



UCF

# FACULTY RESEARCH TALKS

LISTEN. LEARN. COLLABORATE.

Zoom talk | Friday, Feb. 18, 2022 | Noon to 1 p.m.



PRESENTER 1:

## DAN BRITT

Pegasus Professor, Physics; Director for Center for Lunar and Asteroid Surface Science

### Building Partnerships With the NewSpace Industry

The advent of the “NewSpace” industry highlighted by the rapid growth of companies like SpaceX has radically changed both the pace and the possibilities for planetary exploration. NewSpace is supported through two organizations: the Center for Lunar and Asteroid Surface Science (CLASS), a NASA-funded institute that provides planetary science expertise to NewSpace; and the Exolith Lab, the world’s leading provider of science-based simulants for lunar, asteroid, and Martian regoliths. The objective is to build partnerships between UCF, planetary science, and this rapidly-expanding space industry.

Dr. Britt attended the University of Washington and Brown University, receiving a Ph.D. from Brown in 1991. He served in the U.S. Air Force as an ICBM missile launch officer and an economist for Boeing before going into planetary sciences. He has served on the science teams of four NASA missions, Mars Pathfinder and Deep Space 1, the New Horizons Mission for the flyby of the Kuiper Belt asteroid 486958 Arrokoth, and the Lucy Mission for a series of flybys of asteroids near Jupiter. Dr. Britt researches the physical properties and mineralogy of asteroids, comets, the Moon, and Mars under several NASA grants and also leads the Exolith Lab. Honors include seven NASA Achievement Awards, election as a Fellow of the Meteoritical Society, and an asteroid named after him: 4395 DanBritt.



CO-PRESENTER 2:

## JAY KAPAT

Pegasus Professor and Trustee Chair, Mechanical and Aerospace Engineering, Center for Advanced Turbomachinery and Energy Research

### Zero-Emission Ammonia Jet Engines: New, 5-Year, \$10M NASA ULI Project

Drs. Kapat and Vasu will share their latest NASA-funded research: using liquid ammonia as a hydrogen carrier with hydrogen as the fuel in turbine engines, and the use of a supercritical carbon dioxide (sCO<sub>2</sub>) power system to convert the exhaust heat from engine core into electricity. The target application is commercial flight. Ammonia stored onboard at -33C will not require any special refrigeration or cryo-cooling at cruising altitude, and will also be used to enhance core performance by providing compressor intercooling and cooled cooling air for turbines. Hydrogen is derived from ammonia through catalytic decomposition to help in thermal management, leading to significantly improved engine efficiency. Using ammonia also eliminates NO<sub>x</sub> from the exhaust stream. A closed-loop sCO<sub>2</sub> power system produces electricity from engine exhaust heat for onboard use and to eliminate power extraction from the core. Hydrogen combustion leads to the absence of soot in exhaust, greatly reducing contrail formation. The proposed technology nearly eliminates every form of emission.

Dr. Kapat is the founding director of the Center for Advanced Turbomachinery and Energy Research. He obtained his Sc.D. in mechanical engineering from Massachusetts Institute of Technology. He joined UCF in 1997 as an assistant professor, and was promoted to the ranks of associate professor and professor in 2001 and 2005, respectively. Since the mid-2000s, Dr. Kapat has fully focused his research activities on turbo-machineries and associated technologies for power generation, aviation and space propulsion, and created partnerships with a number of OEMs in these industries.



CO-PRESENTER 3:

## SUBITH VASU

Professor, Mechanical and Aerospace Engineering, Center for Advanced Turbomachinery and Energy Research

Dr. Vasu joined UCF in 2012 after his Ph.D. from Stanford and postdoc training at Sandia. He has been published in more than 110 journals, including *Science* and *Proc. of National Academy of Sciences*, and authored more than 200 conference articles. More than 85 publications were co-authored with his students as lead authors. Dr. Vasu has brought in external projects worth more than \$15M. Graduates from his group hold key positions in academia, government, national labs, and aerospace industries. His prestigious early career awards include: DARPA Director’s Fellowship 2020; DARPA Young Faculty Award - YFA 2018; Microsoft Investigator Fellowship 2019; ASME Dilip Ballal Early Career Award 2017 (international award); and the SAE Ralph R Teetor Educational Award 2018 (international). He has received many honors at UCF, including the prestigious UCF Luminary and Reach for the Stars awards.