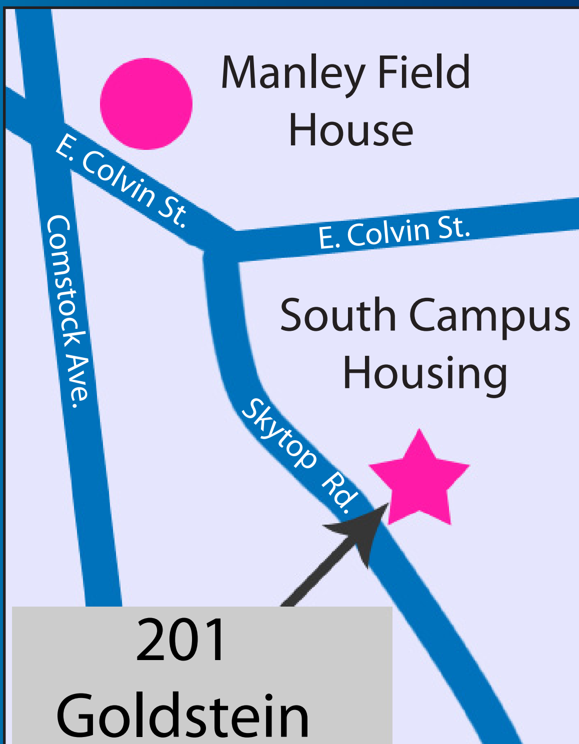
Wednesday, September 24th

6 pm

Syracuse University

Goldstein Student Center

Room 201



Dr. Brian M. Kent is a Consultant in Aerospace, Science, and Technology, and an adjunct professor of Electrical Engineering with Michigan State University. He recently completed 37 years of Service to the United States Air Force having most recently served as the Chief Technology Officer of Air Force Research Laboratory, Wright-Patterson Air Force Base, Ohio. His previous positions include AFRL's Sensor's Directorate Chief Scientist and Senior Scientist for Low Observables and Electromagnetics. Dr. Kent has authored and co-authored more than 90 archival articles and technical reports and has written key sections of classified textbooks and design manuals. He has delivered more than 200 lectures, and developed a special DOD Low Observables Short Course that has been taught to more than 3,000 scientists and engineers since its inception in 1989. Dr. Kent earned a BS degree in electrical engineering from Michigan State University and both the MS and PhD degrees in electrical engineering from Ohio State University.

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IEEE

Characterization of Space Shuttle Ascent Debris Based on Radar Scattering and Ballistic Properties – Evolution of the NASA Debris Radar (NDR) System

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This presentation introduces the NASA Debris Radar (NDR) system developed to characterize debris liberated by the space shuttle during its ascent into space. Radar technology is well suited for characterizing shuttle ascent debris, and is especially valuable during night launches when optical sensors are severely degraded. The shuttle debris mission presents challenging radar requirements in terms of target detection and tracking, minimum detectable radar cross-section (RCS), calibration accuracy, power profile management, and operational readiness. After setting the stage with background on the Columbia accident, the NDR system is described which consists of a stationary C-band radar located at Kennedy Space Center (KSC) and two X-band radars deployed to sea. To better understand the signature of the shuttle stack, Xpatch calculations were generated to predict the radar signature as a function of launch time. These calculations agreed very well with measured data later collected. Various sizes, shapes, and types of shuttle debris materials were characterized using static and dynamic radar measurements and ballistic coefficient calculations. The second part of the presentation discusses the NDR successes, which led to a new challenge of processing and analyzing the large amount of radar data collected and extracting information useful to the NASA debris community. Analysis tools and software codes were developed to visualize the shuttle metric data in real-time, visualize metric and signature data during post-mission analysis, automatically detect and characterize debris tracks in signature data, determine ballistic numbers for detected debris objects, and assess material type, size, release location and threat to the orbiter based on radar scattering and ballistic properties of the debris. Future applications for space situational awareness and space-lift applications will also be discussed.

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