



*Shaping the Future of Aerospace*

# ABOVE AND BEYOND

**Region VI Student Paper Conference**  
**University of California, Merced**  
**6 - 8 April 2018**



Dear attendees,

It is with great honor and distinction that I welcome you to the 2018 American Institute of Aeronautics and Astronautics Region VI Student Conference. For the past six months, our planning committee has been hard at work in striving to create a unique and exceptional conference to celebrate the engagement of students involved in aerospace engineering research. With this year's theme of Above and Beyond, we hope that everyone may gain an eye-catching perspective in what secretly lies ahead into the future. This goes hand-in-hand with one of our club's missions of introducing world class engineering venues to the University of California, Merced.

Established in a prime and growing location in the Central Valley, it has become clear of the impact our chapter's role has been in increasing the valley's involvement, confidence and excitement in aerospace engineering. Universities scattered across the Central Valley have remained disregarded from the opportunities to work alongside leading industries that could change the world. In response, my committee and I have taken upon ourselves to plan this conference with the utmost importance to shed light on the untapped talent hidden across this valley. It is my wish that you thoroughly enjoy the events we have planned and are able to leave with a growing excitement of your role in the aerospace engineering industry.

It is my pleasure to lead, organize and invite each of you to our campus. I would like to thank the AIAA Foundation, Lockheed Martin, and our planning committee for without their sponsorship and support this event would simply not have been possible.

Warmest Regards,

*Ivan Suarez*

**Ivan Suarez**

Vice President

AIAA UC Merced Chapter

Conference Committee Leader



# GENERAL SCHEDULE

## Friday, April 6

Time	Event	Location
5:00-6:00	Sign-in and Mignling	Crescent Arch Room
6:00-6:15	Official start/Ivan	Crescent Arch Room
6:15-7:30	Resume Workshop/Networking	Crescent Arch Room

## Saturday, April 7

Time	Event	Location
9:00-9:30	Check-in and Breakfast	California Room
9:30-9:45	Itenerary Rundown	California Room
10:00-11:30	Presentations	SSB 160/170
11:45-1:15	<b>Lunch/Speaker</b> Stephen Frick	California Room
1:30-5:00	Presentations	SSB 160/170
5:15-6:45	<b>Dinner/Speaker</b> Tucker Hamilton	California Room

## Sunday, April 8

Time	Event	Location
8:00-8:45	Check-in and Breakfast	California Room
8:45-9:00	Itenerary Rundown	California Room
9:00-12:00	Castle Air Museum Tour	Atwater, California
12:30-2:15	<b>Lunch/Speaker</b> Rostislav Spektor	California Room
2:30-5:00	Career Fair	Dining Center
5:30-7:30	<b>Awards Dinner</b>	California Room



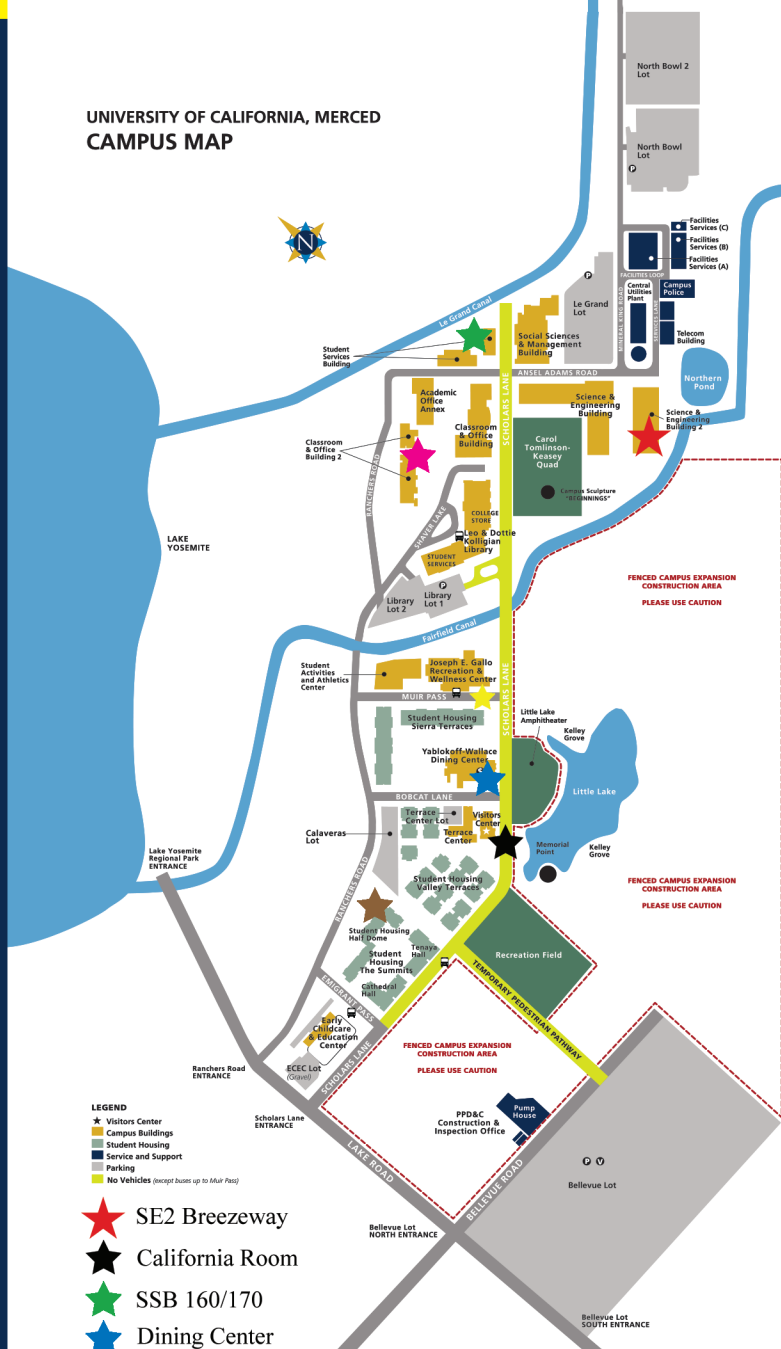
# PRESENTATIONS

Presentation Location: SSB 160	
Time	
10:00-10:30	Design and Analysis of a Solar Sail for an Interplanetary CubeSat Mission (TEAM)
10:30-11:00	Design and Manufacturing of an SMA-based Seamless Camber Morphing UAV Tail Section (TEAM)
11:00-11:30	Design of a Small-scale Inflatable Martian Entry Vehicle for PRANDTL-M (TEAM)
1:30-2:00	Experimental Evaluation of a Simplified Two-Dimensional Flutter Model (TEAM)
2:00-2:30	Investigation of Platelet Size Effect on Fracturing Behavior of Discontinuous Fiber Composites (TEAM)
2:45-3:15	New Innovative Light-weight Twist Morphing Wing with Variable Cant Angle Winglet (TEAM)
3:15-3:45	Spray Cone Formation from Pintle-Type Injector Systems in Liquid Rocket Engines (TEAM)
4:00-4:30	The Design of a High-Altitude Aircraft for Solar-Powered, Long Endurance Flight (TEAM)
4:30-5:00	Theoretical Modeling for Thermal Management of a High-Power LED Panel (TEAM)
Presentation Location: SSB 170	
10:00-10:30	Fin Optimization for Augmented Speed and Altitude Performance of an Experimental Rocket (UG)
10:30-11:00	Separation Standard Characterization for High-Density UAV Systems (UG)
11:00-11:30	Stability and Control Derivative Estimation for the Bell-Shaped Lift Distribution (UG)
1:30-2:00	Eagle Detection, Interaction Sensing, and Deterrence System for Wind Turbines (MASTERS)
2:00-2:30	Velocity Measurements of Projectiles Propelled by Underexpanded Supersonic Jets (MASTERS)



# MAPS

## UNIVERSITY OF CALIFORNIA, MERCED CAMPUS MAP



- LEGEND**
- ★ Visitors Center
  - Campus Buildings
  - Student Housing
  - Service and Support
  - Parking
  - No Vehicles (except buses up to Muir Pass)

- ★ SE2 Breezeway
- ★ California Room
- ★ SSB 160/170
- ★ Dining Center
- ★ COB2 140 (Break Room)
- ★ Crescent Arch Room
- ★ Castle Air Museum Loading Zone



## Stephen Frick

“Space Shuttle Missions and Building the International Space Station:  
Engineering and Operational Challenges”

Stephen Frick is the Director of Strategic Planning and Operations at the Lockheed Martin Space Systems Company Advanced Technology Center (ATC). In this role he is responsible for ensuring the efficient execution of research and engineering programs, and developing new opportunities for the technological innovation needed to provide Lockheed Martin Space Systems Company with future discriminating capabilities.

Mr. Frick joins Lockheed Martin after a nineteen-year career as a NASA Astronaut. He has flown two space missions on the Shuttle Atlantis, as pilot on mission STS-110 in 2002 and mission commander on STS-122, for a total of over 565 hours in space. Other key positions in support of human spaceflight included Astronaut Office Exploration Branch Chief, Orion Program Flight Crew Testing Lead, and the U.S. Naval Postgraduate School Smith/McCool NASA Chair Professor.

A 1986 graduate of the U.S. Naval Academy, he served as a naval aviator, strike fighter pilot, and test pilot retiring as a Captain in 2010. He has logged more than 4,300 flight hours in 38 different aircraft, including 26 combat missions and over 370 carrier landings. His awards include the Legion of Merit, the Distinguished Flying Cross, Navy Commendation Medal with Combat V, and Defense Meritorious Service Medal. Mr. Frick has a BS in Aerospace Engineering from the U.S. Naval Academy, and an MS in Aeronautical Engineering from the Naval Postgraduate School. He is a member of the Society of Experimental Test Pilots.







## Tucker "Cinco" Hamilton

"Making a Difference at Mach 2"

Lt Col Tucker "Cinco" Hamilton is a Experimental Fighter Test Pilot for the United States Air Force. He is also the Director of the F-35 Integrated Test Force and Commander of the 461st Flight Test Squadron at Edwards Air Force Base, California. He directs an integrated team of over 1,000 active duty, government civilians, and contractors in the planning, execution and reporting of F-35 Developmental Testing. Cinco started his Air Force career as an operational F-15C pilot. He supported multiple Red Flag Exercises and real world Operation Noble Eagle missions where he protected the President of the United States; at times escorting Air Force One. He then served as an Air Liaison Officer in Germany where he was the director of operations for a key command and control squadron. While serving in Germany he was hand-selected to be the initial cadre for the first MC-12 squadron in Afghanistan; heralding in the Air Force's first tactical Intelligence, Surveillance, and Reconnaissance aircraft. He served as the Chief Instructor for 200+ aircrew and accumulated over 400 combat hours directly supporting ground forces. After his time in the MC-12 he attended the USAF Test Pilot School (TPS) where he flew 30 different aircraft, wrote 38 technical reports, and took part in the first Automatic Air Collision Avoidance System testing.

After TPS graduation he became an F-15C and F-15E Instructor Experimental Test Pilot and the Technical Director for the Operational Flight Program Combined Test Force at Eglin AFB, FL. He was the lead test pilot on 11 test programs; supporting the newest software, systems, and weapons for the 450+ F-15 fleet. He then served at the Pentagon as the Developmental Test & Evaluation (DT&E) Lead for the Joint Strike Fighter, F-35; overseeing the entire DT&E effort for the U.S. Air Force, Navy, and Marines. He managed an 18 test-aircraft fleet of specially equipped F-35s across multiple operating locations with a \$3B budget. After his F-35 work in D.C. he transitioned to Edwards AFB, CA as the Director of F-35 Operations. After a year in that role he took Command of the F-35 Integrated Test Force where it current serves. Lt Col Hamilton is a senior pilot with combat experience and more than 1,700 flying hours in the F-35A/B/C, F-15C/D/E, F-18, F-16, A-10, T-38A/C, T-34, T-6, and 20 additional aircraft.



## Rostislav Spektor

Electric Propulsion and the Future of Space Exploration

Rostislav Spektor is the Electric Propulsion and Plasma Science section manager in the Propulsion Sciences Department at the Aerospace Corporation. He is also the current chair of the AIAA Electric Propulsion Technical Committee (EPTC) and the technical chair of the International Electric Propulsion

Dr. Spektor holds a PhD in Aerospace Engineering, with emphasis on electric propulsion and plasma science, from Princeton University. He also has a BS degree in Nuclear Engineering as well as in Materials Sciences from UC Berkeley. Dr. Spektor joined The Aerospace Corporation in 2004 as a Member of Technical Staff and participated in the design, construction, launches, and orbital support of multiple Air Force satellites. In his role as a laboratory section manager he is responsible for coordinating the efforts of a dozen PhD scientists and supporting staff. He also helped to develop and implement multiple commercial contracts, design and improve innovative diagnostics techniques and is an author of multiple journal and conference papers.





# CASTLE



## AIR MUSEUM



### Instructions for Castle Air Museum

- Departure from UC Merced:
  - o 9 AM: Walk with staff to the pickup area (indicated in booklet map) and begin student loading in vehicles.
  - o We recommend groups of students to utilize their own transportation from UCM to Castle Air Museum. Address is provided for your convenience.
- Castle Air Museum will be having three tour guides. You may elect to be with the tour groups or head on your own, it is completely your choice.
- Documentation, maps, and various information will be given at the entrance of Castle Air Museum and parking spaces.
- Castle Air Museum arrival and departure times are strictly enforced. If you are driving yourself, please leave by the departure time:
  - o Arrival Time: 9:30 AM
  - o Departure Time: 11:30 PM
- If you have any questions whatsoever, please text the number (209)-326-5540. We will reply instantly with answers.

Address: 5050 Santa Fe Dr, Atwater, CA 95301

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## NOTES

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