



JANNAF INTERAGENCY PROPULSION COMMITTEE JOINT ARMY-NAVY-NASA-AIR FORCE

65th JANNAF Propulsion Meeting (JPM)
Programmatic and Industrial
Base Meeting (PIB)
12th Modeling and Simulation (MSS)
10th Liquid Propulsion (LPS)
9th Spacecraft Propulsion (SPS)
JOINT SUBCOMMITTEE MEETING

**21-24
May
2018**

Registration is now open!

last updated 5/4/2018

**Hilton Long Beach
Long Beach, California**

**Meeting
Invitation**



JANNAF Meeting Invitation - May 2018

You are invited to attend the May 2018 meeting of the Joint Army-Navy-NASA-Air Force (JANNAF), which will consist of the 65th JANNAF Propulsion Meeting / Programmatic and Industrial Base (PIB) Meeting; and the Joint Meeting of the 12th Modeling and Simulation / 10th Liquid Propulsion / 9th Spacecraft Propulsion Subcommittees. This meeting will be held **Monday through Thursday, 21 - 24 2018, at the Hilton Long Beach in Long Beach, California.**



The Program Chair for the meeting is **Major Luke C. Dras**, Air Force Research Laboratory, Edwards AFB, CA. A complete list of Program Committee Members can be found on pages 6-8.

The JANNAF Interagency Propulsion Committee coordinates fundamental research, exploratory development, and advanced development programs; standardizes procedures for nomenclature; promotes and facilitates the exchange of technical information; and accomplishes problem solving in the areas of joint agency interest on propulsion systems for missiles, rockets, boosters, spacecraft, satellites, and guns.

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Meeting Scope

JANNAF Propulsion Meeting

The **JANNAF Propulsion Meeting (JPM)** encompasses research and applications at the systems level. The JPM is held each year in conjunction with standing JANNAF subcommittee meetings on a rotating basis. The scope of the 65th JPM in 2018 spans seven mission areas: Tactical Propulsion; Missile Defense/Strategic Propulsion; Propulsion Systems for Space Access; Gun and Gun-Launched Propulsion; Propulsion and Energetics Test Facilities; Sensors for Propulsion Measurement Applications; and System-wide Application of Additive Manufacturing for Propulsion Applications.

Programmatic and Industrial Base

The **Programmatic and Industrial Base (PIB)** areas of interest include integrated program plans and key decision points; industrial base assessments; risks and opportunities with respect to skills, knowledge, and experience; identification of commonality, innovative acquisition, and partnership opportunities; integrated assessments to identify rocket propulsion industrial base (RPIB) rationalization opportunities; special actions from senior agency, department, or Executive Office of the President (EOP) leadership; and information provided to decision makers for either situational awareness or policy decisions.

JANNAF subcommittees focus their resources on technical issues of interest to the JANNAF agencies.

Modeling and Simulation Subcommittee

The **Modeling and Simulation Subcommittee (MSS)** activities include modeling and simulation of systems; virtual engineering; development of software analogs of propulsion devices or systems; software integration-coupling of diverse simulation tools to enable more detailed, system-of-systems analysis and simulation; simulation credibility-uncertainty, verification, validation, reliability, and risk; and integrated health management-identification and management of off-nominal conditions in propulsion.

Johns Hopkins University Whiting School of Engineering Energetics Research Group (JHU WSE ERG)
provides technical and administrative support to the JANNAF Interagency Propulsion Committee.
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Liquid Propulsion Subcommittee

The **Liquid Propulsion Subcommittee (LPS)** addresses technical problems and issues of greatest national needs associated with liquid engine systems, including liquid and gel propulsion technology topics that include the overall engine system, combustion components, and propellant feed systems.

Spacecraft Propulsion Subcommittee

The **Spacecraft Propulsion Subcommittee (SPS)** focuses on the full array of spacecraft propulsion technology interests including electric propulsion, advanced chemical propulsion, solar thermal propulsion, nuclear thermal propulsion, aerocapture, solar sails, tether systems, and technologies for the future.

Hotel Information



Sleeping rooms have been reserved with the **Hilton Long Beach**, located at 701 W. Ocean Blvd., Long Beach, CA 90831-3012. Amenities include complimentary basic high speed internet access in guestrooms and discounted self-parking.

The JANNAF room rate per night for all attendees will be at the GFY2018 GSA per diem rate, currently \$173 plus state and local tax (15.4% at this time), for single or double occupancy.

These discounted rooms will be held for JANNAF attendees until the deadline of Monday, 30 April at 11:59 p.m. PDT, or until they sell out, whichever comes first. Each individual is responsible for his/her own reservation. Reservations may be made either on the Web (recommended) or by telephone (see below).

Note that the JANNAF discounted room rates are offered beginning Sunday, 20 May through the night of Thursday, 24 May, until sold out. Based upon availability, the hotel will honor the JANNAF discounted rates for up to three days pre- and post-meeting for those who wish to extend their stay.

Federal and State of California employees may be exempt from the City of Long Beach Transient Occupancy Tax (TOT). Please review the [requirements](#) and, if qualified,

complete the [Long Beach Transient Occupancy Tax Exemption Form](#). Submit the form and other required documentation at the time of payment for your room.

Make Your Reservation Online

Click on the reservation link on the [Hotel Page](#) of the meeting website to make your reservation. Using this link will give you **direct access to the JANNAF meeting discounted room block**. Changes to your reservation can also be made via this weblink with your confirmation number.

For additional reservation assistance, please call 1-800-HILTONS (445-8667). Be sure to reference the 2018 May JANNAF Conference to get the JANNAF discounted rate.

Need to cancel your reservation? Be sure to do so no less than 24 hours prior to arrival to avoid paying a cancellation penalty.

Transportation and Parking

The three airports closest to Long Beach, listed in order by distance from the hotel, are:

- [Long Beach Airport \(LGB\)](#) - 10 miles
- [Los Angeles International Airport \(LAX\)](#) - 21 miles
- [John Wayne / Orange County Airport \(SNA\)](#) - 30 miles

Drive time between the hotel and any of the area airports will vary by time of day.

There may be specific travel guidance for DoD employees. Please check the meeting website for guidelines regarding use of personal vehicles or rental cars.

The hotel does not offer airport shuttle service. However, **Prime Time Shuttle** is offering a 10% discount to JANNAF attendees for shared-ride van service and other transportation services between any of the above airports and the hotel. Go [here](#) to get pricing for your airport transportation (for example, from LAX, \$34.10 round trip for one person) and to make a reservation.

For other transportation options, such as taxis, Uber, Lyft, and rental cars, costs vary by airport. Visit the airport websites (links above) for more information about ground transportation.

For those driving personal vehicles or renting a car, the Hilton Long Beach is offering JANNAF attendees a discounted rate of \$15.00 per day (usually \$22) for self-

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parking (with in/out privileges) in the hotel's garage. Overnight guests of the hotel may charge their parking to their room. Attendees commuting or staying elsewhere will need to have their parking ticket validated before exiting the garage.

Meeting Site

All sessions will be held at the **Hilton Long Beach** in downtown Long Beach, California. For attendance at this meeting, please see the Security/Attendance Requirements and Registration instructions below.

Security/Attendance Requirements

The overall security classification of this meeting is Unclassified.

To qualify to attend this meeting, all attendees must be employed by a DoD, DoE, or NASA facility, or with a DoD, DoE, or NASA contractor facility eligible for receipt of militarily-critical technical data. All attendees must also be **invited U.S. citizens qualified to receive unclassified, limited-distribution information. No foreign nationals are permitted to attend.**

Questions concerning attendance eligibility should be directed to the JHU WSE ERG Facility Security Officer, Mary Gannaway, at (410) 992-7304, ext. 211 or mtg@jhu.edu.

Registration

Registration is now open. Register and pay the registration fee by Friday, 18 May at 5:00 p.m. EDT to take advantage of the lowest fee.

To register, you must have a JANNAF Secure Portal account. Please visit the [Registration Page](#) of the meeting website for additional information and important links.

Registration for this JANNAF meeting is a **two-part process**; to complete this process:

1. Register for the meeting via the **JANNAF Secure Portal**.
2. Pay the registration fee (Portal account **not** required).

Additional information and important links for completing your meeting registration can be found at <https://www.jannaf.org/mtgs/2018May/pages/registration.html>.

Registration Fee

For details of what the registration fee includes, please go to the [Registration Page](#) of the meeting website. Please reference the registration fee chart below to determine the amount applicable to your registration. **The dates noted below are based on payment being received.**

Payment Received	Regular Attendee	Student*
<i>on or before 5/18/18</i>	\$1,200.00	\$250.00
<i>5/19/18 or later</i>	\$1,350.00	\$250.00

* A discounted registration fee is offered for **full time** students, interns, and cooperative education students. Students must meet the security/attendance requirements noted above and present current student identification upon registration on-site.

Registration payment will be accepted via check payable to JHU WSE Energetics Research Group, purchase order (government only), or by credit card (VISA, MasterCard, American Express) using the Registration Payment site available online. Go to the [Registration Page](#) of the meeting website, and click on "Pay Registration Fee."

Attendees are encouraged to complete step one of the registration process via the JANNAF Secure Portal, and submit payment, on or before Friday, 18 May 2018 to ensure prompt registration upon arrival at the meeting. Credit card payments made electronically via the Web will be charged immediately; a receipt will be sent to you via email.

Cancellation Policy

Please note our cancellation policy—Written (email) cancellations submitted on or before 7 May 2018 will receive a full refund minus an administrative fee of \$50.00. Cancellations made after 7 May 2018 **will not be refunded**. Substitutes are welcome as long as the request for substitution is from the original attendee; attendance eligibility is appropriately met by the substitute; and the original and substitute attendee are from the same organization to facilitate transfer of registration funds. Please contact Shelley Cohen via email to scohen@erg.jhu.edu to transfer or cancel your registration.

On-Site Registration / Check-in

The JANNAF Registration desk will be located on the second floor of the Hilton Long Beach. Photo identification is required upon registration or check-in. The desk will be open Monday, 21 May from 10:00 a.m. - 5:00 p.m., and Tuesday, 22 May through Thursday, 24 May from 7:00 a.m. - 5:00 p.m.

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Attention DoD

A memorandum for signature to certify the May 2018 JANNAF Meeting in Long Beach CA as a “government sanctioned” conference has been submitted by Mr. Drew DeGeorge, member of the JANNAF Executive Committee from the Air Force Research Laboratory at Edwards AFB.

We anticipate having the signed memo soon. In the meantime, **interested DoD attendees are strongly encouraged to obtain a JANNAF Secure Portal account now and register for the meeting** (step 1). This step does not require travel or training office authorization as it does not include a financial commitment. Payment of the registration fee may be completed as soon as permitted.

Having a Secure Portal account also gives you access to the Preliminary Program with detailed session agendas, and the online Final Program.

Attire

There is no official dress code for JANNAF conferences; however, most attendees wear business or business casual attire. When packing, keep in mind that it can be difficult to regulate the temperature in meeting rooms to everyone's liking, and any changes may not be noticeable quickly, so it is best to bring a sweater or jacket and dress in layers.

Dining

Approximately one and one-half hours for lunch has been built into the program each day. Restaurants in the hotel include The Loft (breakfast), Enclave Lobby Bar and Kitchen (lunch and dinner), and the Cafe (breakfast through mid-afternoon). Additionally, the hotel is located in downtown Long Beach with many dining options within a short walk or short free bus ride.

Networking Room

The International Ballroom Salon III on the 2nd floor of the hotel will serve as the JANNAF networking area; a light continental breakfast and mid-morning coffee break along with mid-afternoon refreshments will be served at the times stated in the program. This area will be open Monday from 10:00 a.m. - 5:00 p.m., Tuesday and Thursday from 7:00 a.m. - 5:00 p.m., and Wednesday from 7:00 a.m. to 4:15 p.m. Please note that scheduled breaks are included in session agendas where time permits.

Networking Night

Come enjoy an evening with fellow JANNAF attendees on Wednesday, 23 May, from 6:30-8:00 p.m., in International Ballroom Salons III-V at the Hilton Long Beach. **There is no charge for meeting attendees**; however, guest tickets may be purchased on the Registration Payment site for \$45 (admission is free for children five and under). Be sure to wear your JANNAF badge to attend the event.

Reading Room

All papers presented in the technical sessions and received in time will be available to read via JANNAF touch-screen tablets in the Reading Room, located in the Caribbean Room and open Monday from 1:30 p.m. - 4:30 p.m., and Tuesday through Thursday from 8:00 a.m. - 4:30 p.m. Reproduction of Reading Room papers is not permitted.

Side Meetings

A limited number of meeting rooms of varying sizes are available for JANNAF-related side meetings. Audiovisual equipment will not be provided. Please contact Shelley Cohen at scohen@erg.jhu.edu to reserve a room as soon as possible. Requests may also be made on-site during the meeting. Rooms will be assigned first-come, first-served.

Program Changes

Meeting programs will be distributed to attendees upon registration/check-in on-site. Note that **Final Programs are Distribution Statement C and should be secured when not in your possession**. Changes to the Final Program will be posted on touch screen monitors located on the 2nd floor. Attendees should periodically check for program updates and administrative announcements and note these updates in their copy of the Final Program.

Meeting Proceedings

Proceedings from this meeting will be published by the JHU WSE Energetics Research Group. Papers, and in limited cases, presentations will be provided complimentary to attendees of this meeting who have paid the full registration fee (early or regular). These attendees will have access to these materials beginning approximately 12 weeks following the meeting via the JANNAF Digital Online Collection (JDOC) Database accessible through your account on the JANNAF Secure Portal. This benefit is not available for student attendees.

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Questions

Questions concerning this program and/or payment of the registration fee should be directed to Shelley Cohen at (410) 992-7302, ext. 215 or email: scohen@erg.jhu.edu.

Questions pertaining to registering via the JANNAF Secure Portal should be directed to:

Mary Gannaway: Call (410) 992-7304, ext. 211 or email mtg@jhu.edu

OR

Tricia Reider: Call (410) 992-7300, ext. 222 or email treider@erg.jhu.edu

Upcoming JANNAF Meetings

45th Structures and Mechanical Behavior
41st Propellant and Explosives Development and Characterization
32nd Rocket Nozzle Technology
30th Safety and Environmental Protection
Joint Subcommittee Meeting
Programmatic and Industrial Base Meeting
December 2018
Portland, OR

66th JANNAF Propulsion Meeting
Programmatic and Industrial Base Meeting
49th Combustion
37th Airbreathing Propulsion
37th Exhaust Plume and Signatures
31st Propulsion Systems Hazards
Joint Subcommittee Meeting
Spring 2019
Location TBD

Program Committee Members

PROGRAM CHAIR

Major Luke C. Dras
Air Force Research Laboratory
Edwards AFB, CA

JANNAF PROPULSION MEETING PROGRAM COMMITTEE

Mr. Bruce R. Askins
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Mission Area III: Propulsion Systems for Space Access

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Mission Area IV: Gun and Gun-Launched Propulsion

Mr. Paul L. Henderson
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Mission Area V: Propulsion and Energetics Test Facilities

Mr. Michael D. Owen
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Ms. Julie A. Carlisle
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Mission Area VI: Sensors for Propulsion Measurement Applications

Dr. Gary W. Hunter
NASA Glenn Research Center / Cleveland, OH

Mission Area VII: System-wide Application of Additive Manufacturing for Propulsion Applications

Mr. James L. Cannon
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PROGRAMMATIC AND INDUSTRIAL BASE

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Mission Area II: Integrated Health Management

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Mr. Nils M. Sedano
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Mission Area II: Liquid Combustion Subsystems and Components

Dr. Christopher S. Protz
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Mr. Robert N. Bernstein
Air Force Research Laboratory / Edwards AFB, CA

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Mission Area III: Liquid Propellant Feed and Pressurization Systems

Mr. James L. Cannon
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Mr. Alan M. Sutton
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Mission Area IV: Advanced Materials for Liquid Propulsion Applications

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Mission Area V: Spacecraft Modeling and Simulation

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Program Highlights

Keynote Address



Ms. Roberta M. Ewart, Chief Scientist, Space and Missile Systems Center (SMC), Air Force Space Command, at Los Angeles AFB, CA, will present the keynote at this year's conference. The title of Ms. Ewart's address is "**Novel Orbits for Guardians of the High Frontier.**" She will present a three part keynote addressing the need for modeling and simulation of novel orbits,

primarily non-Keplerian orbits, how in space propulsion will change to support novel orbits and current SMC technology efforts devising the technology to support novel orbits to ensure U.S. maintains an asymmetric advantage in the contested space domain.

Roberta Ewart is a distinguished graduate in physics from the United States Air Force Academy and earned the Air Force's first ever Marshall Scholarship to Oxford University, United Kingdom. There she completed master's degrees in

Theoretical Physics and Philosophy of Science and crewed on two championship rowing teams. Attending night school, she completed a master's degree in Electrical Engineering from University of Colorado focusing on electro-optics and satellite design. She attended Stanford University, Palo Alto, CA, earning the Degree of Engineer (DE) in Electrical Engineering in advanced low noise laser systems. Ms. Ewart was competitively selected as the first chief scientist at SMC in 2006. In this role, she is the center's principal scientific authority and supports the SMC Commander in assessments of advanced technology. Her primary duty is to advance the knowledge of emerging technologies for improving Air Force space capabilities.

Ms. Ewart holds DAWIA Level 3 Certifications in: Program Manager (PM) and Systems Planning, Research and Development (SPRDE).

All attendees are invited to participate. **The Keynote Address begins at 8:00 a.m. on Tuesday, 22 May, in International Ballroom IV-V** on the second floor of the hotel. An awards presentation will immediately follow the Keynote Address.

Additional Program Highlights

Programmatic and Industrial Base Meeting

The PIB will offer several Specialist Sessions during the May meeting:

- Department of Commerce Propulsion Supplier Survey and Analysis Summary (session 1R on Monday at 1:30 p.m.)
- Commodities Panel (LLPWG) Meeting on LNG and Methane (session 3G on Wednesday at 8:00 a.m.)
- Launch Vehicle Reusability - Approaches to Achieve System Reliability (session 3S on Wednesday at 1:30 p.m.)
- US Test and Evaluation Capabilities (session 4B on Thursday at 8:00 a.m.)
- US Test and Evaluation Challenges, Obsolescence / Regulatory Compliance / Technology Infusion (session 4N on Thursday at 1:30 p.m.)

Modeling and Simulation

Europa Model Based System Engineering (MBSE)

System models and simulations are essential to the improved speed and quality of system engineering. The Jet Propulsion Laboratory (JPL) has been trail blazing the application of model based approaches to the system engineering of the Europa Mission.

The **MSS Plenary** will feature the lessons learned from JPL's Integrated Model Centric Engineering Initiative (IMCE). This will discuss the five system engineering challenges to be addressed by MBSE. Europa Clipper has completed Phase A (Formulation) with a successful System Requirements Review / Mission Definition Review, and is nearing the end of Phase B, with a successful Flight System Preliminary Design Review in October 2017 supported by the application of MBSE. This talk proposes a practical method for

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Program Highlights - continued

measuring value added through use of MBSE, applies this method to the Europa Clipper Project, and suggests how it might be applied to other projects and organizations.

In addition, a Specialist Session will present the results of three other works on Europa MBSE including, “Europa Clipper Science Robustness”, “End-to-End High Fidelity Integrated Full Mission Power/Energy Simulation”, and “Europa Clipper Payload Energy Management Statistical Approach” (session 4F on Thursday, 8:00 a.m. to 12:05 p.m.).

Aerospace Modeling and Simulation Tool Demonstrations

The MSS is providing the demonstration of four modeling and simulations tools supporting the design of aerospace systems in three separate time slots (all within session 3F on Wednesday, between 8:00 a.m. and 12:00 p.m.). Each demonstration provides a brief introduction to the tool along with a demonstration in aerospace application. Tools to be demonstrated include: FEM Builder/Sensor Design and Analysis; HERO; and ROCETS. These demonstrations will provide engineers with a basic understanding in the application of these tools.

Liquid Propulsion

Mr. N. Wayne Hale, Jr., Director of Human Spaceflight and Energy Services for Special Aerospace Services, LLC, and former NASA Space Shuttle Program Manager, will moderate an **LPS Plenary** panel discussion entitled, “**U.S. Government’s Role in Future LRE Development and Technology Maturation**” in session 3C (8:00 a.m.) on Wednesday morning. Panel Members will be representatives from Industry and Government. Potential discussion topics:

- U.S. Government acceleration of propulsion technology development.
- Next technology push for U.S. LRE development.
- Effectiveness of private/public partnerships process in terms of meetings needs of private sector and U.S. government needs.
- PPP’s impact on competition, affordability, reliability and innovation by the IB, as well as USG funded LRE development and technology base.
- Alternate approaches to reduced LRE certification costs such as analysis based certification.

See page 28 of the Preliminary Program for more information about the LPS Plenary Panel Discussion.

Additional LPS program highlights include:

- Multiple combustion stability sessions and workshops, including CSTD final results (session 1M at 1:30 p.m. on Monday), and CPIA 655 revision (session 3T on Wednesday at 1:30 p.m.).
- SMC test standards workshop (session 3Q on Wednesday at 1:30 p.m.).
- Sessions on advanced engine technologies, including modular engine architecture (session 4H at 8:00 a.m. on Thursday), and rotating detonation rocket engines (session 4T on Thursday at 1:30 p.m.).
- multiple sessions on oxygen-rich staged combustion (sessions 2D and 2P, on Tuesday at 10:00 a.m. and 1:30 p.m. respectively) and hydrocarbon fuels (session 4T on Thursday at 1:30 p.m.).

Spacecraft Propulsion

SPS will hold a two-part Workshop on **Electric Propulsion Operation in the Space Environment and Facility Interactions III (EPOSE – III)** on Thursday (sessions 4C at 8:00 a.m. and 4O at 1:30 p.m.). There is growing interest in electric propulsion (EP) within the commercial satellite sector and the U.S. Government. To date, EP systems have successfully operated on hundreds of satellites. However, there are instances where measured thrust levels and other fundamental characteristics diverge between flight and ground test; detailed explanations for the differences have not been established. To fully exploit this pervasive space technology, it is prudent to leverage existing flight data and community-wide expertise to enhance predictive capabilities and reduce risk for future missions. This will improve evaluation of existing EP systems for innovative mission applications and support development of advanced EP technologies for future space capabilities. To this end, a working group called Electric Propulsion Operation in the Space Environment (EPOSE) was formed, with a goal of understanding and mitigating facility effects in the testing and characterization of EP devices, and thereby supporting transition of EP technologies to flight.

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The goals of the EPOSE - III Workshop include:

- Provide an overview of the findings from the 2016 EPOSE II workshop.
- Present detailed overview of the AEHF-2 On-Orbit Environmental and Contamination Sensor Data.
- Present to the EP community the progress that has been made to date on the development of the plasma diagnostics package (PDP) for NASA's Propulsion and Power Element.
- Present recent advances in EP thruster modeling activities at DoD, NASA, and Academia.
- Overview of Present and Future US EP Test Facilities.

Technical Program

This year's technical program currently consists of 38 technical sessions with more than 200 presentations, plus 11 specialist sessions, 4 workshops, 11 panel meetings, plus a plenary presentation and a panel discussion conducted by subcommittees. A detailed daily schedule of all sessions, workshops, meetings and networking activities is provided below and continues through page 14. Detailed agendas of the technical sessions, specialist sessions, and workshops are listed in the Program Section of the Preliminary Program beginning on page 15 (JANNAF Secure Portal account required for access).

A Schedule Color Key has been provided on pages 12 and 14.

SCHEDULE - Monday, 21 May					
10:00 a.m. - 5:00 p.m.	On-Site Check-In and Registration Desk Open				
10:00 a.m. - 5:00 p.m.	I.T. Office Open (for Presenters and Session Chairs needing technical assistance)			Atlantic I	Open
10:00 a.m. - 11:00 a.m.	Networking Area Refreshments			International III	Open
12:00 p.m. - 1:30 p.m.	PIB Executive Committee Meeting			Mediterranean I&II	Closed
12:45 p.m. - 1:00 p.m.	Session Chair Meeting (Monday Sessions)			Caribbean	Closed
1:30 p.m. - 4:30 p.m.	Reading Room			Caribbean	Open
1:30 p.m. - 5:35 p.m.	Monday Afternoon Technical Sessions, Workshop, Specialist Session, and Panel Meeting				
1:30 p.m. - 5:05 p.m.	IM	LPS	Combustion Stability Tool Development: Final Results	International I	Open
1:30 p.m. - 5:30 p.m.	IN	MSS	WORKSHOP: Uncertainty Quantification Approach Incorporating Epistemic and Aleatory Uncertainty Sources	International II	Open
1:30 p.m. - 3:35 p.m.	IP	LPS	Propellant Tank, Feed System and Pressurization Systems	Pacific I	Open
1:30 p.m. - 5:35 p.m.	IQ	LPS	Additively Manufactured Component Development and Test	Pacific II	Open
1:30 p.m. - 5:30 p.m.	IR	PIB	SPECIALIST SESSION: Department of Commerce Propulsion Supplier Survey and Analysis Summary (US Government ONLY)	Gallerie I	US Govt Only
1:30 p.m. - 4:35 p.m.	IS	SPS	Advanced Propulsion Concepts	Gallerie II	Open
1:30 p.m. - 2:35 p.m.	IT	SPS	Micropropulsion: In-Space Propulsion Systems	Gallerie III	Open
2:35 p.m. - 3:05 p.m.	IT	SPS	PANEL MEETING: SmallSat Propulsion Technology Readiness Level Standard Definition	Gallerie III	Open
3:05 p.m. - 4:05 p.m.	Networking Area Refreshments			International III	Open

JANNAF Meeting Invitation - May 2018

SCHEDULE - Tuesday, 22 May

7:00 a.m. - 5:00 p.m.	On-Site Check-In and Registration Desk Open				
7:00 a.m. - 5:00 p.m.	I.T. Office Open (for Presenters and Session Chairs needing technical assistance)			Atlantic I	Open
7:00 a.m. - 8:00 a.m.	Networking Area Refreshments			International III	Open
7:15 a.m. - 7:30 a.m.	Session Chair Meeting (Tuesday Sessions)			Caribbean	Closed
8:00 a.m. - 10:00 a.m.	KEYNOTE ADDRESS: "Novel Orbits for Guardians of the High Frontier" Ms. Roberta M. Ewerts, Space and Missile Systems Center (SMC), Air Force Space Command <i>Awards and Announcements</i>			International IV-V	Open
8:00 a.m. - 4:30 p.m.	Reading Room			Caribbean	Open
9:30 a.m. - 10:00 a.m.	Networking Area Refreshments			International III	Open
10:00 a.m. - 6:00 p.m.	JANNAF Technical Executive Committee Meeting			Gallerie Boardroom	Closed
10:00 a.m. - 12:05 p.m.	Tuesday Morning Technical Sessions				
10:00 a.m. - 12:05 p.m.	2B	SPS	Electric Propulsion Flight Data and Mission Concepts	International II	Open
10:00 a.m. - 11:05 a.m.	2D	LPS	Oxygen Rich Technology Maturation - I	Pacific I	Open
10:00 a.m. - 12:05 p.m.	2E	LPS	Combustion Stability and Dynamics - I	Pacific II	Open
10:00 a.m. - 12:05 p.m.	2F	MSS/SPS	Advances in Spacecraft Modeling and Simulation Approaches	Gallerie I	Open
10:00 a.m. - 12:05 p.m.	2G	JPM	Sensors and Measurements for Propulsion Applications	Gallerie II	Open
10:00 a.m. - 12:05 p.m.	2H	LPS	Liquid Propulsion Fuels - Methane	Gallerie III	Open
12:00 p.m. - 1:30 p.m.	Lunch Break - <i>On Your Own</i>				
12:05 p.m. - 1:25 p.m.	SPS Technical Steering Group Meeting			Coral	Closed
1:30 p.m. - 5:30 p.m.	PIB Dept of Commerce Propulsion Supplier Survey & Analysis One-on-Ones			Mediterranean I	Closed
1:30 p.m. - 6:35 p.m.	Tuesday Afternoon Technical Sessions and Panel Meetings				
1:30 p.m. - 4:35 p.m.	2M	SPS	Test Results	International I	Open
1:30 p.m. - 5:35 p.m.	2N	SPS	Hall Thruster Research and Development - I	International II	Open
1:30 p.m. - 4:35 p.m.	2O	JPM	Additive Manufacturing of Gun Propellant and Charges	International IV & V	Open
1:30 p.m. - 5:35 p.m.	2P	LPS	Oxygen Rich Technology Maturation - II	Pacific I	Open
1:30 p.m. - 3:35 p.m.	2Q	LPS	Combustion Stability and Dynamics - II	Pacific II	Open
4:05 p.m. - 5:35 p.m.	2Q	LPS	PANEL MEETING: Combustion Stability	Pacific II	Open
1:30 p.m. - 5:35 p.m.	2R	MSS	Model-Based System Engineering Analysis	Gallerie I	Open
5:35 p.m. - 6:35 p.m.	2R	MSS	PANEL MEETING: Model-Based System Engineering	Gallerie I	Open
1:30 p.m. - 3:05 p.m.	2S	JPM	Rocket System Technology Developments	Gallerie II	Open
1:30 p.m. - 5:05 p.m.	2T	LPS	Materials and Manufacturing	Gallerie III	Open
5:05 p.m. - 5:50 p.m.	2T	LPS	PANEL MEETING: Advanced Materials	Gallerie III	Open
3:05 p.m. - 4:05 p.m.	Networking Area Refreshments			International III	Open

Schedule Color Key

Meeting Services	Concurrent Sessions or Panel Meetings
Networking Opportunities	Session Details
Closed Meetings	Panel, Town Hall, & Working Group Meetings

JANNAF Meeting Invitation - May 2018

SCHEDULE - Wednesday, 23 May

7:00 a.m. - 5:00 p.m.	On-Site Check-In and Registration Desk Open				
7:00 a.m. - 5:00 p.m.	I.T. Office Open (for Presenters and Session Chairs needing technical assistance)			Atlantic I	Open
7:00 a.m. - 8:00 a.m.	Networking Area Refreshments			International III	Open
7:15 a.m. - 7:30 a.m.	Session Chair Meeting (Wednesday Sessions)			Caribbean	Closed
8:00 a.m. - 4:30 p.m.	Reading Room			Caribbean	Open
8:00 a.m. - 12:05 p.m.	Wednesday Morning Technical Sessions, Specialist Sessions, Subcommittee Plenary, and Panel Meetings				
8:00 a.m. - 11:05 a.m.	3A	JPM	Missile Defense and Strategic Propulsion	International I	Open
8:00 a.m. - 11:05 a.m.	3B	SPS	Hall Thruster Research and Development - II	International II	Open
11:05 a.m. - 12:05 p.m.	3B	SPS	PANEL MEETING: Electric Propulsion	International II	Open
8:00 a.m. - 10:00 a.m.	3C	LPS	PLENARY PANEL DISCUSSION: U.S. Government's Role in Future LRE Development and Technology Maturation	International IV & V	Open
8:00 a.m. - 9:35 a.m.	3D	SPS	Programs and Systems	Pacific I	Open
10:05 a.m. - 11:05 a.m.	3D	SPS	PANEL MEETING: Development Needs in Modern Chemical Spacecraft Propulsion Systems	Pacific I	Open
8:00 a.m. - 11:05 a.m.	3E	MSS	Model Validation and Uncertainty Quantification	Pacific II	Open
11:05 a.m. - 11:35 a.m.	3E	MSS	PANEL MEETING: Simulation Credibility	Pacific II	Open
8:00 a.m. - 12:00 p.m.	3F	MSS	SPECIALIST SESSION: Propulsion Modeling and Simulation Tools Demonstration	Gallerie I	Open
8:00 a.m. - 12:00 p.m.	3G	PIB	SPECIALIST SESSION: Commodities Panel (LLPWG) Meeting on LNG and Methane	Gallerie II	Open
8:00 a.m. - 11:05 a.m.	3H	JPM	Gun Propellant Manufacturing, Processing and Formulation	Gallerie III	Open
10:00 a.m. - 10:35 a.m.	Networking Area Refreshments			International III	Open
12:00 p.m. - 1:30 p.m.	Lunch Break - <i>On Your Own</i>				
12:00 p.m. - 1:30 p.m.	PIB Large Liquids Propulsion Working Group Meeting (US Government ONLY)			Coral	Closed
1:30 p.m. - 6:05 p.m.	Wednesday Afternoon Technical Sessions, Specialist Sessions, and Panel Meetings				
1:30 p.m. - 4:35 p.m.	3M	SPS	Materials and Components	International I	Open
2:00 p.m. - 4:35 p.m.	3N	MSS/JPM/LPS	System Health Management	International II	Open
4:35 p.m. - 5:05 p.m.	3N	MSS	PANEL MEETING: Integrated Health Management	International II	Open
1:30 p.m. - 4:35 p.m.	3O	MSS	Propellant Slosh Modeling	International IV & V	Open
1:30 p.m. - 5:10 p.m.	3P	LPS	Part 1 - Engine System Production and Development Part 2 - SPECIALIST SESSION: University Rocket Projects	Pacific I	Open
1:30 p.m. - 3:30 p.m.	3Q	LPS	SPECIALIST SESSION: SMC-S-025 "Evaluation and Test Requirements for Liquid Rocket Engines": Background and Key Elements	Pacific II	Open
4:00 p.m. - 5:00 p.m.	3Q	LPS	PANEL MEETING: Test Practices and Standards	Pacific II	Open
1:30 p.m. - 5:05 p.m.	3R	SPS	Micropropulsion: Electro spray	Gallerie I	Open
1:30 p.m. - 5:35 p.m.	3S	PIB	SPECIALIST SESSION: Launch Vehicle Reusability - Approaches to Achieve System Reliability	Gallerie II	Open
1:30 p.m. - 6:05 p.m.	3T	LPS	SPECIALIST SESSION: LRE Combustion Stability CPIA 655 Revision Effort Review	Gallerie III	Open
4:30 p.m. - 5:15 p.m.	JPM Program Planning Meeting			Gallerie Boardroom	Closed
3:00 p.m. - 4:05 p.m.	Networking Area Refreshments			International III	Open
6:00 p.m. - 8:00 p.m.	Networking Night - Dinner and Cash Bar <i>JANNAF Badge or Guest Ticket required</i>			International III-V	Open

JANNAF Meeting Invitation - May 2018

SCHEDULE - Thursday, 24 May

7:00 a.m. - 5:00 p.m.	On-Site Check-In and Registration Desk Open					
7:00 a.m. - 5:00 p.m.	I.T. Office Open (for Presenters and Session Chairs needing technical assistance)			Atlantic I	Open	
7:00 a.m. - 8:00 a.m.	Networking Area Refreshments			International III	Open	
7:15 a.m. - 7:30 a.m.	Session Chair Meeting (Thursday Sessions)			Caribbean	Closed	
8:00 a.m. - 4:30 p.m.	Reading Room			Caribbean	Open	
8:00 a.m. - 12:05 p.m.	Thursday Morning Technical Sessions, Workshops, Specialist Sessions, Subcommittee Plenary, and Panel Meetings					
8:00 a.m. - 9:35 a.m.	4A	JPM	Gun Propellant Test and Characterization	International I	Open	
8:00 a.m. - 11:35 a.m.	4B	PIB	<i>SPECIALIST SESSION: US Test and Evaluation Capabilities</i>	International II	Open	
8:00 a.m. - 12:00 p.m.	4C	SPS	<i>WORKSHOP: Electric Propulsion Operation in the Space Environment and Facility Interactions III (EPOSE - III) - Part I</i>	International IV & V	Open	
8:00 a.m. - 10:05 a.m.	4D	SPS	Bipropellants	Pacific I	Open	
8:00 a.m. - 11:05 a.m.	4E	LPS	Hydrocarbon Fuels Characterization of Properties and Performance	Pacific II	Open	
11:05 a.m. - 11:35 a.m.	4E	LPS	<i>PANEL MEETING: Hydrocarbon Fuels</i>	Pacific II	Open	
8:00 a.m. - 12:05 p.m.	4F	MSS	Part 1 - <i>WORKSHOP: Sensor and Sensing System Handbook Development for Aerospace Propulsion Systems II</i> Part 2 - <i>SPECIALIST SESSION: Europa MBSE - I</i> Part 3 - <i>PLENARY: Measuring Value of MBSE on Europa Clipper</i> Part 4 - <i>SPECIALIST SESSION: Europa MBSE - II</i>	Gallerie I	Open	
8:00 a.m. - 11:05 a.m.	4G	LPS	Liquid Rocket Engine Turbomachinery	Gallerie II	Open	
11:05 a.m. - 12:05 p.m.	4G	LPS	<i>PANEL MEETING: Turbomachinery</i>	Gallerie II	Open	
8:00 a.m. - 12:05 p.m.	4H	LPS	Modular Rocket Engine Studies, Concepts, and Development	Gallerie III	Open	
9:35 a.m. - 10:35 a.m.	Networking Area Refreshments			International III	Open	
12:00 p.m. - 1:30 p.m.	Lunch Break - <i>On Your Own</i>					
12:00 p.m. - 1:30 p.m.	MSS Technical Steering Group Meeting			Gallerie Boardroom	Closed	
12:00 p.m. - 1:30 p.m.	PIB T&E Working Group Meeting			Mediterranean I	Closed	
12:00 p.m. - 1:30 p.m.	LPS Technical Steering Group Meeting			Mediterranean II	Closed	
1:30 p.m. - 6:05 p.m.	Thursday Afternoon Technical Sessions, Workshop, and Specialist Session					
1:30 p.m. - 3:00 p.m.	4G	LPS	<i>PANEL MEETING: Turbomachinery - Continued</i>	Gallerie II	Open	
1:30 p.m. - 5:05 p.m.	4M	JPM	Gun Propellant Modeling	International I	Open	
1:30 p.m. - 6:00 p.m.	4N	PIB	<i>SPECIALIST SESSION: US Test and Evaluation Challenges, Obsolescence / Regulatory Compliance / Technology Infusion</i>	International II	Open	
1:30 p.m. - 5:45 p.m.	4O	SPS	<i>WORKSHOP: Electric Propulsion Operation in the Space Environment and Facility Interactions III (EPOSE - III) - Part II</i>	International IV & V	Open	
1:30 p.m. - 6:05 p.m.	4P	LPS	Combustion, Injection, and Coking Modeling	Pacific I	Open	
1:30 p.m. - 5:05 p.m.	4Q	LPS	Component, Development and Test	Pacific II	Open	
1:30 p.m. - 5:05 p.m.	4T	LPS	Linear and Rotating Detonation Rocket Engines	Gallerie III	Open	
3:05 p.m. - 4:05 p.m.	Networking Area Refreshments			International III	Open	

Schedule Color Key

Meeting Services	Concurrent Sessions or Panel Meetings
Networking Opportunities	Session Details
Closed Meetings	Panel, Town Hall, & Working Group Meetings