PROGRAM

47th ANNUAL AAS GUIDANCE, NAVIGATION & CONTROL CONFERENCE

January 31st to February 5th, 2025

American Astronautical Society

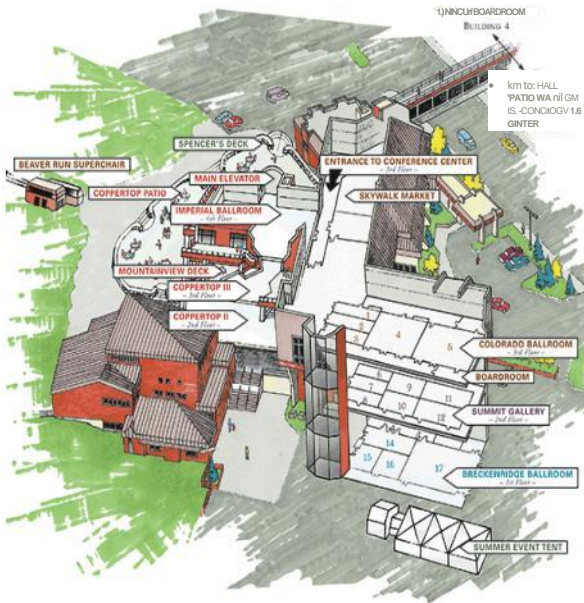Rocky Mountain Section

Conference Location

BEAVER RUN
CONFERENCE CENTER
Breckenridge, Colorado

Room check-in at the Beaver Run Resort
front desk 4:00 PM daily

Conference Registration

Friday 5:00 to 8:00 PM
Daily 6:30 to 10:00 AM and 4:00 to 6:00 PM

Registration Questions

Michelle Barath	303-887-7724
Amy Delay	303-731-9876

47th Annual AAS Guidance, Navigation & Control Conference Chairperson

Graeme Ramsey
Lockheed Martin Space
303-977-1185
graeme.d.ramsey@lmco.com

Wi-Fi Access

Select "Beaver Run Meeting 1" wireless network.
Open a browser window
Enter voucher code: **conferencewifi**

Conference Website

https://aas-rocky-mountain-section.org/

Online Program and Pre-print Paper Access read-only

2025 AAS - Rocky Mountain GN&C Conference xcdsystem.com

QR Code for Online Program

Conference Schedule Overview

Friday January 31st

Conference Registration	5 – 8 pm
Welcome Reception	6 – 9 pm

Saturday February 1st

Breakfast	6:15 – 7 am
Morning Session	7 – 10 am
NASA Astronaut for Children	4 – 5 pm
Technical Exhibits	5 – 8 pm

Sunday February 2nd

Breakfast	6:15 – 7:00 am
Morning Session	7 – 10:30 am
Poster Session Break	8:30 – 9 am
Tutorial (w/ break for lunch)	11 am – 2:30 pm
Afternoon Session	4 – 7 pm
Casino Night	7 – 9:30 pm

Monday February 3rd

Breakfast	6:15 – 7:00 am
Morning Session	7 – 10:30 am
Poster Session Break	8:30 – 9 am
Tutorial (w/ break for lunch)	11 am – 1:30 pm
Afternoon Session	4 – 7 pm
Social Event	7:30 - 8:30 pm

Tuesday February 4th

Breakfast	6:15 – 7:00 am
Morning Session	7 – 10:00 am
Afternoon Session	4 – 7 pm

Wednesday February 5th

Breakfast	6:15 – 7 am
Morning Session	7 – 10:30 am

SATURDAY, FEBRUARY 1ST
7AM CONFERENCE OPENING

S01 - Student Innovations Session
7:00 AM - 10:30 AM

This session embraces the wealth of research and innovative projects related to spacecraft GN&C being accomplished in the university setting. Papers in this session address hardware/software research as well as component, system, or simulation advances. Papers submitted must have a student as the primary author and presenter. Papers will be adjudicated based on level of innovation, complexity of problem solved, perceived technical readiness level, applicability and field-ability to near-term systems, clarity of written and verbal delivery, number of completed years of schooling and adherence to delivery schedule. The session will be limited to 8 papers with the top 3 papers receiving monetary awards.

National Chair: David Geller (Utah State) and Luke Sauter (USAF/DFAS)

Local Chair: David Chart (Sierra Space Corp) and Ian Gravseth (BAE)

AAS-25-012 *A Chebyshev-Picard Method for the Convexification of Nonlinear Dynamics in Predictive Control*
Garvin Saner*, Kirsten Strandjord and Tristan Griffith

AAS-25-013 *Two-Axis Gimbal Simulation Overview for the Emirates Mission to the Asteroid Belt*
Leah Kiner*, Cody Allard and Hanspeter Schaub

AAS-25-014 *Optimal 6-DOF Control Strategies for In-Space Servicing and Assembly Missions at Sun-Earth L2*
Ruthvik Bommena* and Robyn Woollands

AAS-25-016 *Enhancing Small Satellite Mission Reliability through Digital Twin Integration*
Alexander Jackson*

AAS-25-017 *A Refined Approach to Resident Space Object Identification in Unresolved Optical Space Imagery*
Carolin Pech*, Alan Lovell, Ioannis Paraschos, Evan Pavetto-Stewart, Lucas Bottero, Alexandra Torres and Garrison Walker

AAS-25-018 *Resident Space Object Identification in Unresolved Optical Space Imagery via Streak Analysis*
Carolin Pech*, Alan Lovell, David Scolare and Ioannis Paraschos

Student Award Sponsors Include:
Analytical Mechanics Associates (AMA)
Mathworks

S02 - Advances in Propulsion
7:00 AM - 10:30 AM

The development of advanced propulsion technologies is critical for enabling spacecraft platforms ranging from CubeSats to ambitious human and robotic space exploration missions. Innovative developments in chemical, electric, nuclear, and propellantless propulsion will provide higher performance and greater operability, enabling new approaches ranging from launch to interstellar travel. This session will highlight advanced propulsion technologies and enabling subsystems matured by NASA, DOD, industry, and academia.

National Chair: Ron Litchford (NASA) and Jeffrey Sheehy (NASA)

Local Chair: John Abrams (Analytical Mechanics Associates), Mark Covelli (Moog) and Emanuel Grella (Analytical Mechanics Associates)

AAS-25-022 *NASA's Rotating Detonation Rocket Engine Development*
Thomas Teasley*

AAS-25-023 *Analysis of Electric Propulsion Propellant Type for Crewed Mars Missions*
William Hurley*, Richard Hofer and Jacob Simmonds

AAS-25-0246 *Update on the Advanced Electric Propulsion System Thruster Development and Qualification Activities - Placeholder*
Hani Kamhawi*

AAS-25-025 *Recent Advances in High-Power Density Hall Thruster Technology for Robotic and Human Exploration Missions*
Richard Hofer*

AAS-25-026 *Development of High Power Lithium Magnetoplasmadynamic Thrusters for Human Mars Missions*
James Polk*

AAS-25-027 *Integrated Development Strategy for Space Nuclear Propulsion*
Kurt Polzin*, Douglas Burns, Peter Ma and Jason Turpin

AAS-25-028 *Nuclear Electric Propulsion Challenges and Advancements for the Joint Emergent Technology Supplying On-orbit Nuclear Power (JETSON) Program*
Kelsa Palomares*

Special Event for Children of Conference Attendees at 4 PM

Imperial Ballroom

NASA Astronaut, Dan Bursch

This presentation will inspire our next generation of engineers by offering kids the opportunity to interact with an astronaut who flew four spaceflights including three Shuttle missions and one long-duration stay aboard the International Space Station!

TECHNICAL EXHIBITS
(Colorado Ballroom)
Saturday 5:00 PM – 7:00 PM

The Technical Exhibits Session is a unique opportunity to observe displays and demonstrations of state-of-the-art hardware, design and analysis tools, and services applicable to advancement of guidance, navigation, and control technology. The latest commercial tools for GN&C simulations, analysis, and graphical displays are demonstrated in a hands-on interactive environment, and include lessons learned and undocumented features. Associated papers not presented in other sessions are also provided and can be discussed with the author. Come enjoy and excellent complimentary buffet and interact with the technical representatives and authors. This session takes place in a social setting and family members are welcome!

Organizers
Andrew Riskus, BAE
Bryan Helgesen, Sierra Space
Kristina Forystek, Innovation RM
Stephen Lutgring, BAE

Exhibitors

Advanced Space	**Mathworks**
ATTK	**New Space Systems**
Arizona University	**NGC Space**
Beyond Gravity	**Rakon**
Blue Canyon Tech.	**SEAKR**
ESI Motion	**Sodern**
Exail	**Texas A&M**
Innalabs	**Utah State SDL**
Jena-Optronik	**Veoware**
KinetX	

**SUNDAY, FEBRUARY 2ND
MORNING SESSIONS**

S03 - Autonomy in GN&C

7:00 AM - 10:30 AM

Satellite constellations are nothing new, but the sizes, scales, and configurations of modern Distributed Satellite Systems (DSS) are reaching unprecedented levels of scope and complexity. These configurations include constellations, swarms, and various fractionated architectures. Recent demonstrations of these DSS systems show that handling the planning, coordination and operations associated with large-scale constellations is a critical logistical problem that must be addressed for continued effective application of these systems. In addition to the logistical challenges, large and small multi-spacecraft systems must also work through autonomous operational complexities such as formation flying, fractionation, docking, structural assembly, tethering, station keeping for sparse aperture configurations and on-orbit servicing and reconfiguration. Some key system and subsystem challenges for autonomous operations include resource management, health management, task management and decision making, formation control, rendezvous management, expanded autonomous control, on-orbit calibration, station keeping, space traffic management, and human-interfaces. All these topics have a direct impact on GN&C and must be considered when architecting the GN&C system. All papers related to these topics are welcome.

National Chair: Islam Hussein (Trusted Space, Inc.), Hanspeter Schaub (University of Colorado) and Jekan Thangavelautham (University of Arizona)

Local Chair: Holly Borowski (Trusted Space, Inc.) and Matt Sandnas (Trusted Space, Inc.)

AAS-25-031 *Levels of Spacecraft Autonomy*
Daniel Baker* and Sean Phillips

AAS-25-032 *Experimental Demonstrations of Trusted Distributed Autonomy Applications*
Jeremy Murray-Krezan, Joshua Baker, Sydney Bonbrest*, Holly Borowski, Islam Hussein and Sean Phillips

AAS-25-033 *Quantifying the Optimality of a Distributed RL-Based Autonomous Earth-Observing Constellation*
Mark Stephenson*, Lorenzzo Mantovani, Anaïs Cheval and Hanspeter Schaub

AAS-25-034 *Adaptive Swarm Reconfiguration Using Relative Orbit Element (ROE) Space for Enhanced Space Observation*
Harish Vernekar*, Leonard Vance and Jekan Thangavelautham

AAS-25-036 *Multiagent Satellite Autonomy: A Benchmark Evaluation Framework*
Zachary S. Lippay*, Sean Phillips and Amin Maghareh

AAS-25-037 *Autonomous Formation Flying and Swarm Dynamics in Cis Lunar Space*
Hrithik Thukral*, Leonard Vance and Jekan Thangavelautham

AAS-25-038 *A Survey of Autonomous Navigation Techniques Applicable to Lunar Surface Exploration*
Paul McKee*

S04 - Small Body Exploration

7:00 AM - 10:30 AM

Recent years have witnessed a remarkable surge in the landscape of planetary exploration missions to asteroids, comets, and other small solar system objects, with several new endeavors currently underway. This surge has driven significant advancements and innovations in the practical application of optical navigation, sensors, modeling, and autonomy that are essential to accomplish demanding mission objectives. From intricate task of characterizing a small body post-arrival to complexities of operating in a micro-gravity environment, and in some cases executing surface navigation, these tasks are at the core of such missions. This session solicits contributions showcasing GN&C experiences, successes, lessons learned, and future challenges associated with the exploration of asteroids, comets, and other small bodies.

National Chair: Jason Leonard (KinetX) and Jay McMahon (CU)

Local Chair: Anubhav Gupta (In Orbit Aerospace, Inc. & University of Colorado Boulder) and Daniel Kubitschek (Univ of Colorado - LASP)

AAS-25-041 *ANALYSIS OF SOLUTIONS FOR SMALL-BODY TOUCH-AND-GO GUIDANCE SYSTEM DEVELOPMENT*
Nathan Long* and Manoranjan Majji

AAS-25-042 *Low-Cost Reconstructive Topography of Near Earth Objects using High Speed Flyby Swarms.*
Leonard Vance*, Harish Vernekar and Jekan Thangavelautham

AAS-25-043 *Swarm of solar-thermal reflectors for asteroid mining context*
Korbin Hansen*, Sivaperuman Muniyasamy and Jekan Thangavelautham

AAS-25-044 *Time-of-Flight Free Model Predictive Control Application for Polyhedral Asteroid Landings*
Logan Feld*, Joshua Lyzhoft and Koki Ho

AAS-25-045 *Deep Learning based Sensor Data Fusion for Robust Feature Extraction in Asteroid Relative Navigation*
Iain Hall*, Jinglang Feng and Massimiliano Vasile

AAS-25-046 *The Hera LEOP experience*
Andrea Pellacani*, Aida Alcalde, Angel Palomino, Felix Arribas de Antonio, Joao Pimentel, Felix Matthias and Niklas Behrmann

AAS-25-047 *AutoCASS: A Modular Autonomous Collision Avoidance System for Deep Space Exploration*
Gaurav Kumar*

POSTER SESSION BREAKS

**Sunday & Monday
8:30-9:00 AM**

Stephen Lutgring, BAE
stephen.lutgring@baesystems.us

Heidi Hallowell, BAE
heidi.hallowell@baesystems.us

Covering a wide variety of unique GN&C topics, this year's interactive Poster session falls on Sunday and Monday during the morning presentation sessions mid-point break. All Posters will be hosted by the author(s) during these two timespans and will include peoples' choice voting by conference attendees and subsequent awards to two winning Posters. Winners of the two categories, Presentation Quality and Material Interest, to be announced at the Monday night social event. Although the Posters will be on display for the full conference, conference attendees are highly encouraged to engage with poster hosts and cast their peoples' choice vote tokens specifically during the Sunday/Monday Poster session breaks.

Tutorial 1 of 2

STK Lunar Orbit and Trajectory Simulation

11:00am-12:30pm

Please join us for an Apollo 11 recreation that will cover liftoff through lunar orbit insertion in Ansys Systems Tool Kit® (STK®). Follow along on your computer, or simply watch, as our Ansys Application Engineers walk you through this focused 1.5 hr lesson.

A self-served lunch buffet will be provided from 12:30pm-1:00pm.

Tutorial 2 of 2

The Apollo Missions from an Engineer's Perspective

1:00pm-2:30pm

Keynote speaker: Robert P. O'Donnell, PhD
Member of the APOLLO GN&C Team, 1966-1969

Bob O'Donnell will describe his activities as a member of the GNC Team for the APOLLO Program. Bob was a Guidance Analyst for the Apollo PGNCS (Primary GNC System) while a graduate student at the Massachusetts Institute of Technology during the years 1966 – 1969. He played an operational role in the APOLLO 11 Lunar Landing, the first time that human beings walked on the surface of the Moon. Bob will discuss the historical background of APOLLO, fundamental technical challenges, basic characteristics of the PGNCS, and his specific activities and contributions to the APOLLO 11 Mission. The presentation will conclude with discussion of long-term trends in GNC, technically troublesome issues, and strong personal recommendations, followed by some advice, aimed mainly at recent graduates.

**SUNDAY, FEBRUARY 2ND
AFTERNOON SESSIONS**

S05 - Using AI/ML in GN&C

4:00 PM - 7:00 PM

As Guidance, Navigation and Control algorithms become increasingly autonomous, there is a natural progression towards incorporating Artificial Intelligence (AI) and Machine Learning (ML) technologies into the capabilities of today's autonomous systems. When combined with established systems and control theory, AI and ML algorithms can harness the wealth of information available from data obtained by sensors and cyberphysical systems over time. This session will highlight research and demonstrations focused on the theory and methods of learning, control, and computational intelligence for GN&C systems. Some example topics for this session include novel applications of AI systems in traditional GN&C systems, performance comparisons between classical GN&C methods and ones that leverage AI or ML, demonstrations of design and/or test of GN&C systems that utilize ML, and techniques and challenges for the verification and validation (V&V) of systems incorporating these technologies.

National Chair: Ben Bycroft (The Aerospace Corporation) and Christoffer Heckman (University of Colorado at Boulder)

Local Chair: Kip Gwin (BAE Systems) and Hank Steadman (Lockheed Martin Space)

AAS-25-051 *CLOSE-PROXIMITY SATELLITE OPERATIONS THROUGH DEEP REINFORCEMENT LEARNING AND TERRESTRIAL TESTING ENVIRONMENTS*
Sean Phillips*, Joshua Aurand and Zachary S. Lippay

AAS-25-052 *Real-Time Learning-Based Planning for Autonomous Rendezvous and Docking in Space*
Satvik Kumar* and Soon-Jo Chung

AAS-25-053 *Reinforcement Learning for Optimized Rendezvous of Small Satellite Swarms for ISAM Operations*
Harish Vernekar, Athip Thirupathi Raj and Jekan Thangavelautham*

AAS-25-054 *Satellite Pursuit-Evasion using Deep Reinforcement Learning*
Tucker Wheeler*

AAS-25-055 *Improving Robustness of Autonomous Spacecraft Scheduling Using Curriculum Learning*
Lorenzzo Mantovani* and Hanspeter Schaub

AAS-25-057 *Capabilities Toward Trustable AI/ML Pose Estimation for Satellite-to-Satellite Imagery*
Nicholas Oune*

S06 - New Space and Cislunar Exploration

4:00 PM - 7:00 PM

In recent years, the exploration and habitation of the Moon and other extraterrestrial bodies has become increasingly popularized in the government, academic, and commercial aerospace communities. The exploration, development, and settlement of these bodies requires substantially more innovation in GN&C technologies beyond what is currently used in Earth's orbit. The challenges in this domain often require technological advances from a diverse set of sub-fields such as space flight GN&C, landing, autonomous surface operations, human-machine interfaces, and many others. This session focuses on such innovation, describing the challenges and solutions developed within the community.

National Chair: Chris D'Souza (NASA) and Jerry Krassner (Independent Consultant)

Local Chair: Mitchell Hebert (Draper) and Jeff Parker (Advanced Space, LLC)

AAS-25-061 *Cislunar Space and Defense Technology Equities in the Coming Decades*
Bryan Dorland*

AAS-25-062 *Guidelines and Considerations for Managing Cislunar GN&C Mission Reliability*
Philip Hattis*, Hailee Hettrick, Audrey Walsh, Louis Breger and Alan Campbell

AAS-25-063 *Stellar / inertial hybridized navigation system for lunar-based exploration missions*
Baptiste Paul*, Maxime Loil, Fabrice Dauvergne, Guillaume Pascal, Lionel Oddos-Marcel, Johan Montel, Laurent Eychenne and Damien Ponceau

AAS-25-064 *Assessing Horizon-Based Optical Navigation in a Near Rectilinear Halo Orbit*
Matthew Givens*, Michael Caudill, Matthew Bolliger, Daniel Qi and Jeff Parker

AAS-25-065 *Cislunar Maneuver Placement via Controllability Analysis*
Nestor Hernandez*, Ian Down, James McElreath and Manoranjan Majji

AAS-25-066 *Mission-Maps For Cislunar Transfer Trajectory*
Carter Van Hammond*, David Woffinden and Luke Sauter

AAS-25-067 *CLOSED LOOP LINCOV ANALYSIS FOR IM-1 AND IM-2*
Quinn Moon*

AAS-25-068 *Mission Design for Agile SmallSat in Cislunar Space*
Kiarash Tajdaran*

Social Event

Casino Night

Sunday 7:30pm – 9:30pm
Breckenridge Ballroom

Brought to you by Casino Party USA
- 2x Roulette
- 2x Craps
- 4x Blackjack
- 3x Texas Hold'em

Family Members of conference attendees are welcome! (However only conference attendees are eligible for prizes; family members cannot compile chips with attendee)

PRIZES! Chips will be exchanged for raffle tickets at the end of the event (9:30) with prize winners determined in the following 15 minutes. Prizes include a Breckenridge Ski Day Pass, AAS Logo items, and more.

A light dinner buffet will be provided.

MONDAY, FEBRUARY 3RD
MORNING SESSIONS

S07 - Advances in GN&C Software

7:00 AM - 10:30 AM

Successful GN&C system performance is often dependent on innovative algorithms and software. This session is open to all development processes and systems ranging from vehicle code used to operate the spacecraft system, novel algorithms, ground software used for operations/analysis, or simulations/frameworks used to test, validate, or develop GN&C systems. The intent is to include current best practices as well as challenges in future software development.

National Chair: Paul Graven (Cateni) and Patrick Kenneally (Laboratory for Atmospheric and Space Physics (LASP))

Local Chair: Ann Dietrich (The Charles Stark Draper Laboratory) and Levi Smith (Lockheed Martin Space)

AAS-25-071 *Development of a CMG Array Dynamics Modeling Framework and Consideration for CMG Output Axis Compliance*
Jameson Lee* and Tim Hindle

AAS-25-073 *Analytical method for ground point velocity calculation and application to target pointing laws for remote sensing missions*
Jeet Yadav*, Gaurav Kumar and Dhanisha Sateesh

AAS-25-074 *Rust In Space: The Case For a Modern Systems Programming Language*
Samuel Beskur*

AAS-25-075 *ORBITING TRAVELING SALESMAN PROBLEM: AN IMPULSIVE APPROACH*
James McElreath* and Manoranjan Majji

AAS-25-076 *Generalized Augmented-State Covariance Analysis for Spaceflight*
David Geller, Collin York* and David Woffinden

AAS-25-077 *Computationally Efficient Multibody Dynamics Simulation Using Lagrangian Dynamics and Automatic Differentiation*
Joel Runnels*

S08 - Advances in GN&C Hardware

7:00 AM - 10:30 AM

Many programs depend on heritage hardware, but the future is advanced by those willing to design and implement new and novel architectures, technologies, and algorithms to solve GN&C problems. This session is open to papers with topics ranging from theoretical technologies to innovative solutions using existing hardware technologies. These hardware technologies typically involve GN&C sensors or actuators that will advance the state of the art, reduce the cost of applications, and speed the convergence to hardware, numerical or design trade solutions.

National Chair: Alexandra Dominguez (NASA) and Steeve Kowaltschek (European Space Agency)

Local Chair: Teagan Northrup (BAE Systems) and Tyler Thomas (BAE Systems Inc)

AAS-25-081 *Astrix NS: The new, space-qualified, compact gyroscope of the Astrix family*
Alexis Azoura*

AAS-25-082 *Update on The Precision Inertial Reference Unit for Satellite Pointing and Stabilization*
Douglas Meyer*, Grant Atikyan, James Pavell, Rick Harton, Michael Espeland, David Casaburi, Alec Saffer and William Truong

AAS-25-083 *ARIETIS RAD-HARD GYRO QUALIFICATION RESULTS*
Alberto Torasso*, Alan Heffernan and Steeve Kowaltschek

AAS-25-084 *A modular CMG for various satellite missions*
Anja Nicolai*

AAS-25-085 *AstroVision - An All Space Vision Navigation System*
Stephen Bailey*, Giuseppe Pasqualino and Ryan Johnson

AAS-25-086 *ASTRO© CL: THE RADIATION HARD CONSTELLATION STAR TRACKER*
Sebastian Colditz*, Reinhard Berger, Martin Griebel, Steffen Hahn, Steffen Schwarz and Uwe Schmidt

AAS-25-087 *AQUILA space accelerometer test results*
Rabin Francis*, Alberto Torasso, Flavio Felici, Lukasz Glura and Jeroen Vandersteen

AAS-25-088 *Honeywell 3-Axis Space Accelerometer Triad for Small Satellites*
David Pfeifer* and Donald Horkheimer

S09 - RPOD Relative Navigation and State Estimation

7:00 AM - 10:30 AM

Autonomous rendezvous, proximity operations, and docking (RPOD) systems are key enablers for many different types of spacecraft and missions including commercial servicing of existing spacecraft, orbital debris removal, on-orbit refueling, the next generation of space tugs and asteroid missions, or returning humans to the moon to establish a sustained presence. Some would say the heart of the GN&C system required for supporting these RPOD missions is the N: or relative navigation and state estimation. Many design challenges of spacecraft development, such as the need to minimize mass and volume, as well as computational footprint, has generated new, exciting, and innovative solutions to the relative navigation problem. This session explores aspects of enabling technologies for relative navigation, state estimation, and computer vision to support this class of mission.

National Chair: Liz Billman (Sierra Space) and Bo Naasz (NASA)

Local Chair: Jim Carrillo (Blue Origin) and Laura Suarez Henderson (Blue Origin)

AAS-25-091 *Safe Multi-agent Satellite Servicing with Stochastic Control Barrier Functions*
David van Wijk*, Deep Parikh and Manoranjan Majji

AAS-25-092 *RVS® 3000-X LIDAR – Pose Estimation – Test Result vs Landsat7 Mockup*
Max Möller*, Christoph Schmitt, Michael Schwarz, Michael Windmüller and Lukas Kroßner

AAS-25-093 *SHIELD: Deployable Scouting Units for RSO Characterization Leveraging In-Space Upgrade Architecture*
Andrew Sabovik*, Hunter Robertson and John Ware

AAS-25-094 *A Multi-Mission Flight Software Architecture for Autonomous Rendezvous, Proximity Operations, and Docking*
Michael Mercurio*, Christopher Roscoe and Jason Westphal

AAS-25-095 *COVERT 6 Degree of Freedom Pose Estimation Solution*
Doug Marsh, Wei Huang*, Eric Coghill, Christopher Lukowski and Marco Stracci

AAS-25-096 *Autonomous Maneuver Detection of an Unknown Spacecraft in Close Proximity*
Alexander Perruci* and David Lee

AAS-25-097 *Covariance Sensitivity Analysis of Feature Quantity and Placement for Pose Estimation Applications*
Ali Hasnain Khowaja* and Manoranjan Majji

POSTER SESSION BREAKS

**Sunday & Monday
8:30-9:00 AM**

Stephen Lutgring, BAE
stephen.lutgring@baesystems.us

Heidi Hallowell, BAE
heidi.hallowell@baesystems.us

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Tutorial

MATHWORKS ACS for Small Satellites

Part I 11:00am-12pm
Lunch Break 12-12:30pm
(lunch is provided)
Part II 12:30-1:30pm

In this hands-on exercise, learn how to simulate and visualize a satellite scenario with orbit propagation and attitude pointing in MATLAB. Design a 3 degree-of-freedom attitude controller for this scenario and learn how to automatically tune the controller to meet design goals using the Control System Tuner app.

Participants should bring their own laptops (chargers are also recommended) in order to participate in the hands-on exercises. Licenses to MATLAB Online for the session will be provided by MathWorks. We recommend installing the Chrome browser to ensure the best compatibility.

**MONDAY, FEBRUARY 3RD
AFTERNOON SESSIONS**

S10 - Advances in Navigation

4:00 PM - 7:00 PM

Advances in Position, Navigation, and Timing (PNT) seek to push the boundaries of spacecraft navigation and timing technology and address the shortcomings of current PNT systems. Proliferation of large-scale constellation deployments in Earth orbit and the need for maintaining a safe orbital environment for all operators require new PNT techniques and robust architectures to complement the existing ground based and GNSS systems. Lunar, interplanetary, and interstellar mission concepts require novel ways for collecting and processing observations from non-traditional sources. In this session, we explore novel and advanced ground-based, space-based, and autonomous spacecraft PNT approaches. Of particular interest are methods for inter-satellite navigation, lost-in-space scenarios, and new filtering techniques for processing radio and optical observations, pulsar observations, and other deep space signals of opportunity. With goals of expanded lunar exploration and long term habitation, new techniques, algorithms, and technology are needed to enable in-situ autonomous exploration in cislunar space. Additionally, with proposals and deployment of a lunar-centric time reference, there is a need to understand how this timing implementation will impact navigation design in terms of time transfers, stability characterization, and development of timing standards that enable an integrated PNT capability.

National Chair: Evan Anzalone (NASA Marshall Space Flight Center), Penina Axelrad (University of Colorado Boulder) and Michael Thompson (Aerospace)

Local Chair: Lee Barker (Lockheed Martin Space) and Jastesh Sud (Blue Origin)

AAS-25-101 *Fine Pointing for the CubeSat Laser Infrared CrosslinK (CLICK-B/C) Mission*
Paige Forester*

AAS-25-103 *Autonomous Navigation for a Low Lunar Satellite*
Rusty Anderson*

AAS-25-104 *Covariance Minimizing Station-Keeping Strategies for Libration Point Orbits*
Tate Crawford*, Ian Down, Manoranjan Majji and James McElreath

AAS-25-105 *Autonomous Initial Orbit Determination Using Visual Odometry Around A Rotating Primary Body*
Heying Zhang*, Benjamin Benjadol, Tara Mina, Christopher Valenta and John Christian

AAS-25-106 *New Methodologies for Including Time-Varying Consider Parameter Uncertainty in Estimation Applications*
Michael Thompson*, Evan Tucker and Daniel Agress

AAS-25-107 *Design and preliminary results of Scarabaeus: A new open-source navigation tool for interplanetary spacecraft navigation*
Jay McMahon and Mattia Pugliatti*

AAS-25-108 *Onboard Autonomous Orbital State Vector Estimation Using Energy-Binned X-Ray Occultations*
Allen Gift*

S11 - RPOD Guidance/Targeting and Trajectory Design

4:00 PM - 7:00 PM

Autonomous rendezvous, proximity operations, and docking (RPOD) systems are key enablers to supporting objectives such as commercial servicing of existing spacecraft, orbital debris removal, on-orbit refueling, the next generation of space tugs and asteroid missions, or returning humans to the moon to establish a sustained presence. As many of our missions recently are going beyond low-earth orbit, the need to minimize propellant usage or time to rendezvous has generated new and exciting trajectories and guidance/targeting algorithms. This session explores aspects of enabling technologies for guidance and targeting, optimal trajectory design, control, and safety of flight to support this class of mission.

National Chair: Jack Brazzel (NASA Johnson Space Center) and Sam Pedrotty (NASA Johnson Space Center)

Local Chair: DeAnn Redlin Sanders (Blue Origin) and Brady Young (Lockheed Martin Space)

AAS-25-112 *Open-Loop V-Bar Maneuver Design and Analysis for a Semi-Autonomous GEO Servicer*
John Martinez*

AAS-25-113 *Trajectory Optimization of Distributed Space Systems for Tactically Responsive On-Orbit Transportation Using a Dynamic Time-Expanded Network Model*
Shan Selvamurugan*, E. Glenn Lightsey and Koki Ho

AAS-25-114 *An Onboard Spacecraft Guidance Approach Leveraging the Monomial Method*
Ethan Burnett* and Francesco Topputo

AAS-25-115 *Robust Trajectory Optimization for NRHO Rendezvous Using SPICE Kernel Relative Motion*
David Cunningham*, Ryan Russell and David Woffinden

AAS-25-116 *ENHANCING FAST TRANSFER LAUNCH AVAILABILITY TO THE NRHO USING A PHASING LOOP APPROACH*
William Benson*, Benjamin Asher and Sarah Reese

AAS-25-117 *Generalized Reference Targeting for Spaceflight*
David Geller*, David Woffinden and Collin York

S12 - Separation Dynamics

4:00 PM - 7:00 PM

The separation and jettison of mass that is no longer needed is critical to optimize the payload mass to orbit of launch vehicles. Separation recontacts and failures are also a leading cause of launch vehicle failure. This session will involve discussion and analysis of launch vehicle and spacecraft multibody dynamics, equations of motion and trajectories to assess contact and clearance of during liftoff, separation, and jettison events; modeling ascent and in-space environments, errors, disturbances, GN&C algorithms, sensors, actuators, and mechanism; simulation and analysis of nominal, contingency, and failure scenarios during ascent and in-space flight separation and jettison

events; algorithms and tools to analyze 6 DOF trajectories for separations and recontacts; requirement specifications for separation systems; reconstruction of flight trajectories and clearance events using imagery and navigation data.

National Chair: Peter McDonough (Jacobs/NASA)

Local Chair: Matt Sandnas (Trusted Space, Inc.) and Hank Steadman (Lockheed Martin Space)

AAS-25-121 *Liftoff Separation Clearance Analysis and Post Flight Validation of NASA's Artemis I Mission*
Rekesh Ali*, Carole Addona, Peter McDonough, Michael Sanders, William Harlin, Jared Rucker, Zach Muscha, Ben Burger and Drake Ranquist

AAS-25-122 *Dynamics and Clearance Analysis of NASA's Space Launch System Block-1 and Block-1B Solid Rocket Booster Separation Event*
Carole Addona*, Michael Sanders, Rekesh Ali, Ben Burger, William Harlin, Zach Muscha, Jared Rucker, Drake Ranquist and Peter McDonough

AAS-25-123 *Independent Verification and Validation of Artemis 1 Separation Events*
Paul Tartabini*, Tannen VanZwieten, Brett Starr, Rafael Lugo, Esther Lee, Jacob Fleck, Zachary Ernst, Bandu Pamadi and Peter Covell

AAS-25-125 *Space Launch System Block-1B USA Separation Analysis and Requirements Derivation from CLVTOPS Toolchain*
Zach Muscha*, Jared Rucker, Carole Addona, Ben Burger, Peter McDonough and Rekesh Ali

AAS-25-126 *Mars Sample Return Mars Ascent Vehicle Separation Analysis Utilizing the CLVTOPS Toolchain*
Ben Burger, Michael Sanders*

AAS-25-127 *Near-field Separation and Dynamics Analysis of NASA's Space Launch System Block-1 and Block-1B Secondary Payloads*
Jared Rucker*, Michael Sanders, Zach Muscha, Carole Addona, Ben Burger, Peter McDonough, Drake Ranquist, William Harlin and Rekesh Ali

AAS-25-128 *Independent Verification and Validation for Artemis I Ascent Integrated Flight Performance Simulation*
Jacob Fleck*, Tannen VanZwieten, John Davidson, Ivan Bertaska, Jeremy Shidner and Charlie Hall

Social Event

Social Bingo Cocktail Hour

Monday 7:30pm – 8:30pm

Come join your GN&C colleagues for a networking and panel session. This event will focus on the future of the GN&C workforce and what is needed to develop a strong workforce, today and in the future. Audience questions are encouraged.

Heavy appetizers will be served.

S13 - Science Enabled by GN&C

7:00 AM - 10:30 AM

Across decades of space exploration and science investigations, guidance, navigation and control (GN&C) has been fundamentally important to the success of those endeavors and the associated popular interest demonstrated by national and international missions: From pointing and articulation of remote sensing platforms, to stunning images of never-before-seen worlds and small bodies; from targeting of impactors, landers and Earth return vehicles to the return of samples from far-away places; from atmospheric science to heliophysics and astrophysics investigations. This session solicits past, present, and future scientific investigations that are enabled by the GN&C engineers and the systems they design, integrate, test, and operate to advance our scientific knowledge and understanding.

National Chair: Neil Dennehy (JHU APL) and Daniel Scheeres (University of Colorado Boulder)

Local Chair: Drew Englemann (Maxar), Daniel Kubitschek (Univ of Colorado - LASP) and Tayler Quist (Blue Origin)

AAS-25-138 *Enabling Fast Flyby Small Body Science with Onboard Navigation,*
Shyam Bhaskaran*

AAS-25-131 *The Nancy Grace Roman Space Telescope's Attitude Control System*
Matthew Heron* and Eric Stoneking

AAS-25-132 *The Hera GNC Subsystem*
Andrea Pellacani*, Angel Palomino, Aida Alcalde, Alessio Cortese, Felix Arribas de Antonio and Pablo Colmenarejo

AAS-25-133 *Hayabusa2's Asteroid-Proximity GNC methodology and its result*
Yuichi Tsuda*

AAS-25-134 *Science on OSIRIS-REx and APEX enabled by GN&C*
Michael Nolan*

AAS-25-135 *Guidance, Navigation & Control for the Psyche Mission*
Alexander Manka, Paige Arthur, Steven Collins and Kaelan Oldani*

AAS-25-136 *The DART Mission GNC Challenges*
Andy Cheng* and Daniel O'Shaughnessy

AAS-25-137 *Experience and Lessons Learned in Guidance and Navigation from the NASA New Horizons Mission to Pluto and Kuiper Belt Object Arrokoth*
Alan Stern*, Gabe D. Rogers, Yanping Guo, Alice Bowman, Bobby G. Williams, Coralie Adam, Derek Nelson, John Pelgrift, Michael Salinas, Erik Lessac-Chenen and Joel Fischetti

S14 - Image Processing for Spaceborne Navigation

7:00 AM - 10:30 AM

Image Processing (IP) is a critical step in many GN&C and ADCS algorithms, including attitude determination from star cameras and optical navigation from imaging sensors. Applications occur in various mission phases including interplanetary cruise, planetary orbit, proximity operations, descent and landing, and surface operations. An image from a visible, IR, LIDAR, or similar sensor can offer a wealth of information about a space vehicle's navigation state, but this information must be distilled into measurements that can be ingested by a navigation algorithm. Therefore, the success of algorithms which rely on image data depends on how effectively these algorithms perform IP---defined here as the process of extracting the salient pieces of information from an image in the presence of noise, clutter, and other real-world issues. This session is dedicated to papers that explore the relationship between IP algorithms and the broader problem of GN&C. Topics include IP algorithms; feedback/ feedforward between IP and GN&C; uncertainty quantification of IP outputs, processing of IP outputs to improve navigation, hosting platforms/architectures between CPUs, FPGAs,

GPUs, and other processing units; IP techniques base on AI and ML; challenges with on-board real-time IP; on-board rendering; testing, verification, and validation of IP algorithms; and lessons learned from past experiences.

National Chair: Coralie Adam (KinetX, Inc. | AAS Board), Simone D'Amico (Stanford University) and Kevin Kobylka (NASA)

Local Chair: Randy Christensen (Blue Origin), Erin Griggs (Trusted Space) and Ellis King (Blue Origin)

AAS-25-141 *Standalone Hazard Evaluation and Refinement from Instrument Findings (S.H.E.R.I.F.)*
Kevin Kobylka*, Davis Adams, Parth Shrotri, Max T. Marshall, Benjamin Benjadol

AAS-25-142 *Terrestrial Demonstration of Orbital Mapping and Validation Capabilities Over a Lunar Surface Analog*
Andrew Liounis*, Chris Gnam, Adnan Ansar, Michael Barker, Erwan Mazarico, Yang Cheng, Noah Petro, Stephen Scheidt, Jacob Richardson, Ross Beyer, Cecilia Mauceri, Zachary Morgan, Yumi Iwashita and Stefano Bertone

AAS-25-143 *Image-Based Lunar Terrain Relative Navigation without a Map: State Estimation*
Randy Christensen*, John Christian, Timothy Crain and Mike Hansen

AAS-25-145 *Machine Learning based Crater Detection for Terrain Relative Navigation*
Chris Gnam*, Timothy Chase and Andrew Liounis

AAS-25-146 *Removing ambiguities in concurrent monocular single-shot spacecraft shape and pose estimation using a deep neural network*
Emily Bates* and Simone D'Amico

AAS-25-147 *Compensating for center of brightness offsets during autonomous flyby pointing*
Thibaud Teil* and Julian Hammerl

AAS-25-148 *Camera Calibration and Alignment Metrology at Johnson Space Center's Electro-Optics Laboratory*
Paul McKee*, Ronney Lovelace, Steven A. Lockhart and Jorge Chong

**TUESDAY, FEBRUARY 4th
AFTERNOON SESSIONS**

S15 - GN&C in Human Spaceflight

4:00 PM - 7:00 PM

NASA along with its commercial and international partners are striving to bring astronauts and equipment to new Lunar, asteroid and Martian destinations. Increasingly new and innovative GN&C technologies required to transport and deliver crews and return them safely to the Earth are being developed and tested on robotic landers and other testbeds. After the successful 2022 Artemis I mission demonstrated the capabilities of the Orion and Space Launch System (SLS) programs, excitement is building for the crewed Artemis II mission in 2026. New systems such as the Deep Space Gateway and two separate Lunar Landers are being developed as the next steps to establish a lunar base and eventually reach Mars in the coming decade. This session explores key advancements in automation, guidance, navigation and Fault Detection/Isolation (FDI) technologies which will ultimately enable human exploration onto lunar bases and beyond.

National Chair: David P. Dannemiller (NASA Johnson Space Center)

Local Chair: Dan Langholz (Blue Origin) and Harvey Mamich (Lockheed Martin)

AAS-25-151 *Orion Hardware in the Loop OIMU Stimulation Latency Effect on Navigation State Estimation*
Christopher Ertl*

AAS-25-152 *CUMULATIVE DISTRIBUTION OVERLAP TECHNIQUE FOR ARTEMIS MISSION PUBLIC ENTRY RISK ASSESSMENT*
Greg Holt*, Mark McPherson and Brandon Wood

AAS-25-153 *Performance Impacts to the NASA Artemis II Trajectory Correction Burn Placement*
David Woffinden*, Benjamin Margolis and Shane Robinson

AAS-25-154 *Artemis's Compass: Navigation Architecture and Challenges in Support of Initial Lunar Missions*
Evan Anzalone*

AAS-25-155 *ARTEMIS III ORION LIDAR AND DRONE FIELD TESTING*
John Marcy*, Keith Barr and Brian Mincks

AAS-25-156 *Field Demonstration and Evaluation of Terrestrial Navigation Technologies to Artemis Surface Navigation Applications*
Evan Anzalone*, Michael Zanetti, Kyle Miller and Michael Fritzinger

AAS-25-157 *Mobile Control Tower for Autonomous Lunar Surface Operations*
Sivaperuman Muniyasamy* and Jekan Thangavelautham

S16 - Small Satellite GN&C

4:00 PM - 7:00 PM

In recent years, small satellites including NanoSats and CubeSats have seen greater use for a range of applications in government, commercial, and educational sectors. At the high end of this mass range, ESPA-class spacecraft are now trusted platforms for scientific and defense missions. Small satellites require advanced technology insertion (GN&C, on-board processing) while advancing manufacturing practices to achieve higher production rates and enabling new multi-platform mission modalities. Some key challenges related to increasing production volume include supply-chain management, automated production and testing, and design for manufacturing approaches. This session is open to papers covering advanced technology insertion on small sats (e.g., propulsion, optical communications, proximity operations, drag sails, etc.), advanced manufacturing practices (e.g., best practices for satellite production, automation, and design for manufacturing) and innovative operation practices (autonomous mission or conops). Papers on practical mission experience in these areas are welcomed.

National Chair: Glenn Lightsey (Georgia Institute of Technology)

Local Chair: Devon Sanders (Blue Canyon Technologies) and Elvis Silva (Blue Canyon Technologies)

AAS-25-162 *Advanced Steering System for Small Satellites Using VEOCMG Actuators*
Thomas Durbin*

AAS-25-163 *Enhanced SmallSat Agility via CMG-controlled Bus*
Bryan Rogler*, Matt Baumgart, Terry Carl and Forest Rulison

AAS-25-164 *Coordinated Ground Pointing Implementation for Phased Offset Constellations*
Bryan Rogler, Elena Trenholme and Alex Angel*

AAS-25-165 *Single Thruster-Based 3-axis Momentum Control in Arbitrary Attitudes*
Matthew Bitzer*, Alex Angel and Bryan Rogler

AAS-25-166 *Enhancing Small Spacecraft Guidance, Navigation and Control Through Advanced Lighting Design – The SOLARIS Framework*
Jekan Thangavelautham*, Aleksandar Antonic and Athip Thirupathi Raj

AAS-25-167 *Design of the ACS system for a General Atomics 500kg satellite in a Cis-lunar Environment*
Rusty Anderson* and Daniel Bowden

AAS-25-168 *Lunar Crosslink Navigation - the Cislunar Autonomous Positioning System on CAPSTONE*
Anthony Zara*, Alec Forsman and Justin Spurbeck

S17 - Control, Mitigation, and Management of Liquid Propellant Dynamics

7:00 AM - 8:30 AM

Predicting, managing, and controlling space vehicle liquid propellant dynamics continues to present broad-reaching challenges in physics-based modeling, computational methods, control theory, and systems engineering. Emerging concepts in space access, including launch systems, planetary landers, and novel spacecraft are challenged to reduce traditional mass penalties like baffles and vanes while configurations evolve toward increasing propellant mass fractions. The use of cryogens in high-performance designs adds further complications, as thermal management, propellant settling, and GN&C requirements intersect. This session explores advances in slosh modeling and slosh suppression in both microgravity and high-g flow regimes, particularly in the context of vehicle dynamics, test-based or semi-empirical methods, vehicle-CFD co-simulation, and novel techniques for sensing, estimation, and/or control of liquid motion. In addition, efforts to verify and validate dynamic models are of particular interest given the unique scaling challenges between ground test capability and the flight environment.

National Chair: Jeff Brouwer (Blue Origin) and Jeb Orr (Blue Origin)

Local Chair: Uday Shankar (JHU Applied Physics Laboratory)

AAS-25-171 *A CFD Validation Study Using Artemis 1 Orbital Slosh Test Data*
Jed Storey*

AAS-25-172 *New Perspectives on Slosh Dynamics in High-Gravity Regimes for Lunar Missions*
Han Woong Bae*, Kevin Geohagan, Kelly Barber, Ravi Purandare and Juan Orphee

AAS-25-173 *Implementation of a Slosh Mechanical Model during Spacecraft Approach and Docking*
William Elke*, John Bell, Justin McFatter and Jing Pei

AAS-25-174 *Evaluation of Low-g Propellant Slosh Experiments for Model Validation*
Brett Starr*, Tannen VanZwieten, William Benson, Jing Pei, Jed Storey, Brandon Marsell, Esther Lee and William Elke

S18 - Entry, Descent & Landing GN&C

8:45 AM - 10:30 AM

Entry, descent, and landing technologies enable surface exploration of celestial bodies and the safe return of payloads to Earth. Recent advances in powered flight guidance and in atmospheric entry systems have improved landed mass capability to the Moon and Mars, and has made the reuse of launch vehicle first stages commonplace on Earth. Continued advancements through the collaboration of government, industry, and academia will enable even more ambitious capabilities and missions in the future. This session provides a venue for discussing advanced entry vehicles, as well as guidance, navigation and control technologies for powered and unpowered descent and landing systems. Topics include precision navigation and targeting, novel guidance and control methodologies, hazard avoidance, and controlled landings.

National Chair: Henry Cordova (NASA Johnson Space Center) and Lloyd Strohl (Blue Origin)

Local Chair: Jim Carrillo (Blue Origin) and Anubhav Gupta (In Orbit Aerospace, Inc. & University of Colorado Boulder)

AAS-25-182 *A PHYSICS-BASED WORK-ENERGY FORMULATION FOR REAL-TIME TRAJECTORY GUIDANCE OF A LUNAR LANDER*
Jorge Munoz-Burgos* and Peter McDonough

AAS-25-183 *Structure from Motion-Based Terrain Mapping Enabling End-to-End Interplanetary Optical Navigation*
Jake Singh*, Josh Baumann, Christopher Grasso and Alex Nelson

AAS-25-184 *Risk-Aware Aerocapture Guidance Through a Probabilistic Indicator Function*
Grace Calkins*, Jay McMahon and David Woffinden

AAS-25-185 *Design Considerations of an Ascent Abort Monitor Algorithm for use during Service Module Aborts*
Esteban Guzman*

S19 - Recent Experiences

7:00 AM - 10:30 AM

This session focuses on recent experiences in spaceflight GN&C, providing a forum to share insights gained through successes and failures. Discussions typically include GN&C experiences ranging from Earth orbiters to interplanetary spacecraft. This session is a traditional part of the conference and has shown to be most interesting and informative.

National Chair: Julie Halverson (NASA GSFC), and Sam Thurman (NASA Jet Propulsion Laboratory)

Local Chair: Jim Chapel (Lockheed Martin Space) and Mitchell Hebert (Draper)

AAS-25-191 *Maneuver Execution Performance for the IM-1 Nova-C Lunar Mission*
Shaun Stewart* and Wyatt Johnson

AAS-25-192 *Ten Days in Space*
THERESA KLEIN*, Joshua Shaffer and Henry Ludgate

AAS-25-193 *EWS-G1 Inertial Orbit Raising Sequence Post Re-Orbit Anomaly*
Daniel Goldberg*

AAS-25-194 *SWIFT Mission Gyro Patch and Re-Calibration Without a Calibration Campaign*
William Pisano*, Julie Halverson, Joseph Cavaluzzi, John Van Eepoel and Eric Siskind

AAS-25-195 *Lessons from the Psyche GNC schedule constrained development between the 2022 slip to 2023 launch*
Swati Mohan*

AAS-25-196 *Attitude Ground System for the Plankton, Aerosol, Cloud Ocean Ecosystem Mission*
Philip Calhoun*

AAS-25-197 *A Review and Analysis of Parker Solar Probe's Solar Limb Sensor Anomaly*
Brennan McCann*, Sarah Hefter and Mike Kagan

AAS-25-198 *Guidance, Navigation, and Control for The Deep Space Optical Communication Mission*
Dylan Conway*

AAS-25-199 *Recent Experiences – LOFTID Tech Demonstration Mission*
John Reed* and Rohan Deshmukh

AAS STEM-SCAPE Event
(separate from main conference)

Saturday 2/22/2025 9am – 4pm
BAE Systems; 1735 Range St, Boulder, CO 80301

Note, the 2025 STEM-SCAPE event will be held at a separate date and venue from the main conference.

We will be hosting an annual STEM event for hundreds of high school students of diverse background from across the Denver metropolitan area. The event called AAS STEM-SCAPE for "Student Career Arcs to Professional Engineers," will trace the elements of a successful career journey in aerospace including High School and University education, initial employment and ultimately a rewarding profession. The keynote speaker will be followed by a STEM career panel. The event concludes with a short design project that will be co-led with student volunteers from the University of Colorado. This event is made possible by the charitable donations and support from Lockheed Martin, BAE Systems and CU Boulder.

Local Chairpersons
Alexandra Dukes, Lockheed Martin Space
Erik Diaz, BAE Systems

Interested in volunteering?
Email - alexandra.m.dukes@lmco.com &
erik.hernandezdiaz@baesystems.us

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Mr. Matt Sandnas	Trusted Space, Inc.

2025 Planning Committee Honorable Mentions:

AJ Berning	Blue Origin
Amy Delay	Lockheed Martin Space
Bill Frazier	JPL
Bryan Hoskins	Navy
Jeb Orr	Blue Origin
Michelle Barath	Lockheed Martin Space
Pat Hoskins	Naval Research Laboratory
Robert Gay	NASA JSC
Scott Palo	Univ. of Colorado Boulder
Steeve Kowaltschek	ESA
Yohannes Tilahun	BAE

Please join us next year for the 2026
AAS GN&C Conference