CONSTELLATION

MAGAZINE

SPACE FORCE ASSOCIATION

SPACE PROFESSIONAL SOCIETY

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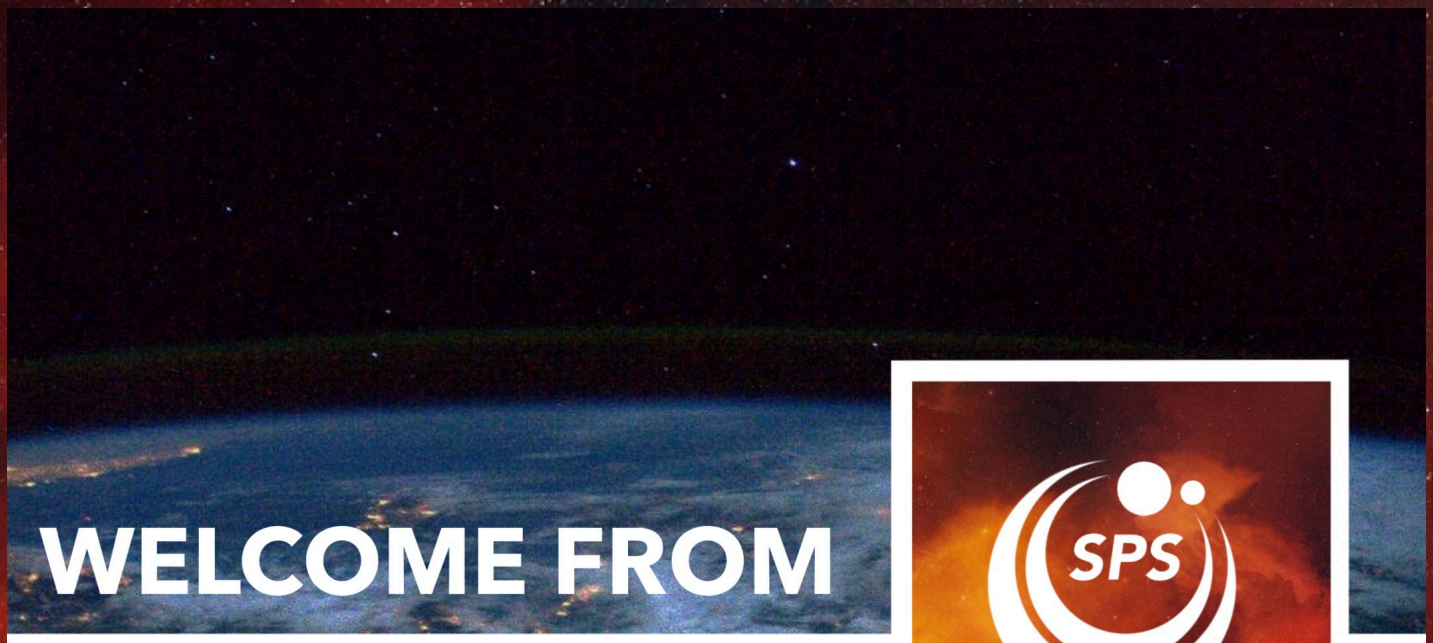

WELCOME FROM SPS NATIONAL

Dear SPS Members, Students, and Guardians,

Welcome to the Space Professional Society's first issue of the *CONSTELLATION* Magazine. This Magazine is dedicated to the exposure of college space programs, and raising awareness about the importance of the space domain. In early 2026, NASA stated that despite the rapid growth of the space sector, there would be a projected shortage of one million workers by 2030. America's continued security and success in space starts with students, and the Space Professional Society's goal, along with every featured space program in this magazine, are determined to change this statistic. This issue is tackling what has been dubbed the 'awareness gap' by bringing attention to students' achievements and Guardian perspectives. Students aren't solely for the future, they need to be included in the present conference discussions, workforce initiatives, and all-domain research. To the students, mentors, Guardians, industry professionals, and even the readers of this magazine, your engagement is what is furthering this mission for America's future in space. And thank you so much to all of the contributors to this magazine, it wouldn't be possible without you.

Sincerely,

Space Professional Society National Staff

The Space Professional Society, and America's Awareness Gap

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Sophia Skiba
NationalDirectorof SPS

Banking transactions, GPS systems, geological surveys, missile warning systems, scientific research, space traffic, weather reporting, sending humans into outer space, and more all require protection of the academic, government, and private interests in the space domain, and still humans are pushing further into the stars. The Bureau of Economic Analysis estimates that the space sector is growing at such a rate, that about fifteen thousand jobs per year are opening up to keep America in this new Space Race. Yet only ten percent of the American population are even aware that the US Space Force exists, and even less are aware about the current Space Race we're in with China. Enter one of the space domain's biggest challenges; the 'Awareness Gap'.

In the early winter of 2023, I encountered Bill "Hippie" Woolf on his way out of Arizona, and he ended up putting me in charge of creating the Space Professional Society (SPS). SPS is dedicated to empowering students in the space domain through opportunities and exposure to the US Space Force and the private space sector. Through SPS, I was mentored by several people within the Space Force Association. They put me in meetings discussing the current ecosystem of the space domain, and then turn to me and ask me what students need. Prominent space professionals, such as Michael Martindale and Stanley Kennedy, gave me the time of day, and sought to give students whatever we needed to be successful in space. Coming to understand the term "Spacepower", what Guardians and companies alike sought, and what the challenges in the stars were, I altered my academic path to include a bachelor's degree in Computer Science with an emphasis in A.I. to become more prepared, and became determined to help other students succeed. Which brought me to turning to my desert community.The Arizona Space Commission recently reactivated, and I attended alongside Hippie. I was ecstatic to hear STEM education being the top priority in the meeting. I was then later horrified to learn that there are currently twenty thousand 18 - 24 year olds completely disengaged from work and education in the Tucson area. Top figures of the state are very much concerned about furthering young adults in the workforce and college, and both the US Space Force and the private space sector are exploding in growth, yet somehow we are short on aerospace machinists and space policy analysts! Upon leaving that meeting, I realized the answer to this disconnect. With the exception of me,

there were no students in that meeting. Most students don't even know this commission exists. From discussions with the deans of Pima Community College, to interviewing students and cadets across the nation, I've found the issue lies within accessibility. Conferences price out students unable to get sponsored, aerospace resources are centralized in prestigious colleges, students have to fight tooth and nail just to land an entry-level internship, and most common of all, students aren't even aware that the scores of space organizations even exist. So SPS is here to change that.

SPS is here to give students what they need without barriers; we're here to highlight all of the brilliant students that deserve chances to show off their skills and gain recognition. Through the Purdue Chapter in Illinois, Sanjana Gadaginsmith and Veer Jain have developed an educational certificate for aerospace and computer majors alike on the applications of A.I. in astronomy to help bridge the knowledge gap in colleges. From National, the "SatelliteRise" competition – currently ongoing– gives freshmen and sophomores experience in satellite design and US Space Force centric mission planning so that they can boost their chances of landing internships. And with

And with the Phoenix Chapter, they're collaborating with Pima Community College Automation & Robotics Department on machinist workshops led by employees of local aerospace companies. And there is so much more for the future!

One of my personal goals for this magazine is to create a community for students. While I would love to interview a four-star general, or the leads of multi-million dollar companies, that is not what students necessarily need. They need a community they can access.

CONSTELLATION is about bringing together students from across the nation, pursuing different aspects of the space domain, to start eroding away at the Awareness Gap that currently is plaguing the space domain.

Students, we're here for you!

Sophia Skiba
National Director of SPS

The First Galaxies, Formations, Stanford, and STEM Accessibility

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Michelle Park
Coterminalmaster's Student at Stanford University
and
Sophia Skiba
SPS National Director

Michelle Park, a co-terminal master's student from Stanford University. presented at the winter American Astronomical Society in Phoenix. There, she spoke about her current research to understand the key physical processes of shaping the first galaxies using next generation cosmological simulations alongside James Webb Space Telescope observations. In Phoenix, she met with the leadership team of *"Slooh"*, and the AZ Chapter of SPS, and recanted her experiences that brought her to the conference.

Michelle grew up in Ohio, where the night was always clouded by light pollution. She said when she was in the eight grade, "I was very curious about variable stars after studying them for the Science Olympiad, and I wanted to delve into research... and I came across *"Slooh"* just by doing a google search. They had these telescopes in the Canary Islands, in Chile, away from the light pollution and in amazing weather. More importantly they had a really great community who were eager to help out this middle schooler on their science fair project, which isn't something you come across very often."

By scheduling telescope observations on *"Slooh",* an eigth grader was able to track the brightness of variable stars over months. This started to move the needle that would eventually push Michelle through the gates of Stanford University.

Now pursuing rigid physics and computational mathematics at Stanford, Michelle joined the *"Stanford Student Space Initiative"* (SSI), joining the team to tackle issues on space policy. During the winter of 2024, the International Traffic in Arms Regulations (ITAR), was being updated by the Department of State. Upon closer inspection, Michelle and her team, who were involved in L1 - L3 rocketry, realized that many of the new regulations on rocket designs inadvertently restricted amateur rocketry teams such as SSI. Michelle said, "In that round of revisions, they were suggesting many new definitions for amateur rocketry, limitations, and restrictions on what these amateur rockets could be made out of, and we immediately recognized this was something that needed to be addressed. A lot of the changes they were proposing were unfortunately going to restrict access to amateur rocketry. These restrictions were developed without context of what these amateur rocketry clubs were up to. That's why we thought it was important to speak up." This proposal created by Michelle and her team is but a small reflection of the space domain's biggest challenge. The lack of awareness concerning the space domain is is overwhelmingly present, and impacts everyone --from college students to four star generals. But as seen with Michelle, we can change this through proper communities and accessible opportunities at the student level.

For the rest of the interview, Michelle told me about her current research endeavor; understanding how the first galaxies have formed and evolved.

“The James Webb Space Telescope has uncovered a suprisingly rapid build-up of large galaxies barely a few hundred million years after the Big Bang. Using cosmological simulations, I analyzed thousands of high-resolution galaxies across different virtual universes, each with different physics. I found that the model with the most comprehensive physics regulates galaxy sizes that match the observations from the James Webb Space Telescope at both the early and late universe. These galaxies have been observed more easily because of their compact sizes and bursty star formation, while also predicting a broader population of fainter galaxies that remain to be detected. Overall, I found that more realistic physics yields more accurate galaxies that can explain our discover of bright galaxies in the early universe.”

Michelle Park at Stanford (above)
Michelle with founder of SLOOH, Michael Paolucci (right)

SSTA & DIMIDIUM; Regeneratively Cooled Rocket Engine Project

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EthanSchemmel, PhoebeStapleton, and Kevin Bobbitt
Members of the Student Space Technology Association

Hailing from the nuclear powerhouse; University of Tennessee, these three students have poured months of effort into their regenerative engine cooling project; DIMIDIUM. Phoebe is a double major doing research on nuclear fusion, Ethan and Kevin seek to use their aerospace degrees to build rockets. All three of us dreamed of space since we were little; with Phoebe even doing research at her local library when her home in rural Virginia lacked internet. But we faced stiff obstacles upon reaching college. Tennessee prioritizes the nuclear field, which has resulted in little efforts to invest into aerospace. Going to college expos and job fairs, and out of two hundred companies there were only three for aerospace, and one for rocketry. Landing an internship was next to impossible when we had to fight every other aerospace major in the area for an internship at one of these companies.

But we found a way, and that was through the Student Space Technology Association (SSTA). All of us drifted towards it, seeking community, opportunity, and to learn how to build propulsion systems. The club on campus was small, but they were welcoming of everyone of all skill levels, and maintained their friendly perseverance even when our attempts at sending a rocket over six thousand feet in the air exploded. Through the SSTA, Kevin became the lead of the propulsion systems team. At first it was just him, but as he devoted his weekends to figuring out CAD and SolidWorks, more people joined. Then over the summer, we came together to begin our project, DIMIDIUM.

On February 28th, the SSTA held an entirely student-led conference for students in the space domain, with even the SFA's CEO, Damon Feltman, giving the first keynote on Spacepower at the conference. The SSTA students overcame the complexities of hosting a conference, and the little investment the college showed them, and for us, it was nothing short of fantastic. In a private meet-up the SSTA President, Zachary Marano gathered together, I and Kevin, were able to impress employees from SpaceX, Relativity, and Axiom Space, and academics from Yale with our progress on propulsion manufacturing and testing. This led us to have incredible conversations with all of them, and gaining deep connections to the aerospace sphere, ones we would have never gotten without the conference. This continued Friday night and Saturday, as we were able to show off our unique work on our projects: DIMIDIUM and the NTP engine. Initially, we hadn't expected much traction, yet people came up to Phoebe and us all night, asking us about what we've done.

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Many heads were turned by our work, including the Chief Engineer of Nuclear Propulsion at NASA, Dr. Kurt Polzin, who allowed us to personally showcase our projects, and graciously invited us to a NASA Marshall tour, and to discuss potential testing for the NTP project. Overall, this was the best networking experience we've ever had in our lives, and was an amazing conference made by students, and for students.

For our project; DIMIDIUM, the club's regeneratively cooled rocket engine is a rocket engine that uses a Nitrous oxidizer and Ethanol fuel/coolant to produce a 5000N 16.3 second burn at temperatures over 3000 Kelvin. Dimidium got its name thanks to the exoplanet 51 Pegasi B, an incredible gas giant that can sustain gaseous properties despite being very close to its host star, and our engine, if it works, should live up to that time. What makes SSTA Dimidium unique is how we keep our combustion gasses burning at the mentioned 3000+ Kelvin. They stay hot due to in house manufactured coolant channels, built within the walls of our engine. To accomplish this, we decided to use a technique that NASA used in the 60's to fabricate their thrust chambers. It entails milling channels in the walls then creating a conductive wax mixture to pour in the channels, which will eventually harden. The reason why it needs to be conductive is due to our next process, electroforming. Electroforming, to summarize, is a process that connects two metal pieces with wires to a power source and then put in a chemical solution. This creates a bath that takes the chemicals out of the solution and deposits them onto a surface. Our engine is created from copper stock, and cooling channels are milled into the metal, so we will initially use a copper chemical solution to plate a small layer over the channels and the stock to ensure a uniform copper surface. Once this is done, we will use a nickel solution, as nickel is a strong metal and useful for structural and thermal aspects of our engine. This is a high level concept that makes or breaks the engine if done correctly, so we created a copper-nickel plated test piece for electroforming proof of concept. The test was successful, and we should plate the full engine and test fire later this year.

For the specifics of the nuclear thermal engine, Phoebe was the lead with her double major in nuclear engineering and physics. Tylos is the name of our nuclear thermal engine, which is currently still in the design process. We are basing the design off of those from the NERVA program of the 1960's, which output a flight ready reactor before being canceled in the early 70s. At the SSTA, we believe that is a shame, and that nuclear propulsion is the future of space technology. As such, we want to help educate others about nuclear propulsion technology, and prepare ourselves to work on it in the future. There are two main goals for the Nuclear Thermal Propulsion project: to design and model an adequate reactor, and test a single non-fissile fuel element from it via external

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heating. The goals of the reactor design aspect of the project are to design as light a core as possible, while maintaining its practicality for real life applications. So far, the nuclear team has been focused on initial criticality estimations and reactor sizing as well as preparation for the multiphysics simulations we will complete later in the project. For the initial reactor design, we have been working on creating a genetic algorithm to select for the most optimal core geometry. Additionally, to validate the core design we select, we have been working on a program that solves the neutron diffusion equation for a cylindrical core. In the future we would like to use the solution to the diffusion equation to help create a system dynamics model of the reactor. This will help to validate our multiphysics simulations. While we plan to use Cardinal for our multiphysics simulations, we have also made a coupled conjugate heat transfer and neutronics simulation using PreCICE, MCNP, and OpenFOAM. This could potentially serve as a lower fidelity version of Cardinal. In the future, we would like to complete materials and reactor safety studies, and run coupled neutronics and conjugate heat transfer simulations on the reactor. To complete fuel element testing, we will manufacture a uranium zirconium carbide fuel rod based on our reactor design, and flow hydrogen through it while heating it externally. Additionally, we would like to run a control test using a uranium carbide element based on designs from the original NERVA program. This control will help characterize the accuracy of our methods. From the fuel element tests, we will ascertain thrust, specific impulse, and thermal hydraulic data. Due to the UT Nuclear Departments interest in our project, we have been given the capacity to test rods manufactured with natural uranium. This will increase the accuracy of the test element's heat transfer properties. We are currently gathering information about how the fuel rods were manufactured, as well as potential coatings we could use to protect the hydrogen propellant channels. Additionally, we are researching different methods for external heating of the element, and designing a test jig for it. If we are successful in completing our tests, we will be the first student program to do so. Lastly, since this engine needs to have practical use cases in the aerospace industry, we will create concept mission plans that utilize it. An orbital trajectory simulation is in development, wherein reactor parameters can be input, and velocity servlet integration is used to optimize maneuvers.

It was through the community of the SSTA that we finally got the visibility that we've fought so hard to get, and there's so much more we want to do with nuclear propulsion systems.

SPS National Staff with USSF CSO General Saltzman, and members of the AZ Space Commission at the Ceremony of SPACEFOR-SOUTH, Jan 22nd, 2026

Jack Zimberg, Bejamin Atkins, Gavin Good, Cooper Furlough, John Schepens, and Ben Herbert presenting "TORCHBEARER" at the SSTA Conference, Feb 28th, 2026

Trinity Young, SPS North Carolina Chapter President speaking with SFA Education Committee Lead, Michael Martindale, and SPS National Director, at the Educational Summit of Spacepower 2025

*i*5Space and the Necessity for Awareness

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BySophia Osborn Mahiques, Ethan Bushong, Colleen Fanning, and Angely Atkinson; members of i5Space

Amidst the early alarm wake ups and hectic work days, people fail to realize how their lives depend on the plethora of Space Technologies. Whether it is the satellites communicating with each other to send messages to others, or a GPS tracker giving directions to classes or sharing locations with your loved ones. The lack of understanding of how space is involved in daily life, emphasizes the importance of maintaining it open and free for others. i5 Space is the premier undergraduate space training organization, specializing in and professional development. Most of the organizations are located within Air Force Reserve Officer Training Corp (AFROTC) detachments or service academies resulting in most of our members representing as or Air Force officers. Through this organization, members gain opportunities to attend space conferences and engage directly with prominent figures, such as USSF CSO General Saltzman, and NASA Astronaut Nick Hauge, across the commercial and defense sectors. Awareness for most members isn't just a casual understanding of what occurs in space, but a genuine understanding and preparation for the future responsibility we will have within space.

Through these opportunities, students experience a depth of knowledge within the space community and come to realize the lack of awareness outside of it. When we connect with others, whether in or out of uniform, we get questions of what is happening in Space and why is it important to have a Space Force. These questions reflect the broader awareness gap in public understanding. People rely on space-based capabilities daily, but they are blissfully unaware of how essential yet vulnerable those capabilities actually are. Space is not just an area for scientific research, but has become a sector to maintain as the ultimate high ground for defense. We are seeing the domain become congested and further contested with advancing technologies, anti-stallite capabilities, debris, and international competition; as seen with China's rapid mobilization of offensive satellites earlier this year. All of which are real risks to everyone on Earth. As we see this increase, a need for understanding of space becomes more necessary to the public. America's scientific and global prosperity is very much rooted in space and will continue to be.

i5Space works diligently to spread this knowledge as we pull in over a thousand students from across the nation from over sixty-seven detachments. From the Orlando Spacepower Conference to the grounds of the SDA TAP Lab, our cadets are working with industry professionals to build opportunities for future Guardians. With these efforts, we can bridge the gap of awareness between the US Space Force and the civilians it protects, and make space the domain of opportunity for students.

I5 National Staff, John Stevenson and Kylyn Smith, with SFA Founder, Bill Woolf (Top)
i5 Director of Support, Sophia Obsorne Mahiques, with members of i5 and SPS (Middle)
i5 members attending Spacepower 2025 (Below)

Orbital Debris: 100 Million Reasons for Concern

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Chase Thompson and Kyle Troy

On November 5, 2025, three Chinese astronauts aboard China's Tiangong Space Station were stranded in orbit when their reentry capsule, Shenzhou-20, was struck by space debris. The collision reportedly cracked a viewport window, which the China Manned Space Agency (CMSA) determined created unsafe conditions for the crew to return to Earth. China's three astronauts remained marooned in orbit for over a week without the ability to resupply.1 This incident underscores one of the most underestimated dangers of the modern space age: orbital debris. Orbital debris ranges in size from tiny flecks of paint to defunct satellites and entire rocket stages left in space after launch. But as scientists have discovered, fragments even as small as just a few millimeters in diameter can travel at nearly 17,500 miles per hour—faster than a bullet2 —enough to cause critical damage to space assets. Incidents like the Shenzhou-20 delay show that no spacecraft, no matter how advanced, is immune to the hazards posed by this hostile orbital junk. This article analyzes the growth of orbital debris, assesses deficiencies in existing liability frameworks, and evaluates practical strategies for addressing legal gaps. Space Asset Liability Frameworks Three key international treaties govern the legal conversation around orbital debris. The first is the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (Outer Space Treaty).3 The Outer Space Treaty serves as the foundational framework for modern space law, promoting "broad international cooperation" and establishing space as the "province of all humankind" (Article I). As it pertains to orbital debris, the Outer Space Treaty declares that states retain ownership of assets when they enter space (Article VIII) and are liable for damages caused by their assets in space (Article VII). The second is the 1972 Convention on International Liability for Damage Caused by Space Objects (Liability Convention),4 which expands the liability framework established in Article VII of the Outer Space Treaty. The Liability Convention holds states absolutely liable for damages caused by their space objects to aircraft in flight or assets on Earth's surface (Article II) and liable by fault for damages caused elsewhere than on Earth's surface (Article III). Finally, the 1975 Convention on Registration of Objects Launched into Outer Space (Registration Convention)5 dictates that states catalog and monitor their objects launched into space to ensure transparency, facilitate identification, and enable accountability in the event of damage or interference. This

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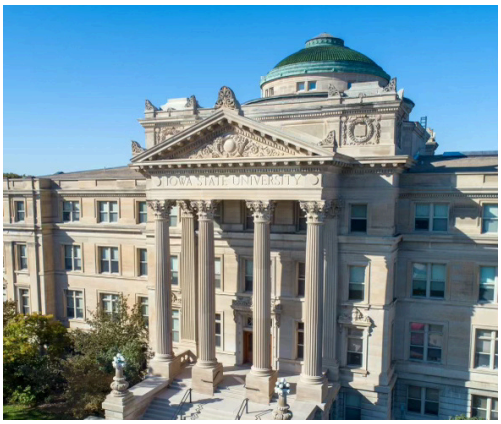
registration process allows other states to track space objects, supports collision avoidance efforts, and provides a clear chain of responsibility if an object causes damage in orbit or upon reentry. Growing Threat of Orbital Debris The likelihood of orbital collision events will increase as space operations expand exponentially. In 2012, about 1,000 operational satellites were in orbit around Earth. By 2020, that number had grown to over 3,000.6 Today, there are nearly 13,000. Popular media sources report on a broad range of commercial and state-sponsored space entities. Yet what cannot be adequately captured is SpaceX's sheer dominance in the sector. As of October 20, 2025, "8,562 of the 12,955 active satellites in low-Earth orbit—just over 66 per cent—are part of SpaceX's Starlink constellation. A further 1,500 Starlink satellites are either inactive or are no longer in orbit."7 The exponential proliferation of satellites underscores the urgent need for regulatory and legal frameworks to manage orbital growth and associated risks. Fault-Based and Absolute Liability A legal course of action exists in theory for damage caused by orbital debris when the object is large Orbital Debris: 100 Million Reasons for Concern By Chase Thompson and Kyle Troy Chase Thompson is a third-year political science student at the University of Central Florida (UCF)—"Space U"—and a legal researcher with C.J. Wilson Law, P.A., in Orlando. Chase is the cofounder and copresident of UCF Forum on Space Policy, Economics, and Law (SPEL), researching topics in aerospace law and developing his professional network. Kyle Troy is a thirdyear international relations and global studies student at UCF. Kyle is the cofounder and copresident of SPEL and has taken an active role in leading the club's long-term goals and project content.   enough to be cataloged. Under these conditions, ownership is attributed to the entity that originally launched the object into orbit. In the recent incident with China's Tiangong Space Station, if China successfully identified the origin of the debris, the nation could invoke Article III of the Liability Convention to seek redress under a "fault"- based framework. In an alternative scenario where the collision had occurred on Earth's surface, Article II of the Liability Convention could be implemented to charge "absolute liability" against the state responsible for the debris source. China must therefore prove the launching state's fault—e.g., negligent practices or failed debris mitigation—which is extremely difficult since the Liability Convention never

defines "fault." Liability Claim Recognition To follow the process established in the Liability Convention, China would first submit its claim to the responsible state through Article IX. This claim would detail the damage, provide evidence connecting the debris's origin to a specific state, assign fault, and specify the method and amount of compensation. Notably, China has the option to request another state to present the claim on its behalf or transmit it directly through the U.N. Secretary-General. This course of action is likely in the event that relations between China and the respondent state are hostile. Per Article X, the claim must be submitted within one year of the incident or of identifying the liable state. Revisions to the claim are permitted as the full extent of the damage becomes known through subsequent evidence. If negotiations fail to produce a settlement within one year of submission, Article XIV allows China to request the establishment of a Claims Commission. This three-member body, described in Articles XV– XIX, consists of one representative appointed by each party and a jointly selected chair. If the parties cannot agree on a chair within a four-month period, China may petition the U.N. Secretary-General to appoint one. The Claims Commission would evaluate the claim and determine compensation sufficient to restore China to its pre-damage condition. Its decisions could be legally binding if the parties agree to such terms in advance. By extension, it stands to reason that current legal principles would apply to harm caused to an astronaut or other living organism through orbital debris liability. Such an incident has not occurred. Ideally, this legal question will remain unanswered. Legal Gaps: Growth Outpaces Technological Development Modern tracking technology can accurately monitor about 25,000 of the largest objects in orbit. These trackable pieces are those over 10 cm in diameter, roughly the size of a baseball, which pose the most immediate risk to satellites and spacecraft.8 However, trackable objects represent less than 1% of the European Space Agency's (ESA's) estimated 100 million pieces of orbital debris.9 Legally, this raises the question: How can liability be assigned if the source of orbital debris is unknown? Until tracking capabilities progress further to attribute smaller fragments to specific actors, commercial and state operators face significant barriers to pursuing liability claims. Under current legal frameworks, orbital debris is often treated as the proverbial "cost of business" inherent to space operations. In the meantime, several nontechnological approaches have been proposed to reduce uncertainty and strengthen accountability in the near term. Existing Orbital Debris Management Regulation The United States accounted for more than 62% of total global space launches in 2025, more than double that of China, which ranked second at 27%.10 Given its operational volume and technological dominance in the global space sector, U.S. standards carry →

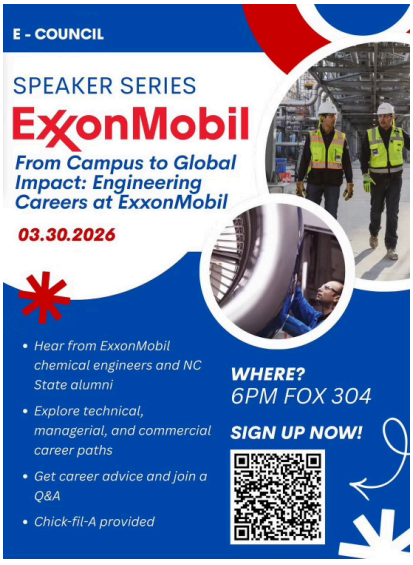
significant leverage and have the opportunity to substantially influence international practices. One such example is the United States' Orbital Sustainability Act (ORBITS Act),11 which created a storm of buzz across international regulatory entities when it passed the Senate. The ORBITS Act would establish a framework where domestic satellite operators are required to submit comprehensive debris-mitigation plans to the Federal Communications Commission (FCC) as part of their license applications. These plans must detail end-of-life (EOL) procedures for each spacecraft, including either controlled deorbiting, where space assets are guided back to Earth, or relocation to a designated "graveyard orbit," where objects are moved safely away from operational orbital paths once the mission concludes. The ORBITS Act also sets deadlines and performance expectations, requiring operators to demonstrate that debris reduction measures are feasible and will be implemented reliably. Financial penalties for noncompliance provide an additional enforcement mechanism, which creates a clear incentive to maintain responsible practices throughout a vehicle's operational life and after. Similar to National Environmental Policy Act (NEPA) evaluations,12 launching satellites and other space assets requires careful planning and consideration of potential impacts to ensure responsible and sustainable operations. Proposed Regulatory Solutions An innovative solution was proposed by NASA Chief Financial Officer nominee Dr. Greg Autry to incentivize private actors to remove orbital objects. Under this model, bounties would be assigned to the most threatening pieces of orbital debris, allowing international private and public sector actors to evaluate Published in The Air & Space Lawyer, Volume 38, Number 1, 2026. 13 The Air & Space Lawyer Volume 38, No. 1, 2026 risk and pursue mitigation projects they deem feasible and economically viable.13 By leveraging market incentives, this approach encourages innovation in debris removal while targeting the fragments that pose the highest risk to operational satellites and crewed missions. Similar international environmental management frameworks have proven effective in ecological conservation. The 1973 Convention on International Trade in Endangered Species (CITES) creates binding obligations and enforceable mechanisms for private sector funding and compliance in the protection of endangered species.14 These models show how international legal frameworks can pool resources to incentivize private actors, offering a clear analog for establishing a legally supported system to

remove hazardous orbital debris. A second notable framework is presented by Enrique Guerra-Pujol, a legal scholar of economics at the University of Central Florida. Guerra-Pujol proposes that the FCC adapt its current regulatory oversight to create a framework that prevents space congestion, thereby reducing the risk of future collisions and the generation of additional orbital debris.15 The FCC regulates communication satellite orbits launched from the United States, exercising authority granted under the International Telecommunication Union's framework and U.S. communications law. In 1993, the Omnibus Budget Reconciliation Act16 gave the FCC the legal authority to auction electromagnetic spectrum licenses for consumer cellular providers, a power later expanded by the Balanced Budget Act of 1997.17 Building on this precedent, Guerra-Pujol applies a similar auction model to orbital slots and launch permissions, allowing market forces to efficiently allocate these finite resources and reduce the risk of congestion in heavily trafficked orbits. Conclusion Space operations are expanding at an unprecedented rate, resulting in orbital debris accumulation and ultimately an increase in orbital collisions. Current technology can track only the largest objects in orbit. Thus, liability for orbital debris damages cannot be reliably assigned. Without clear attribution, legal frameworks struggle to hold operators accountable. The result is that both commercial and state actors remain exposed and are forced to treat orbital debris as an inherent threat to space operations. American space administrators and legal scholars alike have introduced promising solutions to address the threat of orbital debris. Further, the United States is uniquely positioned to leverage its leadership in the space sector to influence international cooperation and adoption of responsible shared orbital environments. In today's market, demand for space operations far outpaces both technological capabilities and regulatory development. Catastrophic orbital debris collisions are increasingly no longer a matter of if, but when. It took just one piece of orbital debris to cause mission-altering damage to China's Tiangong Space Station. So let's not forget, there are another 100 million reasons for concern, currently orbiting Earth.

UPCOMING EVENTS



Announcing the AIAA conference taking place at the Beardshear Hall at Iowa State University.



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