Ask Me Anything Webinars - Session 4

TX08.1- Remote Sensing and TX08.X – Other Sensors and Instruments

TX and Subtopic	Question	Answer
TX08.1 - Remote Sensing - S11.04: Sensor and Detector Technologies for Visible, Infrared (IR), Far-IR, and Submillimeter	For array receivers, is the 1-3 micron range of interest? and can you provide any details on environmental requirements (temp range...)?	This subtopic covers a broad frequency range from **terrors** to optical, so one to three microns is of interest. For example, currently there is a Phase I project for one to three microns for typical imaging or special imaging applications. Often, detectors in this range are preferred because they be operated at higher temperatures and at thermal full-time detector rates. In general, operating at a higher temperature with better signal to noise ratio is always a plus.
TX08.1 - Remote Sensing - S11.04: Sensor and Detector Technologies for Visible, Infrared (IR), Far-IR, and Submillimeter	Would you consider superconducting digital readout integrated with superconductor sensor arrays?	That is definitely a possibility. When it comes to these parameters, keep in mind that when you have a superconducting array and then your readout is also superconducting, that it doesn't become a very power hungry system. If it's super conductive at 4 Kelvin or minus Kelvin, then if there is an array, if there is a large readout system, the array would take a lot of that cooling. For this reason, the proposer needs to be mindful of those parameters. In terms of system implementation, however, that is quite possible.
TX08.1 - Remote Sensing - S12.06	For superconducting magnetic shielding using additive manufacturing, what transition temperature is required? Are there specific substrate materials that are recommended?	We do not have a specific recommendation for the material one should use. However, for the systems we're talking about typically are using niobium (Nb). Nb has a 9 K transition temperature (Tc), and there is a need to protect the circuit that contain the Nb wiring. As such, any shielding material used should have a higher Tc; alternatively, if a material with a lower Tc is used then the system design should be have temperature stages such that the magnetic shields will hit the Tc before the Nb circuit goes below 9 K.

TX08.1 - Remote Sensing - S11.03 Technologies for Passive Microwave Remote Sensing	Would appreciate your input regarding the following question related to broadband feedhorns for wideband multi-channel radiometry, as discussed in this subtopic: 1)Are there any targeted size and weight requirements for the feedhorn structure? Are feedhorn technologies based on waveguide structures in line with such requirements? 2)What are the requirements for the insertion loss as well as feedhorn pattern/gain?	1) NASA does not have a particular size or weight target. Feedhorn technologies based on waveguide structures may be suitable, particularly if they are low-loss give the passive remote sensing application. 2) NASA does not have specific requirements for these parameters, but the application of passive remote sensing requires low loss. Proposers could look to the performance of the GPM Microwave Imager (GMI) radiometer for examples.
TX08.1 - Remote Sensing – A2.01	The second scope (Small UAV Compatible Sensor Development and Payload Integration for Aeronautics Applications) mentions a lot of technologies that are actively in development or being prototyped on current missions. Does there need to be a link to flight test and measurement technologies for a proposal to be responsive? Or are active missions ok?	Active missions would work in that scenario. What really is appealing is if there is a way to be able to piggyback on existing technology. Flight opportunities, whether from UAVs or another existing Glight program, is always preferred. In the past this subtopic has been very successful piggybacking on various UAVs or already flying missions, especially with low TRL technology. Within those projects/programs, personnel can help with ensuring that environmental testing and software requirements are met. It is always good to participate in an existing program that has that infrastructure.
TX08.1 - Remote Sensing – A2.01	The second scope has quite a wide range of applications (3D plume reconstruction, GPS-denied navigation, test beds for lunar landers, etc). Is there a specific mission the ties this together? Or is NASA just interested in funding development of any of these capabilities?	NASA is looking within a broad scope of applications. Proposers should target specific applications and fields. If you have a solution for a problem that exists in a space and that is desperately looking for a solution, that is always good. There are technologies that cross multiple application spaces, which is always helpful to NASA. While it can sometimes be difficult to see the broad spectrum of application, being connected with programs, projects, and people that represent other areas is always helpful.
TX08.1 - Remote Sensing – S16.04 Suborbital	My question is for Scope Title: Hole-Detection Technology for Stratospheric Scientific Balloons.	These are polyethylene balloons ranging from 4 million cubic feet to 60 mcf more information can be found here https://www.nasa.gov/scientificballoons/

Platform Technologies	What type of stratospheric balloons is NASA interested in for this project? Where can we find the detailed information about the balloon structure and how it works?	
TX08.X - Other Senors and Instruments - S13.03: Extreme-Environments Technology (SBIR)	1. Will a spot radiation shielding technology that is applied on COTS electronic component be of interest? ie a paste that is directly 3D printed on electronics of interest? 2. Can you give an example of COTs component that we can plan to coat in Phase 1?	Yes. Any type of a solution that mitigates radiation effects for space is of interest to us. There are companies that are already looking at Rad Pack to package cuts in special package, which enhances performance against extreme environments and radiation. Note, though, that if you are proposing to put some sort of organic paste on, you must ensure that you have a very compelling justification that it will work. The recommendation is that you provide sufficient exhibits in your proposal. For example, review the data workshops published from the Nuclear and Space Radiation Effects Conference (NSREC). My colleagues publish their characterization of different COTS and different electronic components. You just visit their website go there and and pick a part that is susceptible to radiation and something that could be used for the proposal, review the trace, and apply your technology.
TX08.X - Other Senors and Instruments - A3.05 - Scope 1 - Determining Rain Precipitation Rates for Incorporation Into	* Is rainfall rate the only required measurement parameter or are other weather parameters also of interest (e.g., present weather, precipitation type, T, P, H)? * Would an approach that fuses data from multiple sources (local sensors + remote sensor data) be considered responsive? * Can we assume there is (a) fixed power and (b) communication lines available for in situ installations?	As a follow-up to the A3.05 question "Is rainfall rate the only required measurement parameter or are other weather parameters also of interest (e.g., present weather, precipitation type, T, P, H)" If you've not been previously awarded a SBIR under my subtopic, NASA is interested in providing weather to sUAS, drones, Air-Taxi (eVTOL/eSTOL/eCTOL) and would be interested in discussing previous solicitations or the state of art for this market.
TX08.1 - Remote Sensing - T8.07 Photonic Integrated Circuits	Can someone talk about interest in relative navigation sensors and optical communication sensors using photonic integrated circuits?	This topic is maybe a little bit different in the sense that NASA is majorly focusing on new technologies and new capabilities. We are interested in specific applications, and we have call outs for those. The dividing line that we've we've tried to

		define is if you are taking established platonic integrated circuit technology and building a new system with it, it might be more applicable to different subtopics. However, if the proposer is developing new technology, you know better (e.g., modulators, detectors, etc.), then that is definitely in our area. Additionally, we've identified a few specific applications where we have established needs. If the proposer applies to one of those, they don't have to spend as much effort justifying. if the proposer is applying to something that is not one of those specified items, we expect additional justification on why NASA needs this.
TX08.1 - Remote Sensing - S11.01	What is your biggest laser need for remote sensing applications? Wavelength? Energy? Rep rate?	The solicitation mentions several laser wavelengths, some with specified energy and repetition rates. The focus is on transformative technologies and architectures that reduce SWaP-C and Compact, efficient, tunable, and rugged narrow-linewidth pulsed lasers.
TX08.1 - Remote Sensing - S16.04 Suborbital Platform Technologies	Will NASA consider proposals outside of the scope of the scope title ("hole detection...") but within the scope of the subtopic introduction? We launch sounding rockets from ships at sea. Will our solution be immediately disqualified since it has nothing to do with hole-detection?	It is unlikely that the proposal will make it to the reviewers due to the difference in scope. Unsolicited proposals are frequently accepted directly to the programs or through our program executives at HQ. You can reach out to contacts at Wallops Flight Factility, which manages suborbital flight, or directly to the sounding rocket office. There also may be some contacts within the STMD Flight Opportunities program, but i dont know for sure.
TX08.1 - Remote Sensing - S11.03 Technologies for Passive Microwave Remote Sensing	With regards to technologies, processes, or methods, such as AM, that are able to reduce SWaP-C, could you please provide more clarification on which RF blocks/components are mostly of interest? For instance, is the solicitation looking for demonstration of antenna systems, power-splitters, couplers, filters, etc. or is it more focused on demonstration of interconnecting	The subtopic is looking to reduce the size, weight, power and cost of microwave radiometers. Which components or subsystems are most suitable will depend on the technology. Companies can propose what they feel are best candidates for improvement with these new technologies.

	blocks? If the latter, could you please provide some examples.	
TX08.X - Other Senors and Instruments - S14.01 Space Weather R2O2R	Would development of a set of simulative, predictive and/or real-time products for space weather effects on systems (satellite, comm, remote and/or other sensors and instruments) be more apropos to subtopic S14.01 solicitation for these TX08.1/TX08.x SBIR/STTR sections or to section TX11?	The simulative and predictive methods are more appropriate for the TX11 taxonomy. There are three scopes within the S14.01 subtopic, two of them in TX11 and one in TX08. That sort of question would be responsive to one of the TX11 scopes. The TX08 scope calls for hardware capability that could eventually be flown. For example, NASA Flight Opportunities (https://www.nasa.gov/stmd-flight-opportunities/) provides some potential (but not automatic) post-Phase-II paths to flight.
TX08.1 - Remote Sensing - T8.07 Photonic Integrated Circuits	In T8.07 on Photonic Integrated Circuits: PICs are being developed for a wide range of technology applications. Does NASA have any set of preferred applications?	The bullet list in the subtopic provides this information. Some examples include in situ sensors, tunable laser, and spectrometer base. Within this subtopic, NASA is always looking for high speed (e.g., high speed detectors, especially photon efficient detectors, APDS, etc.). We did have a funded SNSPD Phase I. So, currently we are looking at non-cryo, single photon detectors. There are probably a few other technologies. NASA has done some existing projects in microwave photonics. New capabilities are always interesting. For anyone submitting to this subtopic, note that last year we had many submissions. We didn't get to award as many Phase I's as we wanted. The point is that proposers should review recent awards in this subtopic, especially in the last two years. That will provide an overview of what's already going on and where there are gaps.
TX08.1 - Remote Sensing	Do proposed scopes/solutions addressing structure and antenna to meet solicitation identified requirements satisfy the proposal scope, or is this topic primarily focused on the electronics.	Assuming that this question is for S11.02, solutions could be focused just on structures solution. Submissions that are all mechanical are appropriate, or electrical/RF mechanical combinations.
TX08.1 - Remote Sensing - S16.04 Suborbital	My question is for Scope Title: Hole-Detection Technology for Stratospheric Scientific Balloons. Do you have the minimum size	This was not specified so that it could be as broad as possible. Within proposals, we anticipate a huge trade off in complexity. For example, the smaller the hole being

Platform Technologies	(diameter) of the holes that the technology should be able to detect?	detected, the the more complex and higher cost the system will be. For this reason, the subtopic was intentionally made that broad to allow the full trade space. We didn't want to limit the technology. In an ideal world, you'd be able to detect a pinhole, but that's probably not feasible. We are looking to find that out.
TX08.X - Other Senors and Instruments	Extreme technology can mean cryogenic environment?	It also means high temperature environments as well. High dynamic environments are included. So, it is extreme, meaning beyond the norms.
TX08.X - Other Senors and Instruments	Any technology for cryogenic environment is responsive to extreme technology?	I would say yes.
TX08.X - Other Senors and Instruments - S13.03: Extreme-Environments Technology (SBIR)	Would NASA consider slip rings (sliding electrical contacts) within scope of “Wide-temperature-range and low-temperature-capable tribological surfaces”	Within the subtopic, the collaborative team consists of multiple NASA centers with different interests, including mechanical. For this reason, mechanical articles that work under a wide temperature range are of interest. The proposer has to clearly define the innovation so that when the reviewers review the proposal, they can see the innovation immediately. This enhances the interest of these reviewers so that they can provide you with constructive and positive feedback. And if you want to do something like slip rings, you want to make sure that you provide a very good argument that the solution works across a wide temperature range. The technology doesn't go through a mechanical freeze-out due to phase-changing, lubricant, etc. The proposer needs to clearly argue those and and provide very good solutions/solid innovations that would be considered as a breakthrough. The simple answer is yes.
TX08.X - Other Senors and Instruments - S11.04 or S16.04	Are you looking for integrated sensors/instruments or specifically detector element technology? I.e. Are you interested in low-SWaP, optical multi-gas sensors for in-situ trace gas monitoring such as a sensor using spontaneous Raman scattering that can detect various	That is not within the scope of S16.04

	gases at sub-ppm levels? Would this fit under S11.04 or S16.04?	
TX08.1 - Remote Sensing	Any technology for cryogenic environment, including cryogenic energy storage systems or space craft reaction wheels or vibration isolation system, is responsive to extreme technology?	The proposal needs to be related to the NASA missions of interest/targeted planets of interest. If the proposal is for technologies within extreme environments for underwater exploration, that's not of interest to this subtopic. However, technologies that would land on the moon and would support temperatures that go from -180° to plus 120° C would be of interest. The combination of that plus radiation also would be of interest, as well as similar capabilities. The recommendation is to read the call and make sure that the proposal is relevant to that particular subtopic. Other technology needs include sensors that operate in project environments/fluid transfer, etc., crowd food management that addresses some of those calls from a microsonics perspective (especially in extreme high temperature) in terms of sensing, sensing applications (for example, fiber optic sensors that can that can broach that entire spectrum, whether you're dealing with Progenics down the liquid nitrogen, oxygen all the way up to hypersonic temperatures dealing with light sapphire type), etc.
TX08.1 - Remote Sensing - T8.08 Lunar Imagery	Lunar Imagery — is there a preference for hardware or infusion of software solutions into existing flight hardware?	The preference is for technologies that complement our existing assets that are in development for Artemis III and the challenges we face in using them to their performance potential. Bandwidth will be a major constraint. Hardware or software that maximizes and/or exceeds the state of the art for imagery compression/transmission that would help deliver high quality imagery from lunar surface back to Earth would be very important. Making sure NASA is using all those bits wisely is key. If the technology could incorporate methods to have high quality imagery at reduced bandwidth, would be wonderful. We are also

		interested in technologies to improve imagery in shadowed and bright regions when we are on lunar surface, or other assets to complement the sources of imagery in the existing plans.
TX08.1 - Remote Sensing - T8.08 Lunar Imagery	Would you please provide specific examples of "challenges of spaceflight and specifically the lunar environment"? (ii) Is there are target/scope of sensor resolutions and frame rates that make it useful?	Examples of challenges for the lunar environment would be radiation, vacuum and thermal - those are very hard conditions for a system to to survive and still operate. NASA also has very constrained data transmission allowances. Balancing spatial resolution, frame rate, and bit depth of motion imagery with our communication constraints is very important. The subtopic welcomes proposals that help us pick the optimal balance between frame rate, spatial resolution (including dynamic changes), and bit depth while considering the challenging lighting conditions. The goal is to maximize the potential Artemis III imagery hardware to capture the best imagery possible for the lunar environment. The second part of the question regarding a target of sensor resolution / frame rate, the imagery NASA is primarily focused on for this subtopic is imagery that's useful for the public as well as ground operations team (monitoring crew and vehicle while on lunar surface). NASA is primarily interested in invisible spectrum imagery, 1080P or UHD spatial resolution at 30 or 60 frames a second. As mentioned above, but to reiterate, we are very interested in dynamic range (bit depth) as well.
TX08.1 - Remote Sensing – S11.02	The solicitation is seeking technologies enabling low-mass steerable technologies, including, but not limited to, antenna or RF electronics, enabling steering: Cross track +/-7° and along track +/-15°. Is the solicitation only seeking technologies for L- or S-band, or technologies at Ku- or Ka-band	First, assuming your question is with regards to Surface Deformation and Change (SDC) or possibly the STV instrument requirements, for low mass steerable antenna technologies NASA is primarily interested in L-band and possibly S-band. However, NASA is interested in technologies at all frequencies. One

	(mmWave bands in general) also considered?	particularly challenging requirement is for deployable high gain antennas in the range from Ka-band to W-band (no beam steering). At these frequencies, getting an accurate deployable is significantly harder.
TX08.1 - Remote Sensing	Cryogenic systems for NASA HABITABLE WORLDS OBSERVATORY space telescope can respond to extreme technology?	For anything that is developed for extreme environments, the proposer could submit, but I would also look at other subtopics and make sure that that there is not a better fit in the other subtopics that that would be matching your interest. So if you do not find any other subtopics that matches your interest, then submit it to extreme environment technology.
TX08.1 - Remote Sensing – S16.07	Will printed superconducting materials that transition about 7K be of interest for motors and actuators. NbTi transition at 10K but the solicitation mentions "higher temperature superconductors that can operate above 5K". So it is a bit contradictory.	Even though 7K is in excess of the the 5K mentioned in the subtopic, there are many applications for it. Many applications would benefit from having zero or near-zero dissipation actuators and motors. NASA may not need to go as low as 7 Kelvin for a lot of those other applications. Additionally, NASA isn't only interested in superconducting actuators in the five to seven Kelvin range. As long as the transition temperature is lower than OR higher than the technology application, then that would be of interest to this subtopic. Of note, NASA has many systems that will operate in the 10s of Kelvin range, especially for multi-stage cryo cooling/crowd cooled systems. Depending on the specifications of the motors and actuators those missions may use, there are many opportunities for actuators that operate in the 10s of Kelvin range, not necessarily as low as 5 to 7 Kelvin.
TX08.1 - Remote Sensing – S16.04	Hole-Detection Technology for Stratospheric Scientific Balloons. Is it allowed to change the balloon material from clear polyethylene to semitransparent or opaque polyethylene?	It needs to stay in its current state, which is clear to sort of a little bit white for thermal concerns. We can't have any part of the material change at all. Otherwise, it will create a hotspot.