

Space Weaponization And Space Security: A Chinese Perspective

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China has seen much evidence to suggest the movement by the administration of U.S. President George W. Bush toward space weaponization is real. A number of U.S. military planning documents issued in recent years reveal the intention to control space by military means. In practice, the United States is pursuing a number of research programs to enable the development of space weapons, which could be used not only to attack ballistic missiles in flight but also to attack satellites and targets anywhere on Earth. Chinese officials have expressed a growing concern that U.S. plans would stimulate a costly and destabilizing arms race in space and on Earth, with disastrous effects on international security and the peaceful use of outer space. This would not benefit any country's security interests. Beijing believes the most effective way to secure space assets would be to agree on an international ban on weapons in space.

In what follows, I first examine briefly why China says *NO* to U.S. space weaponization. I then explore in detail preventative measures that can be taken.

Why China Says *NO* to U.S. Space Weaponization

China has a number of major concerns about the current direction of U.S. military space efforts. For example, China is worried about how U.S. space weaponization plans might affect Chinese national security, international security, and protection of the space environment.

China's concerns about U.S. actions

Many Chinese officials and security experts have great interest in U.S. military planning documents issued in recent years that explicitly envision the control of space through the use of weapons in, or from, space to establish global superiority. In its 2003 report, "Transformation Flight Plan," the U.S. Air Force lists a number of space weapon systems desirable in the event of a space war.¹ These include space-based kinetic kill vehicles, space-based lasers (SBL),

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hypervelocity rod bundles, space-based radio frequency energy weapons, space maneuver vehicles, and the Evolutionary Air and Space Global Laser Engagement (EAGLES) laser relay mirror. In 2004, the Air Force showed clearly in its *Counterspace Operations Doctrine* document what it actually intends to do: that is, achieve and maintain *space superiority*, – the “freedom to attack as well as the freedom from attack” – in space.²

In practice, the pursuit of controlling space would require anti-satellite (ASAT) weapons to negate an adversary’s space capabilities. It is believed that the current Ground-based Midcourse Defense (GMD) system deployed in Alaska will have a significant intrinsic capability for ASAT use. Thus, it is reasonable to argue that one true purpose for the Bush administration’s rush for the GMD deployment could be to acquire an ASAT capability for its space control strategy. The scope of space weaponry, generally accepted by many Chinese includes not only weapons stationed in outer space, but also weapons based on the ground, at sea or in the air that target objects in outer space. Outer space objects, in the Chinese definition, include not only satellites but also ICBMs traveling through outer space.³ Since the GMD system would intercept its target in outer space, it could be seen as a space weapon. Moreover, the GMD system could be the first step toward a more robust, layered system for space control. Consequently, China feels that U.S. plans to deploy a missile defense system is an intentional first step toward the weaponization of space.⁴ In addition, the United States also pursues a number of other research programs that could lead to ASAT weapons. For instance, the Air Force has a research project to test small satellites, the Experimental Satellite Series (XSS), that could be used to attack other satellites.⁵

Further, the United States is pursuing space-based ballistic missile defense (BMD) for global engagement capabilities. It is believed that an effective, global-coverage BMD system must start intercepting an ICBM as early as the boost phase, which, under U.S. Missile Defense Agency plans, would entail the use of space-based interceptors. Indeed, the current U.S. budget for missile defense shows continued interest in a number of space weapon-related programs, such as the Near Field Infrared Experiment (NFIRE) satellite and Space-Based Interceptor Test Bed.

The United States does have legitimate concerns about its space assets, given that U.S. military operations, economy and society are increasingly dependent on space assets and such assets are inherently vulnerable to attacks from many different sources. However, it does not mean that the United States currently faces credible threats from states that might exploit those vulnerabilities.⁶ Further, space-based weapons cannot protect satellites, since these weapons are also vulnerable to many types of attack, similar to the satellites requiring protection. The true aim of U.S. space plans is not to protect U.S. assets but rather to further enhance American military dominance. Prof. Du Xiangwan, vice president of the Chinese Academy of Engineering, recently presented his view that

the *Transformation Flight Plan* indicated that “many types of space-based weapons will be developed,” and “the tendency toward space weaponization is obvious and serious.” He further noted that military dominance on Earth is not enough, “the U.S. also seeks to dominate space.”⁷ Beijing fears that by unilaterally developing missile defense systems and pursuing space weaponization, the United States is seeking to establish a global military superiority using both offensive and defensive means.⁸ Moreover, China’s fears about U.S. hegemonic tendencies are exacerbated by the fact that space weapons, due to their vulnerability to other less expensive, asymmetric measures, are inherently first-strike weapons.⁹

Neutralizing China’s nuclear deterrent

In particular, China is concerned that the U.S. missile defense network will undercut China’s strategic nuclear deterrent. Even a limited missile defense system could neutralize China’s fewer than two dozen single-warhead ICBMs that are capable of reaching the United States. China is even more concerned about space-based BMD systems that would be far more dangerous to China’s nuclear deterrent than a non-space-based BMD system. In addition, Beijing is worried that the deployment of missile defense systems would further promote a preemptive U.S. military strategy.

As viewed by Chinese leaders, China’s own small strategic nuclear arsenal appears to be a plausible target for U.S. missile defenses.¹⁰ China fears that the BMD network would give the United States more freedom and power to intervene in its affairs, including undermining the country’s efforts at reunification with Taiwan. Moreover, China is concerned that putting weapons in space would constrain its civilian and commercial space activities. China sees itself as a developing economic space power, dependent on free access to space for financial gain. However, U.S. driven space weaponization directly threatens this access.

Arms race

Due to the threatening nature of space weapons, it is reasonable to assume that China and others would attempt to block their deployment and use by political and, if necessary, military means.¹¹ Many Chinese officials and scholars believe that China should take every possible step to maintain the effectiveness of its nuclear deterrent. This includes negating the threats from missile defense and space weaponization plans.¹² In responding to any U.S. move toward deployment space weapons, the first and best option for China is to pursue an arms control agreement to prevent not just the United States but any nation from doing so – as it is advocating presently. However, if this effort fails and if what China perceives as its legitimate security concerns are ignored, it would very likely develop responses to counter and neutralize such a threat.

Despite the enormous cost of space-based weapon systems, they are vulnerable to a number of low-cost and relatively low-technology ASAT attacks

including the use of ground-launched small kinetic-kill vehicles, pellet clouds or space mines. It is reasonable to believe that China and others could resort to these ASAT weapons to counter any U.S. space-based weapons.¹³ This, however, would lead to an arms race in space.

To protect against the potential loss of its deterrent capability, China could potentially resort to enhancing its nuclear forces. Such a move could, in turn, encourage India and then Pakistan to follow suit. Furthermore, Russia has threatened to respond to any country's deployment of space weapons.¹⁴ Moreover, constructing additional weapons would produce a need for more plutonium and highly enriched uranium to fuel those weapons. This impacts China's participation in the fissile material cut-off treaty (FMCT).¹⁵ Eventually, failure to proceed with the nuclear disarmament process, to which the nuclear weapon states committed themselves under the Non-Proliferation Treaty, would damage the entire nuclear nonproliferation regime itself, which is already at the breaking point. As Hu Xiaodi, China's ambassador for disarmament affairs, asked, "With lethal weapons flying overhead in orbit and disrupting global strategic stability, why should people eliminate weapons of mass destruction or missiles on the ground? This cannot but do harm to global peace, security and stability, and hence be detrimental to the fundamental interests of all States."¹⁶

Worsening space environment

Weaponizing space would further exacerbate current problems with space debris.¹⁷ Even worse, some scientists warn that if a number of satellites are destroyed in the course of a war, the Earth would be encased in a cloud of debris that would prevent future satellite stationing and space access.¹⁸ Given concerns over the space debris issue, senior scientists in China have emphasized that preventing environmental pollution should not only apply on Earth, but should also apply in outer space. As Xiangwan recently noted, "prevention of pollution in space should be put on an agenda and as time goes by, this problem will become increasingly obvious." He further states: "In preventing space pollution, the following two issues are worth noticing: space garbage and weaponization of space." "[W]eaponization of space is more dangerous than ordinary space garbage," since "it will seriously pollute space" and "it will threaten peace and stability on the Earth."¹⁹

Some Measures for Space Security

As discussed above, the cumulative effect of space weaponization by the United States would undermine global security and the peaceful use of outer space by all nations. If Washington wants to reduce the potential vulnerability of its space assets, there are a number of ways to improve space security. Weaponizing space can only erode this security. As Ambassador Hu recently emphasized, "for ensuring security in outer space, political and legal approaches are more be effec-

tive, while resorting to force and the development of space weapons will only be counter-productive.”²⁰

There are technical approaches, which, if implemented unilaterally, could improve the survivability of space systems. The United States and others could, for example, harden or shield the most vulnerable parts of their satellites (such as the solar cells and the focal planes) against nuclear, laser, or other conventional attacks. In some cases (e.g. nuclear explosion), hardening satellites would be difficult but technically feasible. To avoid paralysis of a whole system, redundant capabilities could be made available for rapid replacement of satellites in orbit. Increased maneuverability, enhanced situational awareness, and improved stealth capability, would also make it easier to evade a hostile attack.²¹

Furthermore, a number of measures could be taken to secure space assets by multilateral rules or agreements. Specific rules or agreements for space use might include, for example, “keep-out zones,” a non-interference rule for satellites, cooperation on reducing space debris, notification of space launch, development of safe traffic management procedures, and building a hotline between major missile and space powers. These “rules of the road” would be intended to reduce suspicion and encourage the orderly use of space. However, it should be noted that the above technical measures and rules, although important for reducing present risks, would not remove the implicit threat of ASAT attacks. A potential rule on “keep-out-zones” would not prohibit an attack by a space-based laser at long distance. Technical solutions are unlikely to suffice in the absence of strengthened international agreements on space activity. In addition, hardening satellites would be extremely costly, and potentially infeasible, in particular for civilian and commercial satellites. It would impair the operational flexibility of satellites.

A Space Weapons Ban

A set of measures to limit space arms proliferation have been proposed, including a ban on the testing or use of any ASAT weapons and a declaration not to be the first to deploy weapons in space or to further test destructive ASATs.²² It should be noted that, even if the compromise route is taken, any multilateral attempt to address space security should consider all countries’ interests. One of China’s major motivations for a ban on space weaponization is to reduce its concerns regarding U.S. missile defense plans. Thus, any partial arms control measure involving China should emphasize this concern. For example, a proposal that restricted ASATs while allowing the deployment of a U.S. missile defense system would be perceived by China as discriminatory for two reasons. First, ASATs would be an effective way for China to counter the U.S. missile defense threat. Second, it is difficult to distinguish between anti-ballistic missile systems and ASATs, which would create a probable source of tension.

China's position

In China's view, the most effective way to secure space assets would be to agree on a space weaponization ban. Ambassador Hu stated, "If any country is really worried about possible menace to its space interests, this could certainly be alleviated through the negotiation and conclusion of a treaty on the prevention of space weaponization, as suggested by China... Such a legally binding international treaty will be the best tool to safeguard the interests of all sides."²³

China's stance on banning weapons in outer space has been consistent since 1985, when it first introduced a working paper to the U.N. Conference on Disarmament (CD). China's most recent working paper on the issue, introduced in June 2002, emphasizes three basic obligations: (1) Not to place in orbit around the Earth any objects carrying any kind of weapons, not to install such weapons on celestial bodies, and not to station such weapons in outer space in any other manner; (2) Not to resort to the threat or use of force against outer space objects; and (3) Not to assist or encourage other States, groups of States, international organizations to participate in activities prohibited by this Treaty.²⁴

In recent years, the U.N. General Assembly has adopted resolutions calling for the CD to begin negotiations on the Prevention of an Arms Race in Outer Space (PAROS) with an overwhelming majority of support. However, John Bolton, then U.S. undersecretary of state for arms control and non-proliferation, told the CD: "the current international regime regulating the use of space meets all our purposes. We see no need for new agreements."²⁵ Many Chinese leaders believe Bolton is wrong. There are no existing treaties that effectively prevent the testing, deployment and use of weapons, other than those of mass destruction, in outer space. In addition, none of these instruments covers the threat or use of force from Earth (land, sea and air) against objects in outer space. The history of proliferation has taught us that banning the testing and deployment of weapons from the outset is much more effective than attempting disarmament and nonproliferation after the fact.

Scope of "space weapon" and U.S. missile defenses

Once negotiations on a space weapon ban begin, the interpretation of the scope or definition of "space weapon" will be of crucial importance. It will not only affect China's judgment on the value of such a ban, but also U.S. decisions on missile defense systems. There is at present no consensus on what constitutes a space weapon. Based on Chinese documents, space weapons would include: (1) any weapon stationed in outer space for the purpose of attacking any object in space, on the ground, in the air, or at sea; (2) any space- ground-, air- or sea-based weapons that target objects in outer space.

Two key issues of definition regarding the scope of space weaponry are the "basing" of weapons and what constitutes an "object in outer space."

Regarding the basing question, any weapon if stationed in outer space should be classified as a space weapon. This interpretation can easily be widely accepted. Here, the basing of an object in space is the key. For the question of what is an object in outer space, if the “object” refers only to satellites, then we can define the scope of the space weapon ban as applying to: any weapons stationed in outer space and any ASAT weapons (what I call the “focused” approach). However, if the “object” refers not only to satellites but also to missiles traversing space, then space weapons will be defined (according to what I call the “broad” approach) as any space-based weapons, any ASAT weapons, and any anti-ballistic missile weapons intercepting missiles in outer space. Thus, the “focused” approach would permit a non-space-based BMD system, while prohibiting a space-based BMD system. However, the “broad” approach would put a strong limitation on U.S. missile defense system development.

China’s official documents proposed at the CD do not further clarify whether “object in outer space” would exclude ICBMs traveling through outer space. In its 2001 working paper to CD on PAROS, China pointed out one of the three basic obligations as “not to test, deploy or use on land, in sea or atmosphere any weapons, weapon system or their components that can be used for war-fight-

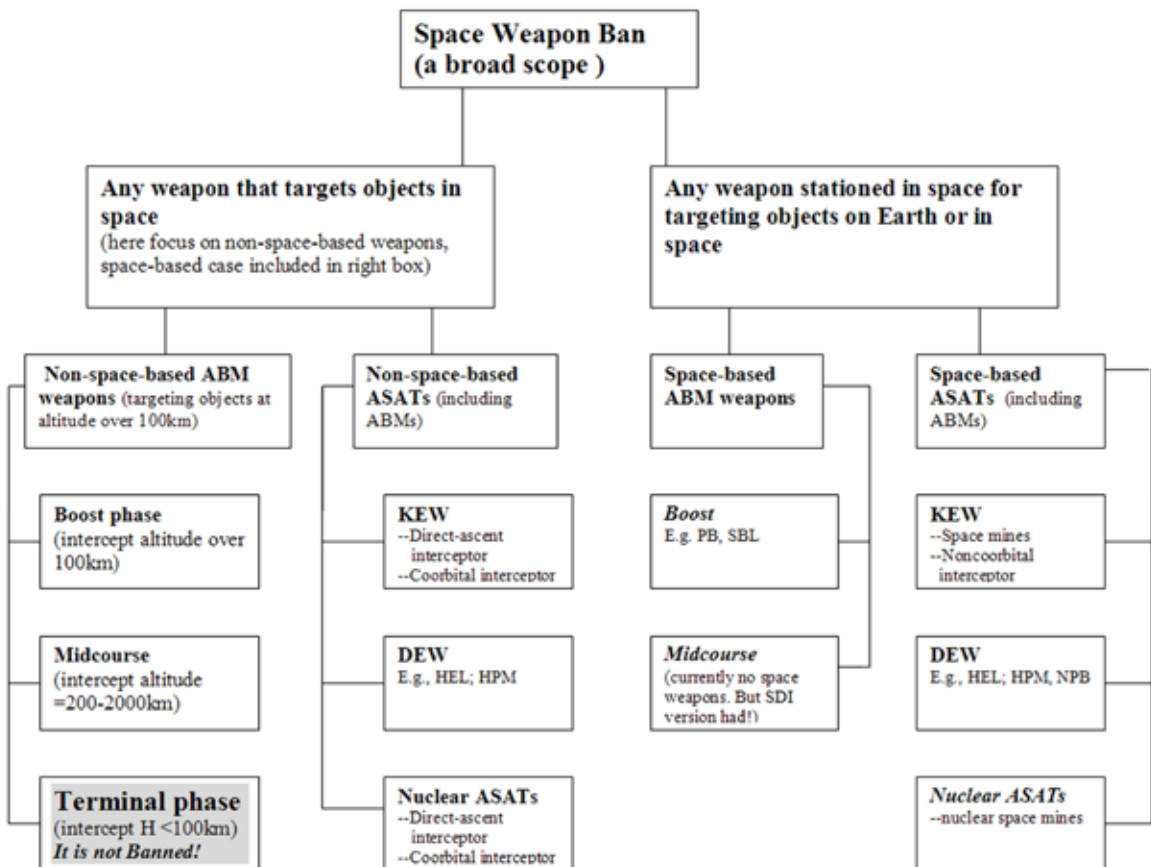


Fig.1: The relation between BMD and the broad scope interpretation of space weapon

ing in outer space.”²⁶ It did not clarify whether using a missile defense system to intercept an ICBM in its mid-course would belong to “war-fighting in outer space.” However, many Chinese officials and experts have generally favored the “broad” approach of the definition of space weapons.²⁷

An examination of missile defense systems illustrates the importance to any treaty negotiation of unambiguously defining the term “objects of outer space.” It assumes outer space as the space above the Earth’s atmosphere, i.e. space 100km above sea level. There is no doubt that all potential space-based missile defense systems, including a space-based boost-phase system, would be captured by either a “broad” or “focused” scope ban on space weapons. Regarding non-space-based BMD systems, the key issue is whether their intercept altitude is above 100km. Even the ground-based mid-course missile defense system, which is currently being deployed, would not be permitted under a “broad” definition, as the intercept altitude of the GMD system is about 200km to 2,000km. The only missile defense system allowed under a broad scope ban on space weapons would be the terminal-phase defense system, which would destroy warheads at tens of kilometers through use of a non-space-based interceptor. However, the defense footprint of the terminal-phase defense system is small in comparison to other systems, as it is only a “point” defense for a localized area such as a missile silo. Without other overlapping systems, it would not provide global coverage.

Thus, a broad interpretation of space weapons would rule out almost all U.S. national missile defense systems. If Chinese officials want to limit all U.S. missile defense deployments through an international ban on space weapons, they would focus on the broad scope approach. However, it is unlikely that the United States would accept such an interpretation or a treaty that sought to rollback U.S. missile defenses.

A focused approach

At this stage, it would be difficult to persuade the United States to alter its ballistic missile defense plans, as the GMD system is already being deployed. The United States would, no doubt, refuse such a broad ban. In fact, it is unrealistic to expect that the United States will accept any negotiations on space weapons in the near future. The United States is unlikely to return to anything like the Anti-Ballistic Missile Treaty – instead, it will seek to retain the right to build and operate at least a ground-based missile defense system. If China wants to move beyond mere complaints towards an actual agreement, then it will have to consider proposals that might conceivably be acceptable to the United States. To overcome the deadlock at CD and to reduce the concerns of both the United States and China, a minimum-scope space weapons ban (the “focused approach”) with some bilateral confidence-building measures could be a practical first step. This approach could include the following two core elements:

- Banning the testing and deployment of any weapons in outer space, including space-based kinetic energy weapons, space-based directed energy weapons, and any other space-based weapons for attacking space-, ground-, sea-, or air-based targets. This would rule out space-based missile defense and ASAT systems.
- Banning the testing and deployment of any “dedicated” ASAT weapons. This would include any strike system – whether ground-based, sea-based, air-based or space-based – against orbiting satellites.

Subsequently, what is the likelihood of both the United States and China considering a “focused approach” to space weapons?

The U.S. Side

The United States would likely find a focused approach more acceptable than a broad approach. While it bans space-based weapons and ASATs, the former would allow deployment of the GMD system that composes the central part of the Missile Defense Agency’s current budget and development efforts. In practice, as a number of studies show, there is no rationale for the U.S. to deploy space weapons and ASATs.²⁸ For example, an enormously expensive space-based interceptor system for missile defense would be intrinsically vulnerable to a number of cost-effective ASAT attacks and be overwhelmed by the simultaneous launch of several missiles from a compact area.²⁹ Moreover, the negative impacts of using space weapons for other military missions – protecting satellites, denying the hostile use of space to adversaries and projecting force – would far outweigh the benefits, since the utility of space weapons is limited by three main factors: high cost, considerable susceptibility to countermeasures, and the availability of cheaper, more effective alternatives.³⁰

Furthermore, a space-based BMD system would inevitably encourage other countries to pursue ASATs as countermeasures. Thus, a space weapon ban would reduce the proliferation of ASATs. It would reduce the risk of a “space Pearl Harbor” for other military and civilian satellites. As many experts in the U.S. point out, given the heavy dependence of the United States on its space assets, “the United States has more to lose than to gain by opening the way to the testing and deployment of ASATs and space weapons.”³¹ The United States is now more dependent on satellites to perform important military functions than any other state. By placing weapons in space, the United States could stimulate others to balance symmetrically and asymmetrically against U.S. space assets. It would be very difficult for the United States to maintain unchallenged hegemony once space is weaponized. The current U.S. military advantage in space instead would be lost, or at a minimum degraded, by weaponization. Further, space weaponization would threaten U.S. civilian and commercial assets by making them far more vulnerable than they are today. The U.S. economy and society are highly dependent on the applications of commercial satellites.

In short, as Richard Garwin and his co-authors point out: “A regime that effectively prohibits the deployment of space weapons and the use of destructive ASATs before they can destroy U.S. or other satellites would be a smart, hard-nosed investment in U.S. national security, but would require U.S. leadership.”³² It is clear that the United States still has time for serious re-consideration of its space activities. While current funding requests from the Bush administration show continued interest in space-based weapons systems, the actual level of funding is small and these weapons remain in the conceptual and research stages. At the current speed of development, for example, the planned space-based BMD system would not reach fruition until around 2020.

China’s Point Of View

From the Chinese perspective, a non-space-based BMD system would be less threatening to national security than a space-based one. Countermeasures for mid-course missile defense systems would be less expensive and easier for China to develop. These include decoys, anti-simulation measures³³ and an increase in warheads capable of penetrating such a defense system. However, as many scientists point out, a robust, global-coverage BMD system would have to include boost-phase missile defense.³⁴ From the Chinese perspective, a U.S. space-based, boost-phase missile defense system would pose the greatest threat of all. This is due to the fact that at boost phase, the missile defense system would have fewer targets; the target ICBM would be much larger than the normal re-entry vehicle; the target would be much more fragile than a re-entry vehicle; and the target would be easily detectable due to the bright plumes of the burning booster. A non-space-based, boost-phase missile defense system would not be able to cover China’s ICBMs. In fact, an ICBM at an altitude of 200km can be detected within a range of 1,600km by a sensor on the ground, and within 2,000km by a sensor at an altitude of 15km. Because of China’s vast area, the United States would have to destroy a Chinese missile in boost-phase from space.³⁵ As such, even a limited ban on space weapons would significantly reduce the threat for China from U.S. missile defense systems, assuming that Chinese military planners have confidence in countermeasures for midcourse missile defense systems.

Other bilateral confidence-building measures between the United States and China would facilitate China’s consideration of a “focused approach” to space weapons negotiations. These measures might include: (1) A U.S. acknowledgment of the seriousness of China’s concerns, including an assurance that a U.S. missile defense system will not target China; (2) A U.S. pledge to adopt a bilateral no-first-use policy toward China, following the example of similar Chinese and Russian policies; such a policy would ease China’s major concern about the possibility of a U.S. preemptive strike; (3) The clear exclusion of Taiwan in the U.S.-Japan joint theater missile defense plan, and a U.S. move to block the sale of such systems to Taiwan; (4) A limitation on the scale and scope of the envisioned

U.S. non-space-based BMD architecture, including placing a limit on the number of missile defense interceptors and restricting the scope of the overall system to the minimum required for dealing with rogue threats. This latter measure would ensure that China's current stock of fissile materials would be sufficient to fill the number of new warheads needed to balance U.S. missile defense interceptors. In the absence of any limitations on U.S. missile defense systems, China harbors concerns about whether its current fissile material stocks are extensive enough to supply the warheads needed to counter the U.S. threat to its nuclear deterrent. This directly affects China's willingness to participate in the Fissile Material Cut-Off Treaty. Restrictions on the U.S. BMD system would also ensure that China builds its nuclear arsenal in a predictable way – until it has the capacity to balance the U.S. defensive capabilities – which the United States would acknowledge and understand. 🌐

~Book Release~

Zhang Hui's upcoming Working Report, "Chinese Perspectives on Space Weapons", will be published in the American Academy of Arts & Science project, *Reconsidering the Rules of Space*. In this report, the author examines China's major security concerns and possible responses to U.S. ambitions for space weaponization. Zhang also explores a number of technical and legal measures that all countries can take to protect a broad range of scientific, commercial, and military activities in space.

Endnotes

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