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Related Categories: Arms Control and Proliferation; Cybersecurity and Cyberwarfare; Intelligence and Counterintelligence; Missile Defense; Resource Security; SPACE; NASA; China

CHINA FOCUSES ON LASER MITIGATION

While the U.S. continues to invest in directed energy weapons, the Chinese military is taking steps to counter lasers - and making progress. Lasers have a wide array of power levels, and not all are designed to destroy a target. Some focus on blinding and disrupting infrared sensor systems with a sharp glare instead. Chinese military researchers have found that by coating a missile's sensor system with a thin layer of vanadium over a composite of gallium nitride (GaN), an adversary laser would end up heating the shielded sensor, thereby changing it into a metallic state which would in turn deflect 90% of laser light and allowing it to continue functioning despite being targeted. (South China Morning Post, January 12, 2023)

TALKING TO HYPERSONICS

Last year, Chinese researchers postulated that the advent of 6G communication may make it possible to communicate with hypersonic weapon systems (see Defense Technology Monitor no. 74). Back then, the idea was only theoretical – but perhaps not for much longer. A Shanghai research team claims to have developed an antenna that could prove revolutionary in communication with hypersonic missiles. At speeds of up to Mach 20, hypersonics experience temperatures of over 3,500 degrees Fahrenheit, particularly at the front of the missile, which generates hot plasma that blacks out communication. However, the breakthrough in antenna technology leverages rear missile positioning, with a metamaterial shielding the antenna and allowing for low frequency transmission. This will theoretically improve the ability for the sender to maintain continuous communication with deployed hypersonic missiles. (South China Morning Post, January 18, 2023)

THE END OF ENCRYPTION?

As quantum technology begins to alter the nature of warfare, risks to the civilian world will increase as well, as everyday encryption methods come under fire. A group of Chinese scientists recently published a working paper claiming that employing classical and quantum computing methods in conjunction with a current quantum computer could break RSA encryption — a method of security leveraged by banks, militaries, and communications app makers all over the world. "It's enormously important that some people in the West come to some real conclusions on this because if it's true, it's pretty disastrous," says Lawrence Gasman, founder and president of Inside Quantum Technology. The paper is currently under peer review, but the authors claim that this breakthrough could "pave the way to factor large integers of realistic cryptographic significance" via quantum computing. If they are correct, the clock seems to be ticking for public and private industries alike with regard to the security of their data. (Defense One, January 20, 2023)

THE PROBLEMS WITH PLANETARY DEFENSE

While the odds of a major asteroid hitting Earth may not be significant, they aren't negligible either. Just ask the dinosaurs. To avoid a future cataclysm, NASA recently used its DART mission to physically impact an asteroid and change its trajectory. However, a new study in the Proceedings of the National Academy of Sciences suggests that planetary defense from large asteroids may be more complicated than previously thought. While studying the asteroid Itokawa, researchers from Curtin University realized that "unlike monolithic asteroids, Itokawa is not a single lump of rock, but belongs to the rubble pile family, which means it's entirely made of loose boulders and rocks, with almost half of it being empty space." The "shock-absorbent nature of rubble pile material" poses new challenges to deflect incoming asteroids of similar composition. But the problem is not necessarily insurmountable. According to experts, "if an asteroid is detected too late for a kinetic push, we can then potentially use a more aggressive approach like using the shockwave of a close-by nuclear blast to push a rubble pile asteroid off course without destroying it." (CNet, January 23, 2023)

A REUSABLE INTERCEPTOR FOR HYPERSONICS?

As the hypersonic arms race heats up, so does work on defenses against them. Earlier this year, a team of Chinese aerospace engineers announced that they have created a "reusable" air defense system, harnessing unmanned aircraft with air-breathing engine technology that can reportedly travel at speeds greater than Mach 5 and return after destroying a hypersonic target. Using new mathematical methods and algorithms, the team was able to positively adjust the launch and flight controls, and the system is now ostensibly capable of flying close to an incoming target and then utilizing a kinetic weapon to destroy it. (Interesting Engineering, January 29, 2023)

