



DEFENSE TECHNOLOGY MONITOR

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Related Categories: Economic Sanctions; Energy Security; Military Innovation; Science and Technology; Warfare; SPACE; China; United Kingdom ; Wales; United States

INVESTING IN NEW NUCLEAR FUEL

In an attempt to create new and sustainable fuel sources, researchers at Bangor University have developed a novel nuclear fuel source intended to sustain next-generation space exploration. The researchers are hopeful that the new nuclear fuel cell technology, known as Trisofuel, can support habitation on the moon and power future space travel. Engineered to be paired with the Rolls-Royce micro nuclear power generator, Trisofuel is designed to power both spacecraft and vehicles. Outside of space exploration, the fuel source is believed to be capable of applications such as disaster relief and mitigation, or be used to power forward operating bases in conflict zones. (*Interesting Engineering*, September 6, 2023)

NOW IS THE TIME FOR QUANTUM CLOCKS

One need look no further than the war in Ukraine to understand that electronic warfare (EW) represents a major factor in modern conflict. In order to exploit its potential, the United States has sought to advance research in quantum clock development. Quantum clocks hold immense strategic potential for military applications, particularly for navigation and guiding precision munitions. Compared to traditional systems, such as atomic clocks, they are significantly more accurate by several orders of magnitude and remove reliance on the Global Positioning System (GPS), which holds security challenges for the United States. However, to be effective and used in military applications, quantum devices in the lab need to be designed and packaged in a more compact and survivable form. (*Breaking Defense*, September 12, 2023)

CIRCUMVENTING SEMICONDUCTOR SANCTIONS

In the global semiconductor race, China is finding ways to weather a growing raft of international restrictions via indigenous suppliers, and making progress on new technologies. For instance, while U.S. sanctions can complicate work for the Chinese defense industrial complex, researchers are nonetheless advancing in the development of new high-powered radar systems. According to senior engineers at the China Electronics Technology Group (CETC), existing semiconductor technology "cannot meet the demand of new, ultra-high-power microwave systems due to their relatively low power density," a situation that has forced them to innovate. Utilizing a new combination of gallium nitride and aluminum in combination with a redesigned chip, Chinese researchers have now engineered a chip to help power their novel advanced radar system — which is capable of identifying targets at distances of approximately 2,800 miles away. Notably, this development circumvented strict American sanctions that sought to prevent China from accessing the technology for military use. (*South China Morning Post*, September 13, 2023)

IS AUGMENTED REALITY BACK ON TRACK?

For years, the U.S. military has envisioned integrating high-technology headsets into its combat forces in order to boost warfighter effectiveness. To that end, the United States Army recently awarded a renewed contract to tech giant Microsoft to advance mixed-use virtual reality goggles. The Integrated Visual Augmentation System is designed to augment and improve the operating efficiency of military personnel operating in combat zones. Previous iterations of the technology have largely failed to meet the needs of the Army and resulted in negative physical symptoms for its operators. Recent alterations in the system, however, are believed to alleviate these concerns. Nevertheless, significant steps are still needed before the technology becomes field operable — something the U.S. military hopes will happen by 2025. To this end, the Pentagon is currently planning to spend roughly \$21.9 billion on the project. (*The Verge*, September 13, 2023)

DRIFTING TOWARD REAL-WORLD TRACTOR BEAMS

In science fiction, "tractor beams" are often used by a spaceship to gain control over an adversary craft and pull it, with the target ship powerless to do anything. While that scenario is still fictional, science has taken a small step in this direction. Chinese researchers have developed what they are calling a "force gun," which uses magnetic plasma rings to alter the movement of objects from as far as a kilometer away. If the technology becomes viable, it will hold tremendous potential, allowing space-faring nations to remove space debris and avoid collisions. The converse, however, is also true, and the technology could be harnessed to, for instance, generate intentional satellite collisions. For the moment, though, the concept is still theoretical, as no prototype has yet been developed. (*The DeBrief*, September 14, 2023)

