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The Laser Future of U.S. Missile Defense

Russia and China recognize the low-cost efficiency of lasers. Does the Pentagon?

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For 20 years, from the first Gulf War to the recent bombardment of Libya, the U.S. military has had few difficulties deploying and supplying its forces. Rivals and would-be enemies—from China to Hezbollah—have taken note, and they're moving to acquire long-range, precision-guided weapons that would threaten our forces by creating mass "kill zones" around airfields, ports and supply depots. This threat is far more formidable than the roadside bombs encountered by our forces in Afghanistan and Iraq.

The Pentagon is aware of this threat, but its approach to addressing it is old-fashioned and expensive. Despite looming budget cuts, it continues emphasizing multimillion-dollar interceptors to shoot down missiles and rockets that enemies can field at a small fraction of that cost. This places our military at the wrong end of a cost competition that our enemies will be only too happy to continue.

There are ways for the U.S. military to defend itself more effectively from such attacks while imposing costs on our enemies. Part of the solution is to attack enemies' rocket and missile launchers on the ground, destroying their weapons before they can be used. Yet such "suppression" attacks require finding and destroying highly mobile missile launchers, artillery and mortar units, which is a difficult challenge.

A better, complementary approach would exploit technologies that can dramatically reduce the cost of this work—specifically, a new generation of high-power lasers.

Previous high-power laser weapon prototypes had insufficient power, were too bulky, or both. The recently cancelled Airborne Laser, a chemical laser carried on a Boeing 747 aircraft modified for military use, is but the most recent example of a laser weapon that failed to realize its promise.

Yet like submarines and torpedoes—which for decades in the late 19th century were considered little more than interesting toys, only to quickly emerge as powerful weapons in World War I—lasers may finally be coming into their own.

Recent dramatic advances in solid-state laser technology (meaning lasers that create a lethal beam of light using solids or fibers, not liquids or gases) have yielded impressive power levels at a very low cost-per-shot, especially when compared to traditional missile interceptors that can cost over \$10 million each. Experts in the U.S. Navy state that within six years, using technologies already developed and demonstrated in test firings, they could field solid-state lasers on warships with sufficient power to counter anti-ship cruise missiles, unmanned aircraft, and fast-attack "swarm" craft like those of Iran. These lasers could reduce the need for warships to carry bulky—and expensive—defensive munitions, while freeing space for other weaponry.

Like solid-state lasers, new chemical lasers can generate much greater power outputs than their predecessors, enabling them to engage a wide range of air and missile threats, including long-range ballistic missiles. Also within six years, and using technologies developed for the Airborne

Laser, the Air Force and the Army could field ground-based, megawatt-class chemical lasers to help protect key bases in the Persian Gulf and Western Pacific.

To be sure, laser weapons have limitations. Bad weather reduces their effectiveness (as it does many other weapons), and killing very hard targets such as ballistic missile warheads will require multiple megawatts of laser power. But combined with suppression attacks and traditional defenses, high-power lasers could provide a major boost to our military's defenses and at a reduced cost, while also complicating an enemy's planning.

Other states—especially Russia and China—see the game-changing potential of these weapons and are investing aggressively in them. Yet the Pentagon plans to cut research funding in this area, even though it currently invests a little over \$500 million in it annually, compared to well over \$10 billion in traditional air and missile defenses. This imbalance is particularly worrisome considering the need to impose costs on our competitors while reducing our own costs.

The Defense Department has said that it is serious about retaining its technological edge, declaring in its new strategic guidance the "imperative to sustain key streams of innovation that may provide significant long-term payoffs." Unfortunately, absent a push from Secretary of Defense Leon Panetta or from Congress, it appears unlikely that high-power lasers will make the jump from the laboratory to the field anytime soon. If not, as in Afghanistan and Iraq, American forces will find themselves again reacting to a threat rather than anticipating it.

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