

2006

## Review Essay—Technologies That May Yet Revolutionize Warfare Future Wars Will Be Fought

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### Recommended Citation

Martel, William C. and Beason, Doug (2006) "Review Essay—Technologies That May Yet Revolutionize Warfare  
Future Wars Will Be Fought," *Naval War College Review*: Vol. 59 : No. 4 , Article 11.  
Available at: <https://digital-commons.usnwc.edu/nwc-review/vol59/iss4/11>

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## REVIEW ESSAYS

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### TECHNOLOGIES THAT MAY YET REVOLUTIONIZE WARFARE

*William C. Martel*

Beason, Doug. *The E-Bomb: How America's New Directed Energy Weapons Will Change the Way Future Wars Will Be Fought*. Cambridge, Mass.: Da Capo, 2005. 256pp. \$26

This work examines the development of directed-energy technologies and their implications for future warfare. From the principle that the “first DE [directed energy] weapons [will] . . . be more revolutionary than the longbow, machine

gun, stealth airplane, cruise missile, nuclear submarine, or nuclear bomb,” Beason argues that directed-energy weapons represent the next development in the “revolution in military affairs.” His thesis is that directed energy represents “a completely new way of thinking, a new way of employing both strategic and non-lethal force, and interacting in the international community.” If his analysis is correct, the age of kinetic weapons (which destroy targets by explosions or impacts) will be transcended by weapons based on lasers and microwaves.

This book reviews the origins of directed-energy weapons and how these weapons may alter warfare. The observation that directed-energy technologies and weapons are revolutionary is not new. The military services have been developing these technologies for decades. In fact, the U.S. Air Force and the Defense Advanced Research Projects Agency (DARPA) have invested billions of dollars in directed-energy

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*Naval War College Review, Autumn 2006, Vol. 59, No. 4*

technologies. Since their invention in the early 1960s, lasers have been heralded as the preeminent technological advance in military capabilities, but the laser (often described as a “solution in search of a problem”) has only recently begun to match these expectations. In examining the development of directed-energy technologies and weapons, Beason pays particular attention to technical and engineering difficulties that complicate the task of translating energy into effective and practical weapons.

Perhaps the most significant aspect of *The E-Bomb* is its detailed analysis of the history of the development of directed-energy technologies. We should expect nothing less from Beason, whose work in the trenches of directed energy has given him firsthand knowledge of those who struggled to make it a reality. This history alone makes this book worthwhile.

In contemporary terms, Beason argues convincingly that recent strides have made it possible for policy makers to believe that significant advances in military capabilities are truly on the immediate horizon. Perhaps the best and most visible example is the Airborne Laser (ABL), which is being developed by the Missile Defense Agency and the U.S. Air Force. Despite significant technical and engineering difficulties, the concept of using a laser on a 747 aircraft to destroy ballistic missiles will soon become an operational reality. At the other end of the spectrum, advances in microwave technology have put within reach the possibility of nonlethal weapons that disable, but do not harm, people.

Although *E-Bomb* offers the reader the basis for understanding the technological and operational forces that will determine whether directed-energy technologies will change U.S. defense capabilities, the book is plagued by several weaknesses that diminish its overall value. First, the author shows a none-too-subtle enthusiasm for the merits of directed energy. As one would expect, Beason has unmitigated, sometimes even contagious, zeal for these technologies. Despite cautionary notes about significant technical and engineering problems to be overcome and a chapter on “The Problem with Directed Energy,” with its extensive discussions of the challenges in using directed energy for military purposes, Beason’s unabashed advocacy weakens the analysis. Having said that, there is still a balanced feel to these discussions; the reader is left with the sense that directed-energy technologies may yet revolutionize warfare—which is essentially the same conclusion, with notable amendments, that we would have drawn a decade or two ago.

Second, the book is characterized by uneven discussions that shift between analyses of directed-energy issues using scientific language and casual discussions often bordering on the mundane. They range from “If the new photon is emitted in the same direction and has the same phase as the incoming photon, this is known as coherent emission,” to references to “Disco Duck,” “megapecking

order,” “our government—you know, the one you pay taxes to support,” “The summer of love: 1969,” and “blowing the enemy to hell.” I could go on. None of this language belongs in a serious work, and its presence raises unsettling questions about editorial control. My suspicion is that Beason was trying to make a work written primarily for members of the defense community more accessible to lay readers. Third, the book’s credibility and persuasiveness are weakened by what could best be thought of as numerous cases of editorial sloppiness: “foyer” rather than “foray”; using the acronym “ATCD” for “advanced concept technology demonstrator” along with the correct one, “ACTD,” twice in the same paragraph; citing the Air Force “science advisory board” rather than the correct “Scientific Advisory Board.”

By what standard should we judge this book? *E-Bomb* is a useful work, one that contributes to the literature on the relationship between advanced technologies and defense. It provides new and useful background and insights into an arcane area of technology that could have a decisive influence on the future of warfare. In the end, it will help policy makers evaluate directed energy in terms of the limitations and costs of making decisions to invest scarce resources in defense. My only wish is that the author had kept a tighter rein on editorial comments, and on his enthusiasm for directed-energy technology, and avoided the unevenness associated with the shifting back and forth between scientific language and casual discussions—all of these detract from the work. My recommendation, however, is that the reader overlook these shortcomings and focus instead on the fact that this book is a valuable aid in understanding the development of the next set of technologies that *could* revolutionize military operations.