LETTERS

Physics and National Security: Of Missiles, Mines, and Morality

I was surprised that in their otherwise excellent article "The Continuing Debate on National Missile Defenses" Lisbeth Gronlund, George N. Lewis, and David C. Wright (PHYSICS TODAY, December 2000, page 36) did not mention one of the more serious problems associated with the NMD system as currently envisaged: The ground-based interceptor (GBI) rockets it will use are about the size of the proposed small intercontinental ballistic missile of the 1980s and will have similar launch signatures and flight characteristics. Since the NMD firing doctrine will require multiple (probably two to four) GBI launches per credible target—that is, disguised warheads and decoys—even a small rogue-country attack against the US could involve the salvo firing of dozens of GBIs. Add to this a possible attack from the Middle East that might necessitate firing the interceptors on a course toward western Russia (especially if the interceptors were based in North Dakota), and one begins to worry about the capability of Russia's decaying missile warning system to make a timely and correct assessment of the situation.

If the US proceeds with NMD, it should consider measures to lessen the chances that Russia, detecting what could seem to be a US surprise attack, would launch its missiles in defense. Sharing early-warning data, as is now being discussed, would be a good start, but providing Russia with an ability to monitor NMD communications channels and the right to inspect GBIs should also be considered.

ALLEN B. THOMSON
(thomsona@flash.net)
Harlingen, Texas

Letters submitted for publication should be sent to Letters, PHYSICS TODAY, American Center for Physics, One Physics Ellipse, College Park, MD 20740-3842 or by e-mail to ptletter@aip.org (using your surname as "Subject"). Please include your affiliation, mailing address, and daytime phone number. We reserve the right to edit letters.

GRONLUND, LEWIS, AND WRIGHT REPLY: We have not investigated the extent to which Russia might mistake a launch of national missile defense (NMD) interceptors for that of offensive US missiles, but this is not an idle concern: In 1995, a scientific research rocket fired from Norway was detected by Russia's early warning system and triggered a false alarm that traveled all the way up the chain of command to President Boris Yeltsin. Moreover, as Allen Thomson notes, Russia's early warning system is deteriorating.

But there is a more fundamental way in which the US deployment of an NMD system could increase the risk of Russia's launching its nuclear armed missiles in response to a mistaken warning of an incoming US attack.

The US and Russia both maintain large numbers of nuclear-tipped missiles that can be launched within minutes. Such a launch-on-warning posture is risky at best, but Russia's deteriorating warning system exacerbates the dangers. Because a mistaken attack from Russia is one of the greatest nuclear dangers to the US, our government should be doing everything in its power to encourage Russia to reduce its launch-on-warning capability. Yet, US deployment of a missile defense that Russia believes might be able to intercept a significant fraction of its survivable missiles will instead serve as an incentive for Russia to maintain this dangerous capability.

This linkage between US missile defenses and Russian launch-on-warning policy was demonstrated clearly in leaked US State Department documents used in the January 2000 US–Russia negotiations to modify the Anti-Ballistic Missile Treaty to permit deployment of the planned NMD system.[1] State Department officials argued that the system would not threaten Russia's deterrent as long as Russia continued to deploy 1000 or more nuclear warheads and maintained the ability to launch promptly on warning of a US attack.

Reference

1. The US State Department document *The ABM Treaty "Talking Points": Russia's Concerns* is on the Web site of *The Bulletin of the Atomic Scientists* at http://www.thebulletin.org/issues/2000/mj00/treaty_doc.html#ANCHOR3.

LISBETH GRONLUND
(lgronlund@ucsusa.org)
DAVID C. WRIGHT
(dwright@ucsusa.org)
Union of Concerned Scientists
Cambridge, Massachusetts
GEORGE N. LEWIS
(gnlewis@mit.edu)
Massachusetts Institute of Technology
Cambridge, Massachusetts

In the article on the evolving battlefield by John S. Foster and Larry D. Welch (PHYSICS TODAY, December 2000, page 31), I was pleased to see mention of landmine detection using nuclear quadrupole resonance (QR) spectroscopy,[1] a technology that shows great promise. In four DARPA-sponsored blind field tests conducted last year, including one in Bosnia, QR-based systems detected and located all of the mines with no false alarms.

Those demonstrations represent a significant increase in performance over systems in current use. The main difficulty in landmine detection has been the high rate of false alarms, not detection sensitivity per se. Current systems yield a great many false alarms for every mine detected, which leads to wasted time digging up metal debris or even rocks. Time thus spent increases stress fatigue, mistakes, and potential exposure to hostile forces. The compound specificity of QR, mentioned in passing by Foster and Welch, means QR detects only bulk explosives and, thus, only true hazards.

QR technology is also being used to scan luggage, mail, and parcels for the presence of explosives; combined with other drug scanning methods, it is also capable of detecting cocaine and heroin in their various forms.

While I agree with Foster and Welch that "efficient, reliable, and affordable approaches" are required to meet the challenges, I must point out that QR detection systems are