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EDITOR'S NOTE

The four articles in this issue of the journal invite the reader to think about four quite different kinds of threat: a nuclear exchange between two nuclear weapon states, nuclear proliferation, the smuggling of a nuclear device into a country, and the Earth impact of a large asteroid.

The first article in this issue, by Li Bin, analyzes in great detail the plausible future survivability of Chinese mobile missiles in the face of likely U.S. efforts over the next decade to develop space-based radars to track these missiles. Li Bin argues that an array of tactics is available to China to ensure that the United States could not have high confidence in such tracking. Most important would be for China to move the missiles in peacetime periodically—not to wait to do so until there is a crisis. The author points to the great importance in any crisis, say in the Taiwan straits, of the United States and China both being clear on the limits of their nuclear arsenals—that the United States cannot be certain that it could mount an effective first strike and that China cannot count on its nuclear missiles deterring all U.S. actions.

The second article, by Babur Habib, explores an issue that is likely to become increasingly important, especially if civilian nuclear power grows substantially—whether measures can be developed to discover clandestine uranium centrifuge facilities. As is well understood, centrifuges have a very light footprint, using little electricity and taking up little space. The article here develops a model to examine the possibility of detecting the electromagnetic signal generated by the motors that spin the centrifuge rotors. Such detection does not look promising. Although the author shows that the signal from an unshielded centrifuge might be detectable at a distance of up to 2 to 3 kilometers, even very light shielding, for example by a relatively thin layer of aluminum, would reduce the range of detection to a few hundreds of meters.

Last year in the journal, Jonathan Katz showed that neutron detectors affixed to the outsides of a container could detect an *unshielded* plutonium sphere when the neutron output from the source is integrated over the duration of an ocean voyage.[1] However, it would not be difficult to shield the plutonium source by surrounding it with neutron-absorbing material. In the article in this issue, Katz, along with co-authors G. S. Blanpied, K. N. Borozdin, and C. Morris, examine the potential of active radiography in detecting a container-delivered plutonium weapon. In this case, active interrogation of containers by energetic X-rays looks promising and a more difficult strategy to defeat through shielding. Both articles, as noted, are concerned with detection of a plutonium weapon. Detection of a uranium weapon would be far more difficult.

In a journal article in 2005, David Morrison described the Earth crossing asteroid impact hazard and the current efforts to map the sky to identify such asteroids decades or more before their projected impact.[2] The final article in this issue, by Jesse Koenig and Christopher Chyba, analyzes the possibilities of deflecting an asteroid on an Earth-striking trajectory once it is discovered. In the past, scientists have often assumed that nuclear explosions or some fanciful new technologies would have to be used for such deflection. One striking result of the analysis here is that the deflections could be done effectively through simple kinetic energy impact. Even a one kilometer–diameter asteroid could be diverted from an Earth collision by 5 to 10 kinetic impacts with a 20 year lead-time, or by 1 to 2 such impacts if the lead-time were 100 years.

NOTES AND REFERENCES

1. J. I. Katz, "Detection of Neutron Sources in Cargo Containers," *Science & Global Security,* 14(2–3) (2006), 145–149.
2. D. Morrison, "Defending the Earth Against Asteroids: The Case for a Global Response," *Science & Global Security* 13(1–2) (2005), 87–104.