Mini-Nukes. Researching the weapons of the future: ‘micro-fusion’ weapons

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Advances in nanotechnology, genetics and nuclear isomers are permitting the production of a new generation of weapons intended to maintain future US military superiority and deter ‘rogue states’ and terrorists.

Forced to consider how to deter threats to its security from ‘rogue states’, terrorist organisations and other groups undeterred by its massive nuclear stockpile, the US is now considering the development of a new generation of weapons.

Most notably, the Bush administration is in the process of trying to develop a new generation of ‘low-yield’ nuclear weapons with yields at or below five kilotons. Development of these weapons would give the US the means to destroy hardened bunkers containing ‘high value targets’ and possibly chemical and biological weapons.

But what lies beyond the ‘mini-nuke’? What kind of arsenals will the US have in the next five to 25 years? An array of futuristic-sounding weapons is moving beyond the imaginations of scientists and military officials into the arena of government and commercial research laboratories. The consequences of the uses of these weapons are yet to be examined fully.

Nanotechnology (NT), the science of designing microscopic structures in which materials are machined and controlled atom by atom, has the potential to produce further miniaturisation of weapons. The ability to build large, complex devices to atomic precision using molecular machine systems was first recognised by US physicist Richard Feynman more than 40 years ago. Assembler-based NT has implications far beyond the Pentagon’s current vision of a ‘revolution in military affairs’, although its applications to advanced weaponry are certainly fertile ground for fantasy. Proponents of ‘micro-fusion’ nuclear weapons insist that they are the only types of warheads capable of retaining relatively high yields of energy through the process of miniaturisation.

The impetus for creating these systems arose from the need to develop extremely rugged and safe arming and triggering mechanisms for smaller nuclear weapons such as atomic artillery shells. In such warheads, the nuclear explosive and its trigger undergo extreme acceleration upon their use. This forced weapons designers to make the trigger’s crucial components as small as possible, for smaller electromechanical systems are more enduring and resistant to exogenous stresses. Controlled microexplosions could be used in weapons if suitable compact triggers were developed.

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