

# Keeping comets and asteroids at bay

August 1, 2012



Every two years, experts from around the globe convene at the Planetary Defense Conference to discuss possible strategies should a major asteroid or a comet appear to be on a collision course with the Earth. Bob Weaver, with the Lab's Thermonuclear Applications Physics Group, plans to participate in 2013, as he has in past years. He's previously modeled possible tsunami scenarios if there is an impact in the ocean, and these days he spends some of his time working on how a nuclear explosion could be used to divert or destroy these bodies if they appear to be an imminent threat to us.

A nuclear option might be considered if the object could reach us in less than a year. On the other hand, if a comet or asteroid were spotted a decade or more away, many more diversion options would be available. That's because the farther away the object is, the less force it would take to divert it from our path.

There are two main reasons that scientists are unsure when there could be a threat. First is the sheer number of bodies out in space (more than 4,000 comets alone have been identified, and there are hundreds of thousands of asteroids). Second, huge orbits mean they come by us so seldom (like once every 100,000 years) that we haven't had a

chance to figure out exactly how they move. Should intervention be necessary, Weaver has looked at scenarios where nuclear explosions could be used to deal with asteroids and comets.

**Asteroids:** Due to inferences based on their orbital behavior, asteroids are thought to be collections of rocks that have amassed due to their the gravitational pull. Some of the smallest ones are the size of a house, and it is believed that they frequently collide with each other, breaking up and reforming countless times.

**Comets:** They can be basically thought of as snowballs with rocks in them since their exteriors are often icy and their interiors are hard. While asteroids can cause damage (and can also have solid cores), comets are of more concern due to their greater mass, faster speeds, and larger distribution in space than asteroids.

There are several different ways to employ nuclear explosions against these threats, depending on the characteristics of the objects involved. These could range from exploding a payload beneath the object's surface to a near-surface explosion that could "nudge" it into a different trajectory.

Contrary to what some believe, such an intervention would be designed to move any resulting debris far enough away from the earth that it would no longer be a threat, and would even preclude an asteroid-like reformation.

For more information on the International Academy of Astronautics and its upcoming conference on "Gathering for Impact" in 2013, go to <http://www.iaaweb.org/>.

**Los Alamos National Laboratory**

**[www.lanl.gov](http://www.lanl.gov)**

**(505) 667-7000**

**Los Alamos, NM**

Operated by Los Alamos National Security, LLC for the Department of Energy's NNSA

