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Wednesday April 11 2:04 PM ET

New Method to Predict Plutonium Stability

LONDON (Reuters) - In a finding that could lead to safer handling and storage of nuclear weapons, scientists in the United States said Wednesday they have devised a new method to predict the physical properties of plutonium.

Scientists at Rutgers University in New Jersey used analytical and computer calculations to predict changes in the structure of the solid states of plutonium from a dense, unstable phase to a safer state.

With stockpiles of plutonium-based weapons stored around the world, effectively predicting stability changes is of international importance.

In a report in the science journal Nature, Kotliar and his colleagues Sergej Savrasov and Elihu Abrahams describe their new technique, the first in 30 years, which is a potential landmark achievement in solid-state physics.

"While the search for answers about plutonium phases generally has been through experimental methods, we employed analytical and computer calculations to predict changes in the structure of the solid states of plutonium," Kotliar explained.

The scientists used a U.S. Department of Energy ([news](#) - [web sites](#)) supercomputer and a grid of 80 computer processors to predict the volume and stability changes between the different phases of the element.

"We are dealing with an extremely delicate balance between the two phases, and which one wins and when this happens is information that is necessary to assure the safe storage of this important material," Kotliar added.

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Plutonium, an artificial element that was made for the first time in 1940, is one of the most mysterious, toxic and dangerous substances known. It is dangerous to handle, difficult to store and impossible to dispose of.

The silvery-white radioactive element occurs only rarely in nature and is produced synthetically from uranium. Plutonium has a half-life of 24,000 years, which means it loses only half its radioactivity over that period.

Traces of plutonium in depleted uranium (DU) weapons used by NATO ([news](#) - [web sites](#))-led forces in the Balkans have aroused fears that the armor-piercing weapons could pose a health risk but defense experts have played down any potential dangers.

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