

# Energy Secy advances nano science in spare time

July 7 2010, By SETH BORENSTEIN , AP Science Writer

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(AP) -- Some people relax by doing crossword puzzles, watching movies or reading a good book. In his down time, often while flying somewhere, Energy Secretary Steven Chu relaxes by tackling a scientific conundrum and stretching the limits of technology.

The result: Chu has a dense research paper being published online Wednesday in the prestigious scientific journal *Nature*. The title: "Subnanometre single-molecule localization registration and distance measurements."

It's all about seeing the small stuff. The really, really small stuff.

Chu's scientific colleagues call his study a major advancement in how tiny an object optical microscopes can see. Instead of objects measuring 10 [nanometers](#) - thought to be the about the smallest scientists could see using such microscopes - Chu came up with a system using existing technology to see objects, such as molecules and parts of cells, as small as half a nanometer. Half a nanometer is the distance separating molecules. The thickness of a human hair is between 50,000 and 100,000 nanometers.

This will allow scientists to see what's going on at the smallest scale in biology. Chu said electron microscopes can see this small, but they require techniques that aren't as useful for tissue, like [cancer cells](#). So Chu's method improves the precision of the more versatile [optical microscope](#).

This is Chu's second such meaty scientific paper in recent months, both published in the [journal Nature](#). The first, published in February, was following Albert Einstein's general relativity theory and better measuring how gravity slows time. Both were published while he has been [energy secretary](#), but started long before he took the job in January 2009. A third study is in the pipeline, Chu said.

None of this is the sort of thing Cabinet secretaries usually read, let alone write. For the Nobel Prize-winning physicist, it's how he takes a break from the problems of a devastating oil spill, global warming and high gas prices.

"I just consider it my equivalent of ... vegging out in front of the TV," he told The Associated Press.

Sitting on the president's Cabinet and doing science is what Chu calls a situation of working "on parallel universes." He said he long ago found that he has the ability to work on a scientific problem, let it go from his conscious mind, and then days or weeks later think about it again and not have to start over or even review it.

"I can think about things so I am not consciously aware I am thinking about them," he explained. Chu and colleagues at Stanford University and University of California at Berkeley had been working on the sub-nanometer paper off-and-on since 2003, long before he joined President Barack Obama's Cabinet.

It's complicated, but Chu's idea involved using two different colored lights, beams of tiny light and a few other techniques to reduce the signal-to-noise ratio in optical microscopes.

The work, published online Wednesday, is being hailed as a big breakthrough by three outside experts in the microscopy field.

"It's tremendously important," said John Fourkas at the University of Maryland. "It's something that in a few years everybody in the single molecule field will use if they are going to be on the cutting edge."

**More information:** Nature: <http://www.nature.com/nature>

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