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## UW nanophotonic lab aims at chips

Miniaturize it

Puget Sound Business Journal (Seattle) - July 6, 2007 by [Eric Engleman](#) Staff Writer

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The University of Washington is expanding its research in nanophotonics, an emerging field of science involving ultra-tiny materials and light that many believe has the potential to revolutionize computing.

The UW is due to start receiving a new five-year, \$20 million grant from the National Science Foundation next month, intended largely for nanophotonics research, said Larry Dalton, the UW scientist heading up the project.



Photo: Matt Hagen  
UW professor Larry Dalton is developing technology that could one day be used in photon-driven computer chips. [View Larger](#)

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The university also is recruiting high-profile nanophotonics scientists. In June it hired Michael Hochberg, a postdoctoral scholar at the California Institute of Technology. To lure Hochberg, who's considered a rising star, the UW pledged to chip in more than \$1 million to help build a new lab facility, Dalton said.

Nanophotonics, the science of manipulating light using nano materials, or objects on the scale of a billionth of a meter, holds great interest for chipmakers like **Intel Corp.** for its potential to vastly increase the processing power of computers. Instead of using electrons traveling through metal wires to transmit data, as standard computer chips do, the new chips would transmit data via photons, or light

particles, that travel at much faster speeds.

Hochberg is a trailblazer in this field. While an undergrad at CalTech, he co-founded a company called Luxtera, which is a pioneer in building silicon chips that use fiber-optic technology.

The UW will use the new National Science Foundation grant money to fund a broad array of nanophotonics research, Dalton said. The UW does not have a nanophotonics center per se. The scientists who do such research are spread across various departments, including engineering, material sciences, chemistry and physics.

The new lab will be devoted to nano materials fabrication, Hochberg's specialty. The lab will feature equipment capable of electron beam lithography, which uses a beam of electrons to carve nano-scale patterns on a computer chip or other surface. The UW will partially fund the lab, and Hochberg will also raise funds for the facility, Dalton said. The lab's location hasn't been decided; it could be placed somewhere outside the UW Seattle campus.

As the UW beefs up its funding and academic muscle in nanophotonics, it's also trying to lay the groundwork for research spinoff companies. To that end, key UW professors have been talking up the field with local business elites.

This spring, Dalton and another UW scientist, Alex Jen, gave a presentation on nanophotonics to the Community Development Roundtable, a group of business and civic leaders that meets weekly in Seattle.

UW staff also convened a group of technology industry veterans to help promote the field. The group includes Rick LeFavre, a venture partner with **OVP Venture Partners**, of Kirkland; technology investor Chris Somogyi; James Rottsalk, former CEO of supercomputer company **Cray Inc.**; and Susannah Malarkey, executive director of the Technology Alliance.

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LeFaivre said nanophotonic computing has been "one of these holy grail things" that until recently was buried in research labs. But he said the field is making some breakthroughs and is moving closer to commercial viability.

"I'm interested in looking at what's over the hill, what are the new emerging spaces. This is another one that's beginning," LeFaivre said.

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"If you can have a photonics-based signals processing chip that's a thousand times faster, that gets very interesting to a lot of people," he said.



Photo: Matt Hagen  
UW professor Larry Dalton is developing technology that could one day be used in photon-driven computer chips.  
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Intel is putting significant resources into nanophotonics. Last year the chip giant, working with researchers at the University of California, Santa Barbara, developed a hybrid silicon chip that emits and guides a laser beam of light. The chip is not yet in commercial production, but Intel has touted its potential to create a "new era" of high-speed computers and data centers.

Dalton said light beams will likely enhance, rather than replace, electronic data

transmission in computer chips of the future.

"Future technologies are moving more and more toward the integrated system. You don't want to get rid of the electronic part, but there are so many things you can do photonically, you want to use the best of both worlds," Dalton said.

The University of Washington's recruitment of Hochberg from Cal Tech is something of a coup. Cal Tech and Cornell are considered to have the leading nanophotonics programs in the country.

Hochberg will join UW's faculty in the fall, though he will retain his position at Cal Tech for another year. He declined to go into the specifics of UW's offer, but called it "absolutely extraordinary." He said the university's new nano materials fabrication lab would be open to outside researchers as well.

The University of Washington has licensed a number of fiber optic technologies to companies over the past several years. **Lumera Corp.**, a publicly traded company based in Bothell, works with technology developed by Dalton at UW.

Another startup called **Advanced Electroluminescent Systems** works with lighting display technologies developed by Alex Jen and other UW scientists.

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