

# New multifunctional chip to meld memory, logic and communications functions

**The Department of Defense has awarded up to \$5 million over five years for a multi-university research initiative led by David D. Awschalom, a professor of physics and of electrical and computer engineering, to develop a chip that can independently process electronic, magnetic, and optical information and convert from any one type to any other type of information.**

Described as a "multifunctional" chip, it would be highly compact and use considerably less power than would a system constructed from several components to perform the same function. Current electronic devices rely on the electron charge to transport and store information, but the new technological approach to be pursued by this collaboration relies on using another property of the electron, called "spin," to store and transport information, and to interface with optics and magnetics.

At UCSB, Awschalom is director of the Center for Spintronics and Quantum Computation. He also serves as associate scientific director of the California NanoSystems Institute (CNSI). The spintronics center that Awschalom heads is affiliated with the CNSI, one of the four California Institutes for Science and Innovation established in 2000 and supported by the state and private industry. The nanosystems institute is a joint project of UC Santa Barbara and UCLA.

Awschalom and his research group have pioneered new experimental techniques that made possible the discovery of long-lived electron spin lifetimes and coherence in semiconductors and nanostructures. They recently demonstrated all-electrical generation and manipulation of both electron and nuclear spins in prototype solid-state devices. This work opens the door to new opportunities for research and technology in the emerging fields of semiconductor spintronics and quantum computation, including the development of fundamentally new systems for high density storage, ultra-fast information processing, and secure communication.

The MURI consortium includes UC Santa Barbara, Cornell University, Pennsylvania State University, The University of Iowa, The University of Minnesota, and The University of Virginia. The program will be monitored by Chagaan Baatar of the Office of Naval Research.

Source: University of California - Santa Barbara

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