

Future of electronics spun on its heels?

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New manifestations of Einstein's theory of special relativity may have practical industrial applications

Electron spins controlled by beams of light could pave the way for the next generation of electronic circuitry powered by magnetic properties of charges, says University of Toronto research.

A paper published in the July issue of *Physical Review Letters* shows how U of T researchers propose a new technique using lasers to harness the quantum mechanical attribute – spin – of particles in solids. The research solves a key obstacle to the new field of spin-based electronics or “spintronics:” how to control the spin of electrons in an energy-efficient way. “Spins of particles interact with magnetic fields like tiny bar magnets,” says Ali Najmaie, the study’s lead author and a graduate student in physics. “The challenge is to produce spin currents by aligning and sorting the motion of electrons according to their spins.”

Najmaie and co-authors, research associate Eugene Sherman and Professor John Sipe, say that a kind of light scattering –where a beam of light interacts with matter and its colour is changed– can be used to sort electrons according to their spins. The technique incorporates elements from Einstein’s theory of special relativity, quantum mechanics and symmetries of nature. “After 100 years, we’re still learning new consequences and manifestations of Einstein’s theory of special relativity,” Sherman says. Someday, cell phones and hard drives may use the spin of electrons in solids and electronics may be replaced with spintronics.

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Source: University of Toronto

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