

CORE-CM SEMINAR
Michigan State University

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Room-temperature electronic spin correlations: towards spin-coherent technologies

Modern high-volume information storage technology relies on room-temperature electronic spin transport through so-called “spin valves”, which can have parallel or antiparallel magnetic domains. In such spintronic devices individual electrons experience different scattering rates depending on whether their spins are parallel or antiparallel to a magnetic domain’s magnetization, but the interaction between current-carrying electrons is negligible. New room-temperature spintronic devices are now emerging that rely on spin correlations between current carriers during transport. These spin-spin interactions render the resistance and electroluminescence of nonmagnetic organic materials very sensitive at room temperature to external magnetic fields as small as a few Gauss, as well as to fringing magnetic fields from nearby small magnets. Spin-spin interactions can produce large effects at room temperature even without the transport of charge carriers. The spin wave transport properties of magnetic insulators can be manipulated with electric fields, yielding room-temperature voltage-controlled phase-shifters for coherent spin wave transport.

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Prof. John McGuire – Host