

Mapping spin-orbit effects in semiconductors

Prof. Vanessa Sih
University of Michigan

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Spin-orbit coupling is a consequence of relativity but can be observed and used at the device scale to electrically initialize and manipulate electron spin polarization. Understanding how to exploit spin-orbit effects in semiconductors may enable the development of new devices with enhanced functionality and performance, such as spin-based devices that combine logic and storage and fast optical switches for information processing. In this talk, I'll describe time- and spatially-resolved measurements of electron spin transport that enable sensitive measurements of the spin-orbit field and its dependence on applied electric fields and mechanical strain. These spin splittings also provide a mechanism for the electrical generation of spin polarization.